Project Supervisors

The following members of staff will be supervising undergraduate Computing projects during 2025-26.

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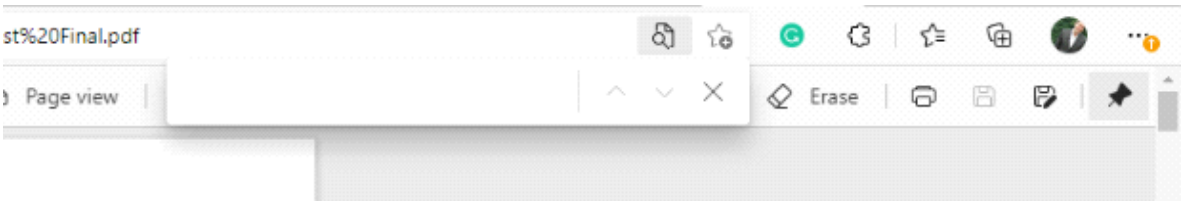
Few Frequently Asked Questions:

- Can I choose a different topic to the one the supervisors are recommending?
    - YES! But try to find the supervisor that closely matches your topic by searching for the keywords on this page. For example, if your topic is Big Data, then search for it and see which supervisors have experience with this topic.
- Can I pick a topic from one supervisor but ask another tutor on this list to supervise me?
    - YES, but ask the other tutor if they like the idea.
- Can I modify the supervisor's idea?
    - YES, but check with the supervisor to make sure they are happy.
- Can two or more students work together on the same idea?

    - NO! You can do the same idea but separately and never share any content. Any evidence of collusion (Sharing) between students working on similar or different ideas is bases for cheating and will results in an investigation and possible suspension from the programme.
- If I select a supervisor, am I guaranteed to have them?
    - NO. I will be collating all the requests for a given supervisor. Where there are more requests than the supervisor's allocation, it will be down to their discretion to select the students they want to supervise based on the topics proposed. After that, and if not selected, I will notify you of the possible available supervisors.
- How can I quickly find a supervisor who is interested in my topic?
    - This is a PDF file. While the file is open, select 'Control then F' a search menu will open as below:



Type a keyword such as: Big Data, Security, A.I, Artificial Intelligence, VR…etc. and it will list these keywords for you.

Aakriti Maharjan

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Areas of Expertise and Interests:

- AI, Machine Learning, Deep learning
- Data preprocessing, feature extraction
- Biomedical Image Analysis
- Signal Processing
- Object Detection and Segmentation

Project Ideas:

- **Project Title: Arrythmia Detection from ECG Signals**

This project aims to develop a deep learning model to detect and classify arrhythmias from ECG signals. This will involve preprocessing data, segmentation of heart-beat signals, and train neural network models such as CNN, CNN-LSTM.

- **Project Title: Seizure detection using EEG Signals**

The goal of this project is to detect epileptic seizures from EEG data using machine learning and deep learning models. It involves preprocess EEG signals, extract relevant features, and train CNN-based models for binary classification. Key outcomes include high sensitivity, early seizure detection, and robust performance on real-world EEG data.

- **Project Title: Automated Feature Extraction from Time-Series Biomedical Signals**
  This project develops a hybrid system to extract features from biomedical signals like EEG and ECG using both classical (FFT, wavelets) and deep learning (1D CNN) techniques, benchmarking traditional machine learning models against deep and hybrid approaches. The goal is to identify efficient and interpretable feature pipelines for time-series biomedical signal classification.

- **Project Title: Real-Time Medical Speech Translation Chatbot**
  This project aims to develop a real-time chatbot that listens to doctor-patient conversations, transcribes speech, and translates it into the patient's preferred language. It leverages speech recognition, language translation, and medical terminology processing to bridge communication

gaps in healthcare settings. The goal is to improve patient understanding and accessibility in multilingual environments.

- **Project Title: Personal Finance Tracker**
  Develop a web or mobile app that allows users to log expenses, categorize spending, and visualize financial trends over time. This project teaches key skills in user authentication, data management, and creating interactive charts.

Abdul Qadoos
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Areas of Expertise and Interest:

- Artificial Intelligence & Machine Learning.
- Deep Learning.
- Finance and Technology (FinTech).
- Sentiment Analysis.
- Natural Language Processing.
- Survey Data analysis.
- Web Development.

Project Ideas

Project Title: AI-Powered Chatbot for Disease Information and Assistance.

Project Description:
A chatbot powered by artificial intelligence (AI) will be developed to provide users with health information and advice. In response to user questions, the chatbot will assist accurately and timely about symptoms, prevention methods, treatment options, and general advice. Chatbots use Natural Language Processing (NLP) to understand user inquiries and respond accordingly.

Project Title: Stock Price Prediction using Neural Network Models.

Project Description:
Build a predictive model based on neural networks for predicting stock prices. Variety of factors (complexity, volatility) that influence stock prices, making it difficult to predict prices accurately. Using neural network models, particularly RNN based algorithms, this project attempts to predict future stock market prices based on historical financial market data. The purpose of this project is to build and train a neural network model that analyse historical stock price data, identifies patterns, and trends, and provides accurate predictions for future stock prices.

Project Title: Fraudulent Transection Detection using Machine Learning.

Project Description:
Develop a model that detects fraudulent transactions in financial datasets using machine learning. This project aims to create a robust model that analyse transaction data, detects fraud patterns, and flags suspicious transactions accurately and evaluate model's performance. This system can reduce fraud incidence, improve fraud detection capabilities, and protect both assets and customers from fraud.

Project Title: Product Review Sentiment Analysis using Natural Language Processing.

Project Description:
Using Natural Language Processing (NLP) techniques, develop an e-commerce sentiment analysis system that analyses customer reviews. On e-commerce platforms such as Amazon, eBay, and Walmart, customer-generated reviews are valuable. A model will be developed to categorise customer reviews as positive, negative, or neutral. Customers and businesses can benefit from this sentiment classification, enabling them to make informed purchasing decisions and improving their product offerings and customer services.

Project Title: Development of a Job Portal with Personalized Job Recommendations Based on user Profiles.

Project Description:
A job portal platform can be designed and developed that will allow users to post jobs, apply for jobs, and receive personalised job recommendations. Project aim to provide a comprehensive platform to users for searching and recommending jobs. Machine learning algorithms will be employed to help users find jobs that match their qualifications, experience, and preferences through personalized job suggestions.

Dr Abdulrazaq Abba
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Areas of Expertise and Interest:

- Software engineering
- Cybersecurity
- Data science
- Intelligent systems
- e-Health/Healthcare Systems
- Robotics and Serious Games
- Technology-Enhanced Learning

Project Ideas

Project Title: Knowledge Extraction
Project Description:
Extracting useful information (pattern) from raw data (databases) to knowledge. This can be done by applying effective techniques for extracting information. The project will have a lot of work: finding a suitable data set, understanding the data, data mining, data modelling, developing an interface using a selected visualization technique. There are lots of platforms that can help in conducting and running the project, such as MATLAB, Spark, Hadoop, Microsoft Power BI, and so on.

Project Title: Mobile app for sharing and discovering food recipes
Project Description:
Study existing recipes in the literature and come up with an efficient way of organising the recipes to make them easy to share in a mobile/web app, in a way that will also initiate or spark discussion between like-minded people.

Project Title: Analysing Healthcare Models
Project Description:
Healthcare is an integral part of societies. Various businesses have proposed various models for healthcare systems. This project will study the existing healthcare systems and recommend/select a suitable model for developing web/mobile app for comparing healthcare services.

Project Title: Mental Wealth/Health
Project Description:
Study existing literature/models/approaches for enriching mental wealth/health and

develop a good prototype web/mobile app to make it accessible to the public. Examples are BlueIce app (https://www.oxfordhealth.nhs.uk/blueice), Chill Panda app (https://www.nhs.uk/apps-library/chill-panda), Cove app (https://www.nhs.uk/apps-library/cove). The project will develop a working prototype of the proposed model and provide a fair assessment in comparison with the existing models/apps, including ethical and social concerns.

Project Title: Technology for Enhancing Learning

Project Description:

Study the existing tools/apps for teaching STEM subjects and propose a suitable model for engaging students in teaching one of the STEM subjects. The project will develop a working prototype of the proposed model and provide a fair assessment in comparison with the existing models/apps, including ethical and social concerns.

Prof. Dr. Md Atiqur Rahman Ahad
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http://ahadvisionlab.com

Areas of Expertise and Interest:

- Artificial Intelligence, Generative AI
- Vision, Image Processing, IoT Sensors
- Antimicrobial Resistance (AMR)
- Focusing on: Healthcare in Parkinson's Disease, Mental health/stress, Rehabilitation/Stroke, Elderly, Autism
- Technologies for Unreached People

Project Ideas:

ONLY based on the following topics, I can work. You are welcome to discuss and propose a theme based on the following projects ONLY. Visit http://ahadvisionlab.com to know about the recent works.

Requirement:

- Good programming language (**python,** or C/C++/Java)
- The mentality to enjoy a task with sincere efforts
- MUST meet at least once/week in-person, and MUST report the progress of the work by every Friday night. **Welcome for ONLY committed and sincere minds.**
- If you are not committed, be committed then 😊

1. Project Title: **Antimicrobial Resistance Mechanism – based on Micro-imaging on Bacteria**

***Need* – Coding & knowledge on image processing, deep learning**

Reference:

https://www.nature.com/articles/s42003-022-03634-z

2. Project Title: **Parkinson's Disease using Sensors**

***Need* – Coding & knowledge on data analysis, ML, deep learning**

Reference:

"Forecasting Parkinson's Patient's Wearing-off Periods by Employing Stacked Super Learner", 5th Int. Conf. on Activity and Behavior Computing, DFKI,

Germany, 7-9 Sept. 2023. (Achieved 2nd Place Award - Parkinson's Disease Wearing-off Recognition Challenge 2023)

3. Project Title: IoT **Sensor-Based Heatstroke and Thermal Stress Understanding**

***Need* – Coding & knowledge on data analysis, ML, deep learning**

Reference:

"Predictive Modeling for Heatstroke Risk Forecasting Integrating Physiological Features Using Ensemble Classifier", DFKI, Germany, 7-9 Sept. 2023. (Achieved WINNER Award - Heatstroke Prevention Challenge 2023)

"Clustering-based Feature Selection and Stacked Generalization Method to Offset Imbalanced Data for Thermal Stress Assessment", 5th Int. Conf. on Activity and Behavior Computing, DFKI, Germany, 7-9 Sept. 2023. (Achieved 3rd Place Award - Heatstroke Prevention Challenge 2023)

"Predicting Heatstroke Risk and Preventing Health Complications Using Machine Learning and Physiological Data", 5th Int. Conf. on Activity and Behavior Computing, DFKI, Germany, 7-9 Sept. 2023.

"Analysis of Personal Thermal State using Machine Learning Algorithms to Prevent Heatstroke", 5th Int. Conf. on Activity and Behavior Computing, DFKI, Germany, 7-9 Sept. 2023.

"IoT Sensor-Based Activity Recognition - Human Activity Recognition", Springer Nature Switzerland AG, ISBN 978-3-030-51379-5, 2020.

4. Project Title: Framework for Estimating **Autism Spectrum Disorder** Severity by Robot Enhanced Therapy

***Need* – Coding & knowledge on data analysis, skeleton data, sensors data, ML, deep learning**

Reference:

"Task Detection of ASD Children by Analyzing Robotic Enhanced and Standard Human Therapy", 13th International Conference on Mobile Computing and Ubiquitous Networking (iCMU), Japan, 17-19 Nov. 2021.

"Data-Driven Automated Detection of Autism Spectrum Disorder Using Activity Analysis: A Review", Cognitive Computation, Springer, 2021.

"ASD-EVNet: An Ensemble Vision Network based on Facial Expression for Autism Spectrum Disorder Recognition", 18th International Conference on Machine Vision Applications, Hamamatsu, Japan, 23–25 July, 2023.

"Sequencer Local and Global Feature Representation of Facial Image for Autism Spectrum Disorder Classification", IEEE International Conference on Systems, Man, and Cybernetics (SMC), Hawaii, USA, 1-4 Oct., 2023.

5. Project Title: **Emotion and Depression** understanding based on large dataset

***Need* – Coding & knowledge on data analysis, ML, deep learning**

Afroza Rahman
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Areas of Expertise and Interest:

- Artificial Intelligence (AI) in healthcare
- Machine Learning (ML)
- Deep Learning for Medical Image Analysis
- Advanced Image Segmentation Techniques
- Feature Extraction and Image Classification
- Data Science and Analytics
- Data Visualization and Interpretation
- Predictive Analytics using IoT Data
- Pattern Recognition in Biomedical Imaging
- Computer Vision and Image Processing
- Transfer Learning and Model Optimisation

Project Ideas

Project Title: Leveraging AI for Detecting Antimicrobial Resistance (AMR) in Microscopic Images

Project Description: Harnessing the power of artificial intelligence (AI) to advance the detection of antimicrobial resistance (AMR) in microscopic images. By employing sophisticated deep learning models, the objective is to significantly improve the precision, efficiency, and scalability of identifying resistant microbial patterns, underscoring AI's transformative potential in AMR research.

Project Title: Artificial Intelligence in Healthcare

Project Description: Exploring the broad application of artificial intelligence in healthcare, focusing on AI techniques such as machine learning and neural networks to enhance the automation, accuracy, and efficiency of diagnostic and treatment workflows, leading to better outcomes across various healthcare domains.

Project Title: Advanced Machine Learning and Deep Learning Techniques for Image Processing

Project Description: Applying cutting-edge machine learning and deep learning algorithms in image processing, with a focus on enhancing image quality through advanced methods such as segmentation, feature extraction, and image enhancement, ultimately improving accuracy and efficiency in image-based diagnostics.

Ali Jafari

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Subjects of interest:

- Machine Learning (predictive analytics, supervised/unsupervised learning)
- Deep Learning (CNNs, RNNs, transformers, generative models)
- Python Programming (data analysis, Data Cleaning & Preprocessing, automation)
- Big Data Analytics (Hadoop, Spark, distributed data processing)
- Computer Vision (image recognition, object detection)

Suggested topics:

- **Computer Vision:** Applying deep learning for tasks like image recognition, object detection, or medical imaging to assist with diagnosis and decision support.
- **Large Language Models (LLMs) for Domain-Specific Chatbots:** Fine-tuning GPT-like models for specialised use cases such as healthcare FAQs, educational support, or customer service automation.
- **Big Data + ML for Predictive Analytics:** Using tools like Spark MLlib to analyse large datasets and predict trends in finance, supply chains, or healthcare.
- **Applied AI in Healthcare:** Leveraging ML and deep learning to enhance diagnosis, predict patient outcomes, personalise treatments, and reduce medication errors.
- **Applied AI in Finance:** Applying AI to detect fraud, assess credit risk, power algorithmic trading, and personalise financial services.
- **Applied AI in Insurance:** Using AI to automate claims, detect fraud, assess risk more accurately, and design personalised insurance products.

Dr Aloy Adotey Edoh Jnr.
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Areas of Expertise and Interest:

- Distributed Systems and Cloud Computing Application for Systems Development
- Cyber networks, Wireless design, Cellular Mobile Computing and Next Generation Networks
- Data Science and Predictive analytics in Healthcare, Education, Security and Smart Cities
- Multi-Agent Systems and Agentic Systems in Medical and Disease Detection
- CI/CD and pipeline development with Agile, interactive models and software tools
- Machine Learning and AI techniques for Intelligent Decision Support Systems
- Enterprise Architecture, BPMN, Graph Analytics tools for Information Systems Development
- Data communication and Network Security using Cyber Security Threat modelling
- Development and Optimization of Multi-Cloud Computing Systems using Machine learning
- Development and evaluation of AWS and AZURE Applications and Muti Cloud Systems

Project Ideas

Project Title:
Cloud computing and Wireless Network or Smart City design

Project Description:
Design and implementation of cyber/sensors/cloud wireless network using Packet Tracer and or AWS/AZURE systems; application of network sniffer tools such as Wireshark to collect network data for performance evaluation and optimisation. The student will design systems of physical network devices and collect data for various Performance and Security analysis. Alternatively, design a Smart City in Packet Tracer using IPV6 for analysis.

Project Title:
Application of Data analytics or Predictive Analytics in Healthcare/Medical or DSS for business applications

Project Description:
Students would have relevant medical, security or business dataset where machine learning and or predictive analysis techniques to predict the probability of an event occurring over a period (risk of person having CVD and or Diabetics).

This will be done using Orange, RStudio or RSpark. The implementation is carried out with Python or any similar platform. An example will be predicting CVD risk or diabetics in health care system using predictive analytics tools.

Project Title:
Machine Learning as analytical tool for Data Communication and Cyber Security networks

Project Description:
Students would have to use Cloud Computing or Computer Network or Data Communication dataset. Alternatively, students can implement their own cyber/sensors/cloud/smart network using Orange, Packet Tracer, OPNET and Wireshark to collect network data; the student would use Machine Learning techniques to determine security threats and vulnerabilities as Intrusion detection systems. (i.e., Cyber Security Threat modelling and techniques).

Project Title:
Multi-Cloud Architecture Design and realisation with Cloud Integration Platform

Project Description:
In this project students will learn how to design Cloud computing application and or Multi-Cloud Architecture as well as evaluate the Azure and AWS platforms. The practical realisation would include implementation, migration of applications and database to Cloud using Azure, Google or AWS. Students can propose any topic on cloud computing implementation, data analytics and cost analysis on any Cloud platform.

Project Title:
Modelling intelligent DSS and Enterprise Architecture with BPMN for System realisation

Project Description:
In this project, students will apply AI or Machine Learning techniques and or tools to design and model intelligent DSS or Enterprise Architecture. The intelligent DSS or Enterprise Architecture must incorporate AI or Machine Learning in BPMN and TOGAF. The practical realisation aspect must include the implementation and deployment of Enterprise Platforms to address Application Oriented Architecture (AOA), Service Oriented Architecture (SOA) or Cloud Oriented Architecture (COA) issues. The student can use MS SQL Server or any database as the backend for the implementation.

Mr Arish Siddiqui
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Areas of Expertise and Interest:

- - Blockchain
- - Cryptocurrency
- - Information Systems
- - Cybersecurity
- - Data and Databases

Project Ideas

Project Title: Ideally your project should reflect your main expertise/area of interest that you would prefer as your career path. Final Year projects play a vital role in showcasing your skills to the prospective employers and to some extent make up for the industrial experience that you may be missing. Therefore, you must explore yourself and choose a project that is in line with current technology, unique and more importantly of your interest. The projects that I would prefer to supervise would be around Distributed Ledger Technology i.e Blockchain, data driven information systems. To name a few, Multi cryptocurrency based payment gateway system, Blockchain based supply chain management system, Blockchain based procurement systems, ERP systems for the production lines with prediction and forecasting using data analysis techniques.

Project Description:

- As long as it is based on a real scenario that may support a business or an organisation.

Dr Athirah Mohd Ramly
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Areas of Expertise and Interest:

- Wireless communications
- Computer Network
- Network Security
- Cybersecurity
- IoT
- Wireless sensors
- AI/ML

Project Ideas

*Project Title: W*ireless Sensors and IoT for Search and Rescue (SAR) Missions in Natural Disasters /Wilderness Environments

Project Description: It is a research project that requires development and analytical thinking. Good programming skills (Python/MATLAB/C++) is required.

Project Title: Intrusion Detection and Prevention Systems (IDS/IPS) for Smart Factory Applications

Project Description: Simulation of Intrusion Detection and Prevention Systems (IDS/IPS) for Smart Factory Applications using Python/MATLAB/C++

Project Title: Optimization of Flood Detection and Prediction Systems in a High-Risk Area using AI/ML

Project Description: It is a research project that requires development and analytical thinking. Good programming skills (Python/MATLAB/C++) is required.

Dr Azhar Mahmood
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uj

Areas of Expertise and Interest:

- Predictive Analytics for Heathcare
- Smart Cities Applications & Services
- Machine Learning/DL for Social, Medical and Elderlies Applications
- AI Enabled Disaster Management Systems

Project Ideas

Project Title: **Fake Product Review Identification**

Project Description: Many business owners out there who fabricate reviews for their products to get more sales misleading individuals who are looking to purchase high-quality products. You can build a fake review identification system to solve this problem. Kaggle has a dataset called Deceptive Opinion Spam Corpus that you can use for this project. This dataset contains 1600 hotel reviews- 800 of them are positive, and another 800 are negative.

Project Title: **Age Detection Model**

Project Description: We can tell if a person is young, middle-aged, or old. In this AI project, you can automate this process by creating a deep learning age detection model. OpenCV has a package called DNN (Deep Neural Networks) that can be used to import models from well-known deep learning frameworks. You can use a framework called Caffe for this task which has pre-trained models for age and gender.

Project Title: **Blindness Detection**

Project Description: Create a machine learning model to support disease diagnosis in this project. You'll use tonnes of images acquired in rural regions to aid in the automatic detection of diabetic retinopathy. The model will help prevent blindness and detect other future diseases, such as glaucoma and macular degeneration. APTOS 2019 Blindness Detection dataset can be used to build the image classifier model.

Dr Bilyaminu Auwal Romo

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Areas of Expertise and Interests:

- Empirical Software Engineering
- Software Maintenance and Evolution; Mining Software Repositories
- Software Fault and Prediction
- Open Source Software & Component Re-use
- Blockchain Technology: Open Source Distributed Application; Circularity Theory.
- Web3; dApps;

Project Ideas

Project title:
Circularity and Blockchain Technology for Food Redistribution and Community Well-being

Project Description:
Various reports released prior to the COVID-19 pandemic suggested that millions of children around the UK are living in homes with significant food insecurity thus having an impact on their wellbeing and social care. The figures reported by the Guardian and Independent (2019) show that 1 in 5 children in the UK live in such homes and around 2.2 million people in Britain are significantly food insecure (the highest in Europe and indication that one in five severely food insecure people on the continent reside in the UK). Other studies show that the families of nearly 4 million children in the UK struggle to afford enough fruit, vegetables and other essentials due to rising poverty and cost of living, and low benefit levels leading to adverse health outcomes and negative impacts on healthcare and wellbeing. Charitable clubs aimed at providing meals for children also access surplus food from organisations like Fareshare (charitable food redistribution organisation that makes use of the services of volunteers for redistribution to vulnerable people), The Trussell Trust (provided over 1.3 million food parcels to people in 2018 using their distribution network) and food banks.

This project will be implementing a decentralised software solution (Blockchain Technology) that will enable users in various communities in the UK (or councils) to address emerging issues during and after Covid-19 pandemic.

Essential Technical skills: Solidity, React - JavaScript, Smart contract.

Project topics:

1. Assessing the quality of bug data and development logs in open source software projects
2. Identifying and predicting software faults using development logs and bug data
3. Mining bug data and development logs in Open Source Software repositories
4. Application domain in empirical software engineering
5. Open Source Software project for Development (OSS 4D)

Projects suitable for the following programmes of study:

Computer Science

Dr Chris Ok'Onkwo
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Areas of Expertise and Interest:

- DevOps Technical Implementation Pipeline Design
- Smart Education Module Ecosystems Design
- Cloud Services Integrator (AWS, Azure)
- Event Dashboard Analytics Design (LINUX)
- Database Design and Integration
- Project Management (Initiation & Implementation)
- Smart Event Monitor (IoT) and Prompt creator
- AR Content Creator

Project Ideas

Project Title: Service Reporting and Management

Project Description:

Using smart IoT devices to collect and report service status in smart education environments. Explore Smart Education Ecosystems through integrated technology, to eliminate decentralised reporting systems.

Project Title: Project Driven DevOps Development

Project Description:
Designing SLA based on DevOps pipelines in a Project Driven Environment.
Using work breakdown structures to measure time to market using cloud solutions.

Project Title: AR Content Creation

Project Description: Using the EON-XR for content creation, to assist educator and demonstrator. Service orientation self-development tool

Ms Dhara Parekh

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Areas of Expertise and Research Interest:

- **AI & Machine Learning**
- **AI in Education**
- **Business Intelligence and Strategy – Power**
- **ETL & Data Warehousing**
- **Cloud and Distributed Computing**
- **Database Management and Architecture**
- **Operations related Data Analytics**
- **Market related Data Analytics**
- **Statistical Data Analytics**
- **AI in Healthcare – Parkinson's Disease**

Research topics:

Project Title: Prediction & Recognition of Wearing-off Phenomena in Parkinson's Disease, using multimodal data and AI approaches.

Project Title: Personalized Learning Platform

- Develop an AI-powered education platform that adapts content and learning materials to individual student needs and learning styles.

Project Title: Language Learning Assistant using AI

- Build a language learning app that uses AI to assess a user's language proficiency and tailor lessons accordingly.

Project Title: Data driven Guided System for UEL to design and develop a Map of the campus to support locating places.

Project Title: IOT based mobile application to help improvise the commute of buses at UEL

Project Title: Workforce Productivity Analysis

- Analyse workforce data to identify trends and opportunities for improving productivity and employee satisfaction.

Project Title: Survey Data Analysis

- Analyse survey data to derive meaningful insights and trends, such as customer satisfaction or employee engagement.

Project Title: Database Performance Tuning:

- Optimize the performance of a database system by analysing query performance, indexing, and database schema design.

Project Title: Multi-cloud Database Integration

- Create a solution that allows businesses to seamlessly integrate and synchronize data across databases hosted on different cloud providers.

Project Title: AI-Powered Student Support

- Develop an AI-based chatbot or virtual assistant to provide students with instant support and guidance on academic and administrative matters.

Project Title: E-Learning Platform Enhancement

- Develop features for an existing e-learning platform, such as personalized learning paths, adaptive assessments, or AI-driven content recommendations.

Project Title: Cost-Benefit Analysis for IT Investments

- Evaluate the potential ROI of IT investments, such as implementing new software or hardware, by conducting a thorough cost-benefit analysis.

Project Title: SWOT Analysis for Business Strategy

- Perform a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis to assess the current state of a business and inform strategic planning.

Project Title: Dashboard for Executive Decision-Making

- Create an interactive business intelligence dashboard that consolidates key performance indicators (KPIs) from various departments to help executives make informed decisions.

Project Title: Predictive Sales Analytics

- Develop a predictive analytics model to forecast sales trends, helping businesses allocate resources more effectively and identify potential growth opportunities.

Dr Elias Eze

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Areas of Expertise and Interest:

- Cybersecurity/Information Security
- Fraud detection
- Big data analytics
- Artificial Intelligence & Machine Learning
- Blockchain and Smart City Security
- Deep neural network techniques
- Data science
- Vehicular ad-hoc networks (VANETs)/Internet of vehicles (IoVs)
- Blockchain-based Healthcare Systems

Project Ideas

Project Title: Cryptographic application using artificial neural networks

Project Description:
Cryptography is the science and art of maintaining computational security and avoiding data leakages in electronic communications. One can implement a project in this field by using different neural network architectures and training algorithms. Suppose the objective of the study is to investigate the use of artificial neural networks in cryptography. For the implementation, the use of a recurrent structure such as Jordan network, trained by the back-propagation algorithm could be applied. This will help to obtain a finite state sequential machine, which will be used for the encryption and decryption processes. Similarly, chaotic neural nets can form an integral part of the cryptographic algorithm in such systems.

Project Title: Convolutional neural network (CNN) model for autonomous driving applications

Project Description:
Nowadays, neural networks are applied to a wide range of business functions, such as customer research, sales forecasting, data validation, risk management, price predictions, etc. CNNs are typically applied to

analyse visual imagery. This architecture can be used for different purposes, such as for image processing in self-driving cars. Autonomous driving applications use this model to interface with the smart vehicles where CNNs receive image feedback and pass it along to a series of output decisions (turn right/left, stop/drive, etc.) Then, Reinforcement Learning algorithms process these decisions for driverless driving.

Project Title: Artificial neural network-based credit scoring application for financial institutions

Project Description:
Loan defaulters can stimulate enormous losses for banks and financial institutions. Therefore, they have to dedicate significant resources for assessing credit risks and classifying applications. In such a scenario, artificial neural networks (ANNs) can provide an excellent alternative to traditional statistical models. They offer a better predictive ability and more accurate classification outcomes than techniques such as logistic regression and discriminant analysis.

Project Title: Deep neural network application for cancer detection

Project Description:
Neural network implementations have the potential to introduce efficiency in medical diagnosis, and particularly in the field of cancer detection. Since cancer cells are different from healthy cells, it is possible to detect the ailment using histology images. For instance, a multi-tiered deep neural network architecture allows you to classify breast tissue into malignant and benign. The practice of building a breast cancer classifier using the Invasive ductal carcinoma (IDC) dataset from Kaggle, which is publicly available in the public domain can be studied under this project.

Project Title: Credit card fraud detection application

Project Description:
There were over 459,297 cases of credit fraud in 2020, with the resulting losses reaching more than $28.65 billion worldwide according to The Nelson Report [https://nilsonreport.com/mention/1313/1link/]. This project can apply data analytics to solve develop a fraud detection system. The first step entails building a training database for the machine learning algorithm, involving information on fraud risk scores from sources like MicroBilt. Using these datasets, the model can predict the likelihood of a fraudulent transaction.

Dr Fadi Safieddine

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Areas of Expertise and Interests:

- M-commerce
- Disruptive technologies
- Business Information Systems
- Sustainability and Green IT
- Virtual Reality (VR)
- Propagation of Fake News on Social media

Project Ideas

Project Title:
Virtual Reality Lectures: Case Study

Project Description:
Only open to student in Computing with Business. Has to have excellent track record in CN4000 and using of technology. The student will be given access to a Virtual reality recording camera. The first term will be to plan, study, and use the technology including running few tests. For term two, the student will attend the Mental Wealth module in year 1 to record all the lectures. The student to select ten volunteers who are studying from home, to use Virtual Reality to watch the recording of the lecture and provide qualitative feedback on their experience. The final report to reflect on lessons learned and potential challenges.

Key and Desired Skills: Has to have some background in video editing and the ability to learn new skills. Ideally, a student with an overall grade of distinction.

Project Title:
Investigating the use of alternative reality in fake news videos

Project Description:
To investigate the different tools available in the market to generate fake news videos and where some are able to integrate A.I., Augmented Reality, and other tools to regenerate videos with fake content. The study would start with a review of the different examples where videos have been used to generate fake news. The student will then need to demonstrate the use of these tools by creating one or more none harmful fake news videos related to scientific discovery - for demonstration purposes. Where possible, the student could extend their work to consider ways to help identify fake news videos.

Key and Desired Skills: Has to have some background in video editing and ability to learn new skills. Ideally a student with an overall grade of distinction.

Project Title:
VR Cycling Application

Project Description:
This application is to encourage people to cycle more and use car and other forms of transport less. It can also be a great tourism application. I have about five VR recording and you will be given access to VR headsets. Your role is research how to add sound to VR, how to enhance the VR, and upload these onto the VR as well as a dedicated VR YouTube channel. This project has minimal coding. For advanced level, you may want to develop an app in the Meta. The research would be to conduct field studies where students would experience the VR cycling and give feedback on how to enhance it.

Key Skills: Video editing skills, digital music integration, and field study.
Desirable skills: App development that integrates the VR videos.

Project Title:
Business Process Model for SMEs in M-Commerce Based on Uber / Deliveroo / Just Eat / Airbnb or a company of your choice.

Project Description:
SMEs represent a major part of the world economy. However, SMEs face major challenges in breaking into electronic commerce and specifically mobile commerce. Your project is to look at the transition to m-commerce in the context of SMEs in the UK (or country of your choice). By conducting a review of the top downloaded applications from four application stores and reflecting on the most successful breakthroughs to identify the business models for SMEs, focusing on intermediaries. Business intermediaries provide value and opportunities for SMEs as well as allowing consumers to better compare and customise products or services. The models used by these apps is diverse, but the impact is profound, in what researchers have termed as disruptive technologies. I would be particularly interested in individual case studies an area where the model could be optimised. Recent premutation of this model include shared car rentals, laundry service, and cleaning services. Under this category, you could also suggest your own intermediary app.

Key Skills: System Analysis and Design; App Development.
Desirable skills: industry experience from working for one of these companies.

Project Title:
Sustainability and green IT

Project Description:
Sustainability and green IT is finding technological solutions to everyday problems that can prove to have a positive impact on the environment. It is a common mistake to assume that saving on paper printing and travel are the only answers. Students will need to consider the carbon footprint of technology from manufacturing, transport, lifetime use, breakdown, and recycling. Planning and designing more efficient use of hardware and/or software solutions are an essential component in that project.

Key Skills: System Analysis and Design; Software Development.
Desirable skills: Creative use of hardware and software.

Project Title:
System and Office Automation

Project Description:
It is unlikely to find companies these days that do not have computers for communication and information system processing. However, many of their processes are inefficient; where some processes are using incorrect procedures, poorly selected software, or hybrid of applications. Paper-based systems are especially inefficient, difficult to manage and use, cannot be backed up easily and create a tedious amount of work when trying to generate a report. From records of orders, sales, customers, products, services, accounting, payroll, staff management, and many more of these systems are the type of systems you need to consider. The final output needs to be a functioning system, allowing multiuser access, and include enhanced features.

Key Skills: Software development.
Desirable skills: Problem-solving.

Galvin Kaiyamo

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Areas of Expertise & Interests

- Artificial Intelligence and Machine Learning
- Data Engineering and Real-Time Systems
- Software Engineering and Full-Stack Development
- Web and Mobile Application Development

Project Ideas:

Project Title: Sustainable Shopping Recommendation System
Project Description: Growing awareness of climate change and environmental issues has led many consumers to seek more sustainable options, yet they often lack reliable information or guidance when making purchasing decisions. This project examines how data-driven systems can empower individuals to make greener choices. Students will design and implement an application that evaluates or recommends products according to sustainability criteria. The project encourages exploration of recommendation algorithms, the use of external datasets or APIs, and effective ways of presenting information to users. By working on this, students will not only gain technical experience but also engage with a pressing real-world challenge of encouraging responsible consumption.

Project Title: AI-Powered Job Application Assistant
Project Description: Applying for jobs requires tailoring CVs and cover letters to specific roles, but many applicants struggle to do this effectively. Employers increasingly rely on automated systems to screen applications, and failure to include the right information can result in strong candidates being overlooked. This project aims to build an AI-based system that supports job seekers by analysing application materials in relation to job descriptions and identifying areas

for improvement. Students will investigate techniques in natural language processing and text comparison, while also considering how to provide actionable feedback in a clear and ethical way. The project is highly relevant to employability and demonstrates the role of AI in solving everyday professional challenges.

Project Title: AI for Fake News Detection
Project Description: The rapid spread of misinformation online has become one of the defining challenges of the digital age, with direct consequences for politics, public health, and social trust. This project investigates how artificial intelligence can be applied to the problem of detecting fake news and misleading content. Students will explore natural language processing and machine learning approaches to distinguish reliable sources from potentially deceptive ones. The project requires careful consideration of dataset quality, classification methods, and ethical implications such as bias and fairness. By completing this project, students will contribute to an area of global importance and gain hands-on experience in designing AI systems that address real-world social problems.

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Areas of Expertise and Interest:

- Cybersecurity
- Risk Management in critical Infrastructure
- Governance, Risk and Compliance
- Artificial Intelligence & Machine Learning for Cybersecurity
- AI-Augmented Risk Quantification & Cyber Insurance
- Data Protection and Compliance Automation (GDPR, ISO 27001, SOC2)
- Threat Intelligence & Incident Response
- Emerging Threat Vectors (QR Code Risks, Deepfakes, AI-powered Fraud)

Project Ideas

Project Title: Secure AI for Smart Agriculture

This project explores how AI and IoT sensors can be used to monitor crop health, detect fraud in agri-supply chains, and predict yields. Students will design a pipeline using drone imagery, Python ML libraries, and cloud platforms (e.g., AWS IoT, Azure FarmBeats). Emphasis will be on data encryption, integrity checks, and compliance with NDPR/GDPR. The goal is to make agricultural systems more transparent and resilient.

Project Title: Fraud Detection AI for Banking Compliance

This project develops a machine learning model to detect anomalies in financial transaction logs. Using Python (scikit-learn, PyTorch) and visualization dashboards, students will test fraud detection strategies under NDPR/GDPR compliance rules. Audit trails and tamper-proof logs will be integrated for forensics. The aim is to reduce fraud risk while maintaining regulatory alignment.

Project Title: CTI-Driven Anti-Terrorism AI

This project investigates how cyber threat intelligence (CTI) can be automated using AI. Students will build pipelines to analyze open-source, social media, and dark web data using

NLP and graph analysis tools. Security hardening, identity management, and compliance with surveillance and data rights laws will be a key focus. The aim is to support proactive and lawful counter-terrorism strategies.

Project Title: AI for Detecting Misinformation & Disinformation

This project applies AI to identify coordinated botnets, fake accounts, and disinformation campaigns. Students will use network analysis, NLP, and forensic metadata tracing to map information flows. Compliance with digital rights and freedom of expression will be emphasized. The goal is to improve resilience against information warfare and protect democratic integrity.

Project Title: Privacy Compliance Copilot for Mobile Apps

This project builds a lightweight NLP-based tool to analyze mobile app privacy policies. Using Python NLP libraries and compliance checklists (GDPR, NDPR), the system will flag contradictions, broad permissions, and risky practices. A simple dashboard will visualize compliance status. The aim is to help developers improve transparency and trust.

Project Title: Privacy Compliance Dashboard for App Developers

This project aims to build a dashboard that tracks the compliance of an app's privacy policy with major data protection laws. The dashboard will flag potential overbroad personal data collection clauses and suggest improvements based on comparisons with the privacy policies of similar apps. The project will focus on building an easy-to-use interface that allows developers to visualize their app's privacy policy compliance status and take necessary actions.

Project Title: Technological Asymmetry: Comparing AI Adoption rates between Cybercriminals and Industry Entities

While industries increasingly incorporate AI for automating processes, enhancing cybersecurity, and optimizing operations, cybercriminals are also leveraging AI to develop more sophisticated attacks. The project will compare how AI is used by both groups, with cybercriminals adopting AI to automate phishing campaigns, create deepfakes, evade detection, and enhance malware. On the other hand, businesses use AI to enhance their defenses with threat detection, predictive analytics, and automated incident response.

The goal of the project is to assess whether cybercriminals are adopting AI at a faster rate than businesses, thereby creating a technological gap (asymmetry) that may leave organizations more vulnerable to attacks. The project will gather data on AI adoption in both sectors through case studies, news reports, and cybersecurity research, then analyze the results to highlight key trends. By understanding these asymmetries, the project will provide recommendations on how businesses can close the gap and stay ahead in the AI arms race against cybercriminals.

Himanshu Singhal

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Areas of Expertise:

Full Stack & Cloud Development
Full Stack Development, Hybrid Mobile Apps, DevOps, CI/CD, Automated Deployments, Cloud Platforms

Artificial Intelligence & Data Science
Machine Learning, Deep Learning, Recommendation Systems, Agentic AI, Explainable AI, Data Analysis, Time Series

Data Engineering & Databases
Database Design & Management, Data Transformation (ETL/ELT), Data Pipelines, Big Data Tools like Kafka, PySpark

Project Ideas:

Project Title - Building a Secure Online Marketplace with Stripe Payments
This project focuses on designing a secure e-commerce platform where customers can browse products, manage carts, and pay online using Stripe. It explores how full-stack applications handle transactions, protect sensitive data, and scale for real-world retail needs. Students will analyse both the technical design and security challenges of digital marketplaces.

Project Title - One Login for All: Implementing University Single Sign-On
The project aims to develop a centralized login system that allows students and staff to access multiple university services with one account. It examines how identity management and secure authentication improve user experience while reducing security risks. The outcome highlights the role of Single Sign-On in streamlining IT infrastructure in education.

Project Title - Automating Healthcare Systems: CI/CD for Patient Apps
This project investigates how continuous integration and delivery (CI/CD) pipelines can automate deployment for healthcare applications. Using GitHub Actions and AWS, students will evaluate how automation reduces downtime, improves reliability, and ensures compliance with sensitive data requirements. The focus is on making healthcare systems more robust and efficient.

Project Title - Smart Banking on the Go: Developing a Cross-Platform App
The project involves building a cross-platform mobile banking app with features such as biometric login, reminders, and smart spending alerts. It examines challenges in creating secure and user-friendly mobile financial applications. Students will explore how fintech combines strong security with accessible design to build user trust.

Project Title - Predicting Alzheimer's: AI for Early Disease Detection
This project applies machine learning and deep learning to medical datasets to predict early signs of Alzheimer's. It investigates how data preprocessing, model accuracy, and ethical considerations shape the use of AI in healthcare. The goal is to evaluate how AI can support early diagnosis while addressing limitations and risks.

Project Title - Trustworthy Conversations: Building an Explainable AI Chatbot
The project focuses on developing a chatbot powered by LLAMA3 that not only provides answers but also explains its reasoning. It explores how explainable AI improves transparency and builds user trust in conversational systems. Students will compare different explanation techniques and assess their value for real-world applications.

Project Title - Smarter Spending: A Recommendation Agent for Personal Finance
This project designs a recommendation system that analyzes user spending to suggest savings strategies or financial products. It examines how personalization algorithms balance usefulness with data privacy. Students will assess the role of recommender systems in improving financial decision-making for individuals.

Project Title - Data Transformation Engine
The project aims to build a service that converts inconsistent datasets (CSV, XML, JSON) into standardized formats using PySpark. It explores the challenges of cleaning, transforming, and scaling data pipelines. Students will evaluate how standardized data supports accessibility and reuse in open data systems.

Project Title - Smart Cities in Real Time: Monitoring with Kafka
This project develops a live dashboard for monitoring city metrics such as traffic, air quality, or noise using Kafka. It examines the challenges of real-time data processing, scalability, and visualization. The goal is to show how streaming data can support smart city planning and sustainability.

Project Title - Multi-Channel Campaign Management

The project focuses on creating a system that enables businesses to launch marketing campaigns across WhatsApp, Email, SMS, and Slack. It investigates integration challenges, delivery reliability, and analytics for measuring engagement. Students will evaluate how multi-channel systems improve outreach and guide better business decisions.

Dr Hisham AbouGrad
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Areas of Expertise and Interest:

- Artificial Intelligence (AI) Modelling
- Machine Learning (ML) Applications and Experiments
- Financial Technology (FinTech) Analytical Apps and Performance Enhancements
- Information Security and Data Protection Systems
- Data Science and Applications
- Expert Systems and Applications
- Decision Making (DM) and Support System (DSSs) Frameworks
- Visual Recognition (VR) using Computer Vision Applications
- Workflow Systems Performance
- Information Systems Measurement and Performance
- Geographic Information Systems (GIS) using Python Geospatial Tools & Techniques (e.g. Geofencing, GeoAI, GeoInfo)
- AI-augmented Business Process Management Systems (ABPMSs)
- An Intelligent Automation Enterprise Content Management (IA-ECM) System
- AI Enhanced User Experience (UX), also known as AIUX Design and Patterns

Project Topics and Study Areas:

- ☐ Retrieval Augmented Generation - RAG: An LLM Application Pattern
- ☐ AI Content Detector and Analytics Dashboard Platform
- ☐ Local/Online LLM RAG Application
- ☐ Intelligent document processing (IDP) solutions – AI-powered IDP: Key Features to Look for in IDP Solutions includes: Automatic data extraction, AI-powered indexing, Flexible onboarding, Enhanced data validation, and Seamless integration.
- ☐ Blockchain-Technology-Based Solutions for IOT Security
- ☐ Deep Trek: Custom GPT
- ☐ Finternet: future vision for a user-centric, interconnected financial system built on tokenization and unified ledgers.

Project Ideas

Project Title: Realtime Database and Management System

Project Description: The project could be implemented in Java (or C# for the Net) using realtime cloud database design or any other similar database engine to develop Dissertations Management System (DMS). Indeed, such DMS is designed for managing and maintaining an integrated system. The DMS software seeks to allow operate more productively while handling the typical day-to-day tasks. If you are looking for final year degree projects, this is perfect for you to practice on developing a repository system.

Project Title: Supply Chain Management System (SCMS)

Project Description: Supply chain management refers to the management of businesses interconnected over a network. It includes a whole range of management procedures like handling, storage and movement of raw materials, inventory, and transporting finished goods from the source to its final destination. This project aims to smoothen the supply chain management process by closely monitoring the dealers and clients and continually tracking the products through the different points in the supply chain. The SCMS seeks to allow a company to directly communicate with its clients, obtain the product requirements, manufacture the product to fit those requirements, and finally ship it off to the client.

This project uses JSP, JDBC, and HTML for the front-end and MS Access database (or any other similar database engine) as the back-end database. It is a web-based application that will automate the system of communication between the management or admin, dealers, and clients of the company. There are three modules (main objects) in the SCMS:

- **Admin module:** This is used to check information on the manufactured products, newly launched products, and products that must be delivered to the clients.
- **Dealer module:** This keeps track of all the essential information concerning the dealers, particularly the record of items. So, dealers can generate and update the item list for a product.
- **Client module:** This used to provide the necessary specifications of a product. The client feedback is processed through this module and forwarded to the Admin.

By using this application, the clients can directly convey their product requirements to the manufacturer, who then contacts multiple vendors to acquire the necessary resources for making the product. The dealers usually create a list of items as per the product information provided to them, after which the manufacturer selects the materials that best fit the specifications given by the client. Then, the selected list of items is forwarded to the inventory department for processing, after which the manufacturing begins. Once the production is complete, the accounts department calculates the raw materials' costs and manufacturing costs to generate the total bill. Lastly, the product, along with the invoice, is shipped to the client. The client is free to offer feedback on the received product.

Dr Joseph Annan

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Research interest:

General research interest is in Team Science; specifically assembling optimum teams using Machine Learning techniques.

Research topics:

- Using Machine Learning for prediction:
- - Diseases
- - Banking
- - Sentiment Analysis
- - Recommender Systems
- - etc

→ Database applications
→ Information Systems development and Implementation
→ R Programming

Research topics:

★ · Data Science
★ · Machine Learning (ML)
★ · Database and Database Systems
★ · Information Systems Analysis and Design
★ · Geographic Information Systems (GIS)
★ · R programming
★ · Decision Support System (DSS)
★ · Expert System

Dr Kazi Tansen

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Research interest:

- Blockchain Technology
- Cyber Security
- Digital Forensics
- Artificial Intelligence
- Machine Learning
- Deep Learning
- Data Science
- Software Engineering
- Internet of Things (IoT)
- Computer Networking

Project Ideas:

Project Title: Blockchain-Based Intellectual Property Protection System

Project Description: A Blockchain-Based Intellectual Property Protection System will be developed to safeguard digital assets and intellectual property in the contemporary digital landscape. This project aims to create a decentralised platform using Blockchain technology to securely store and manage intellectual property records, such as patents, copyrights, and trademarks. It will enable creators, artists, and innovators to timestamp and verify the authenticity of their work while providing a transparent and tamper-proof record of ownership. Smart contracts will automate the process of licensing and royalty distribution, ensuring fair compensation for creators. Advanced encryption techniques will be integrated to protect sensitive data. The system will be user-friendly, offering a web-based interface for easy interaction.

Technical Skills and Tools:

- Programming Languages: Solidity for smart contract development, JavaScript for frontend development.

- Tools: Ethereum or other suitable Blockchain platforms, IPFS (InterPlanetary File System) for decentralized file storage, Metamask for wallet integration, Ganache, Remix IDE and Truffle for smart contract testing and deployment.
- Knowledge of Blockchain technology, cryptography, and web development.

Project Title: Blockchain-Based Healthcare Records Management

Project Description: The project aims to develop a Blockchain-based healthcare records management system to ensure the integrity, security, and privacy of patients' medical data. Patients, healthcare providers, and insurers will have access to a tamper-proof, distributed ledger for medical record storage and access control. Technical skills needed for this project include decentralised application development for Ethereum or a similar platform, smart contract development and web development skills (HTML, CSS, JavaScript) for creating the user interface.

Project Title: Automated Threat Detection and Response System for Small Businesses

Project Description: The project aims to develop an Automated Threat Detection and Response System tailored for small businesses to enhance their cybersecurity standpoint. The system will leverage machine learning algorithms for real-time monitoring of network traffic, identifying potential threats, and automatically initiating predefined response actions, such as isolating affected devices or alerting administrators. The project will require proficiency in programming languages like Python and the utilization of cybersecurity tools and frameworks, including Wireshark, Snort, and open-source machine learning libraries. This project will contribute to the security of small businesses, which are often vulnerable to cyberattacks due to resource constraints.

Project Title: Automated Memory Analysis for Malware Detection

Project Description: This project aims to develop an automated system for memory analysis in digital forensics to enhance malware detection capabilities. The system will utilize machine learning algorithms to identify patterns and anomalies in memory dumps, enabling investigators to quickly and accurately detect malicious code and behaviour. Required technical skills for this project include proficiency in Python for machine learning implementation, expertise in memory forensics tools such as Volatility, and knowledge of assembly language to analyse memory structures effectively.

Project Title: Automated Code Review and Feedback System

Project Description: An automated code review and feedback system will be developed to streamline the code review process and provide actionable feedback to developers. This system will utilize machine learning algorithms to analyse code for adherence to coding standards, best practices, and potential vulnerabilities. It will also generate comprehensive reports and suggestions for code improvements. The project will require proficiency in programming languages such as Python and Java, along with expertise in software development tools like Git for version control and integration with popular code repositories

like GitHub. Additionally, knowledge of machine learning frameworks like TensorFlow or PyTorch will be necessary for implementing code analysis algorithms.

Mr Kiran Patel

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Areas of Expertise and Interests:

- Web Development – Dynamic Database System using Modern Language Stacks to build from scratch using modern/innovative approaches of software development.
- Data Collection and Processing to support the development of wider research projects.
- App Development – Swift/Kotlin Development or Hybrid Development approaches
- Web Virtual/Augmented Reality – Web VR/AR Concepts in Educations
- Health IoT – Improving outcomes for younger or olders generations using technology.
- Social Community Impact with New Technologies (aligning to the UN Global Sustainable Development Goals)
- Modern Education Development with New Technologies

Project Ideas

You may propose your projects related to the above interest areas mentioned or in the computing industry, as a supervisor I wish to support projects that either have commercial value in the computing industry or social value in the community.

Many of the projects I work with are real client projects, you will be collaborating with Docklands Creative Ltd that will lead the project with your support to deliver either an element or full complete version of the client project subject to availability and skills match.

Project Idea 1: Title: Work Based Learning Assessment Automation System.

Delivering for an internal UEL project that will directly impact a delivery of a module potential, you will be required to build an automation from scratch to help deliver a platform that will help track and support students in fulfilling the requirements of the module whilst also fully automating the administrative elements of the platform. You may build it using advance libraries and tools like Selenium. Predicating students that will fail.

Project Idea 2: Title: Social Community Impact with New Technologies

United Nations Member States in 2015 adopted 'The 2030 Agenda for Sustainable Development' as part of this the 17 Sustainable Development Goals (SDGs) was created, which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go together with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests. Could you use your skills to make an impact towards anyone or more of the 17 Goals than this is your opportunity to make a positive impact in the community.

Your project must technically support one of the 17 Goals. It could be a hardware or software project in the format of an App or Web applications that helps support, alleviate or help reduce our human impact to the world around us.

Project Idea 3: Title: Evaluate the Industry 3.0 and 4.O Marketplace for new careers.

Working Idea further development would be required with collaboration with student.

Lucian Duta
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Areas of Expertise and Interest:

- Blockchain Technology
- Smart Contracts
- Decentralised Applications (DApps)
- Full Stack Development (MERN Stack)
- Mobile Application Development (Flutter and React Native)
- Backend development
- FinTech and InsurTech
- RegTech and SupTech
- Software Engineering
- Sustainability and Social Impact Projects

Project Ideas

Project Title:
Blockchain-Based Platform for Transparent and Efficient Disaster Relief

Project Description:
In the aftermath of disasters, inefficiencies of centralised systems and lack of transparency often lead to delayed aid and inappropriate allocation of resources to affected individuals. However, a decentralised application (DApp) based on blockchain technology can revolutionise disaster relief efforts. Such a platform will connect donors, relief organisations, and affected communities on a transparent and secure network. Moreover, with smart contracts, donations can be automatically released when predefined conditions are met, ensuring that aid reaches those in need promptly and without mismanagement. Real-time tracking of funds and resources will build trust among stakeholders and enhance the efficiency of relief operations. This project aims to harness the potential of blockchain to make a substantial difference in times of crisis, using technology for a better world.

Project Title:
Mobile App for Community Cost of Living Support

Project Description:
The constantly rising cost of living has a major impact on our society and emphasises the need for accessible tools that help people reduce expenses and access support services. This project aims to provide a solution designed to assist individuals and communities in navigating the cost

of living crisis. The app will serve as a centralised platform where users can access real-time information on local resources, discounts, and support services to alleviate financial strain. Features may include a community marketplace, discount aggregator, resource locator, budgeting tools, government assistance information, and community forums. This goal is to empower users financially, strengthen community bonds, promote sustainability, and enhance accessibility while contributing to the SDGs.

Project Title:
Blockchain-Enabled Fair Trade Supply Chain Tracking

Project Description:
Consumers increasingly demand transparency regarding the ethical sourcing and production of goods. However, verifying fair trade practices is a challenge due to the complexity and obscurity of supply chains. This project focuses on developing a blockchain platform to enhance transparency and accountability in fair trade supply chains. Recording each supply chain step on the blockchain ensures that products labelled as fair trade genuinely adhere to ethical sourcing and production practices. Consumers can verify the origin and journey of products, promoting sustainable consumption. The platform aims to support producers by ensuring fair compensation and empowering consumers to make informed decisions, ultimately contributing to economic sustainability and social justice.

Project Title:
Open Source Community Skill-Sharing App

Project Description:
Diverse skills and talents within communities often go underutilised due to the lack of technology focused on the non-monetary exchange of services. However, a mobile application that facilitates a community-driven skill-sharing network can help its people offer their talents, such as tutoring, gardening, programming, or art lessons, and, in return, receive services from others in the community without monetary transactions. The app will feature a time-credit system to track exchanges and user profiles and a rating system to build trust. By promoting mutual aid and social unity, this project leverages technology to strengthen community bonds and empower individuals, reflecting a commitment to societal impact through innovative software solutions.

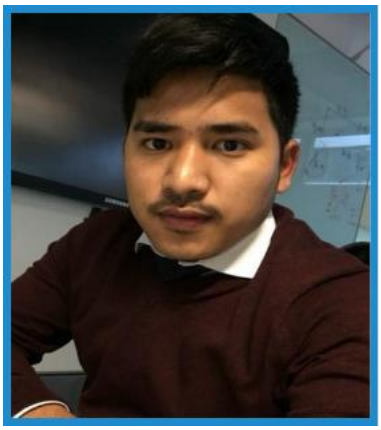
Project Title:
Blockchain-Based Transparent Charity Donation Platform

Project Description:
Concerns about mismanagement and lack of transparency in charities often discourage donors and reduce the effectiveness of charitable efforts. Nonetheless, a decentralised solution that leverages blockchain technology can create a transparent and secure environment for charitable organisations. With the help of smart contracts, the system can track donations from donors to beneficiaries, ensuring funds are used as intended. The platform aims to enhance trust in charitable organisations by providing an immutable ledger of transactions, reducing administrative overhead, and increasing the impact of each donation. This project aligns to promote social good through technology by making charity more efficient and transparent.

Project Title:

Career Enhancement App for IT Students

Project Description:
Navigating the competitive IT job market can be challenging for students and graduates who often need guidance on showing their skills, connecting with employers and understanding industry demands. However, a dedicated environment can assist students in finding jobs easier and better following their career goals. The app will provide tips and tricks on where to look for job opportunities, serve as a platform for showcasing work, offer project collaborations, and facilitate connections with potential employers. Additional features may include insights into companies' tech stacks, guidance on the best skills to learn based on the industry pulse, discussion threads, and resources for career development. This project aims to streamline the job search process and enhance career readiness by empowering IT students with valuable resources and networking opportunities.



Dr Madhav Tamang
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Areas of Expertise and Interest:

- Advanced Machine learning and Deep Learning Techniques
- Intelligent Systems and Medical Data Analysis
- Machine Learning for Health Impact Prediction
- Bio signal Acquisition and Analysis
- Big Data and Real-Time Analytics in Healthcare
- Sentiment Analysis and Natural Language Processing
- Predictive Analytics for Business Solutions
- Sustainable Urban Mobility Solutions with AI

Project Ideas

Project Title: An Intelligent System for Real-Time Traffic Prediction Using Machine Learning Algorithms

Project Description:

Develop an intelligent system for real-time traffic prediction utilizing advanced machine learning algorithms. Traffic congestion in urban areas is a significant challenge, impacting travel times, fuel consumption, and environmental pollution. The system will use historical traffic data, real-time sensor inputs, and contextual information such as weather conditions and public events to provide accurate traffic flow predictions. Using several machine learning algorithms, we aim to build a system capable of scaling and adapting to various traffic environments, leading to efficient traffic management and improved urban mobility.

Project Title: Developing a Smart Health Monitoring System: Predicting Heart Disease Using AI Algorithms

Project Description:
Developing a smart health monitoring system that predicts heart disease using AI algorithms involves integrating several key components from data collection and analysis to the deployment of machine learning models. It can revolutionize healthcare by improving early detection, risk assessment, and continuous patient monitoring.

Project Title: Building an AI Model for Predicting Student Performance Based on Learning Behaviours

Project Description: Building an AI model for predicting student performance based on learning behaviours means creating a system that uses artificial intelligence (AI) and machine learning techniques to analyse patterns in how students learn and engage with educational material, and then predict their future academic outcomes, such as grades, test scores, or likelihood of passing a course.

Project Title:
AI-Powered Fraud Detection in E-Commerce Transactions: A Machine Learning Approach

Project Description:
Fraud detection in e-commerce is a critical component of maintaining trust, financial security, and business integrity. Application of AI and machine learning (ML) in fraud detection is a transformative approach that leverages complex algorithms to identify fraudulent activities in real-time with high accuracy. In this project, we explore the key concepts, algorithms, and strategies in AI-powered fraud detection, focusing on machine learning techniques that can help e-commerce businesses prevent fraud effectively.

Dr. Mahmud Ahmed

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Area of Expertise and Interest:

. Artificial Intelligence
. Explainable Machine Learning
. Data Science
. Educational Data Mining
. Big Data Analytics
. Predictive Modelling

Research topics:

Project Title:

Prediction of Depression Severity and Personalized Risk Factors Using Machine Learning on Multimodal Data

Project Description:

Depression is a prevalent mental health disorder that impacts millions globally, often leading to a decreased quality of life and even suicide. Despite the availability of treatments, many cases of depression remain undetected and untreated. As such, there is a need for an accurate and personalized prediction model for depression severity and risk factors using machine learning algorithms on multimodal datasets.

Project Title: E*arthquake Classification using Machine Learning Algorithm*

Project Description:

The ability to anticipate and analyze earthquakes is an essential part of disaster management and geoscientific study. With the use of machine learning methods, this work gives a thorough investigation of earthquake data analysis and prediction. Multiple machine learning models for predicting the state of earthquakes are implemented in this study, after extensive data preparation and exploratory data analysis.

Project Title:
Towards Developing University Admission Prediction System using Stacked Ensemble Learning

Project Description:
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In this research, a stacked ensemble model that predicts the chances of being admitted of a student to a particular university has been proposed. The proposed model takes into consideration numerous factors related to the student including their research experience, industry experience etc. Further, the system proposed has been evaluated against various other machine learning algorithms including other deep learning methods.

Maimoona Sharif

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Areas of Expertise and Interest:

- Multilingual Sentiment Analysis (MSA) using NLP Techniques and Language Models.
- Cryptocurrency Price Prediction (CPP) using social media, News and Historical Data.
- Machine Learning (ML) Algorithms and Experiments for Financial Forecasting.
- Financial Technology (FinTech) Predictive Analytics and Market Performance.
- Big Data Processing and Applications in Multilingual and Multi-Modal Contexts.
- Explainable Artificial Intelligence (XAI) for Trustworthy Financial Modelling.
- Time Series Forecasting (TSF) in High-Volatility and Non-Stationary Markets.
- On-Chain Data Analytics (OCDA) and Blockchain Transaction Modelling.
- Decision Support Systems (DSSs) Powered by AI for Investor Insights.
- AI-Augmented Human-Centered Financial Systems and Applications.
- Python, React, SQL and APIs for Data-driven Financial Systems.
- Biometric Security and Presentation Attack Detection.

Project Title 1:

Explainable AI (XAI) for FinTech Applications.

Project Description:

Financial forecasting often relies on black-box models that limit trust and adoption. This project aims to design explainable AI frameworks for FinTech applications, with a focus on cryptocurrency price prediction. The student will apply SHAP, LIME, and other interpretability tools to identify which features (e.g., sentiment, historical data, or on-chain transactions) drive price fluctuations. The outcome will be an AI model that not only predicts but also explains its decisions in human-readable terms.

Key Skills: Machine learning, explainable AI frameworks, Python.
Desirable Skills: Finance/FinTech domain knowledge.

Project Title 2:

Big Data Pipeline for Multilingual Financial Sentiment Analysis.

Project Description:
With growing multilingual data sources, processing efficiency is critical. This project will design a big data pipeline using tools such as Apache Spark or Hadoop for real-time sentiment extraction from news and social media. The aim is to scale up financial sentiment analysis to handle large volumes of text across multiple languages and integrate results into predictive models for cryptocurrency or stock price movements.

Key Skills: Big data tools, NLP, Python.
Desirable Skills: Cloud computing (AWS, GCP, or Azure).

Project Title 3:

Human-Centered AI for Detecting Fake or Manipulated Financial News.

Project Description:
Fake or manipulated news can distort cryptocurrency markets. This project will develop an AI system capable of identifying fake or misleading financial news articles and videos using NLP and sentiment features. The student will build a dataset of genuine vs. fake news, train classifiers and evaluate performance. The extended work may include designing explainable interfaces to support users in understanding why certain content was flagged.

Key Skills: NLP, text classification, Python.
Desirable Skills: Video analysis, misinformation detection.

Project Title 4:

Fake News Video Detection using GPT and Whisper.

Project Description:
This project focuses on detecting fake or manipulated financial news videos using OpenAI Whisper (for speech-to-text transcription) and GPT (for text analysis). The system will extract transcripts from financial videos analyse content for misinformation patterns and classify them as real or fake. The extended goal is to design a prototype detection tool for regulators or financial institutions.

Key Skills: Speech-to-text, NLP, misinformation detection.
Desirable Skills: Video analysis, OpenAI Whisper API.

Project Title 5:

OpenAI-Powered GeoAI for Financial Market Events.

Project Description:
This project combines OpenAI GPT with Geographic Information Systems (GIS) to analyse the geospatial impact of financial events. For example, crypto mining news or government regulations often have regional impacts. GPT will extract event-related information from multilingual news while Python geospatial tools (e.g., GeoPandas) will visualize event hot spots.

Key Skills: NLP, geospatial data analysis, Python.
Desirable Skills: GIS tools, financial event analysis.

Project Title 6:

AI-Driven Anomaly Detection in Cryptocurrency Markets.

Project Description:
This project uses GPT-based sentiment signals and historical price data to detect anomalies in cryptocurrency markets (e.g., flash crashes, suspicious spikes). The student will train ML models to identify patterns that deviate from normal behaviour and test whether sentiment shifts can predict anomalies.

Key Skills: Time series anomaly detection, machine learning, NLP.
Desirable Skills: Blockchain analytics, financial modelling.

Project Title 7:

Combating Online Disinformation: Using NLP and Machine Learning to Identify Deceptive Content.

Project Description:
This project aims to investigate how Natural Language Processing (NLP) and Machine Learning (ML) can be applied to detect and classify deceptive or misleading online content. The student will collect a dataset of genuine and deceptive text (such as fake news articles, misleading tweets or fraudulent reviews) and apply NLP techniques to extract linguistic and semantic features. Machine learning algorithms (e.g., Logistic Regression, Support Vector Machines, Random Forests or Neural Networks) will then be trained to distinguish between truthful and deceptive content. The project may also explore visualization techniques to present detection results and evaluate model performance.

Key Skills: Natural Language Processing, Machine Learning, Python programming.
Desirable Skills: Data preprocessing, text classification, data visualization.

Project Title 8:

Face Spoofing Detection using OpenCV for Remote Identity Verification.

Project Description:
This project focuses on detecting basic face spoofing attacks in remote identity verification systems. Spoofing attacks often use printed photos, mobile screens or replayed videos to trick face recognition software. The student will use OpenCV and basic image processing techniques (such as eye blink detection, motion analysis or texture analysis) to distinguish real faces from spoofed ones. A small dataset of genuine

and spoofed face inputs will be collected for testing. The goal is to build a lightweight system that demonstrates how simple computer vision techniques can enhance biometric security.

Key Skills: Python, OpenCV, Image Processing.
Desirable Skills: Basic Machine Learning, data collection, report writing.

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Areas of Expertise and Interest:

- Artificial Intelligence & Machine Learning
- Computer Vision and Image processing
- Deep Learning
- CNN and SVM
- Predictive models with time series analysis
- Image processing
- Data Analysis & Data Engineering
- Data Visualization and Interpretation
- Predictive analytics using IoT Data
- Big Data and Realtime analytics
- Python/Java, MySQL, PostgreSQL, Django, Flash & Spring boot

Project Ideas

Project Title:
Object Detection for Autonomous Vehicles using Machine Learning

Project Description:
The self-driving technology thrives on the unique opportunity to solve key challenges in autonomous vehicle development, focusing on 3D object detection over semantic maps. This is crucial for improving vehicle security, prediction, planning, enabling self-navigation. Automated vehicles promise to reduce accidents, ease traffic congestion and lower emissions, enhancing unban life. By providing a large-scale dataset of raw sensor data opens doors for research community to innovate in this area. Student can leverage their data analysis skills to develop

advanced algorithms, using machine learning and computer vision to the future of self-driving technology.

Project Title:
Energy Consumption Optimization

Project Description:

Use of smart homes or smart gride involves finding the most effective way to use optimization energy recourse while consumption minimize environment impact. This involves demand-side management, peak load reduction, energy efficiency and user preferences. In this project students need to develop AI-driven solutions that can effectively predict energy usage, identify areas for optimization and implement strategies to reduce consumption while maintaining comfort and functionality.

Project Title:
IoT Data Analysis Framework

Project Description:
IoT Data Analytics are design to process and analyze the vast amount of data generated by Internet of Things devices in real time. These frameworks provide the necessary tools and infrastructure to efficiently handle the high-volume, high-velocity and high-variety nature IoT data. By leveraging IoT data analytics frameworks it eases of the full potential of IoT deployments, gain valuable insights and driven innovation.

Project Title:
Predictive Analysis for Patient Outcomes

Project Description:
The objective of this project is to create a model that can accurately predict the probability of a patient developing condition based on their medical history. To vigorous predictive model using machine learning techniques, accurate predication can enable early innervation improve patient outcomes and optimize resource allocation.

Project Title:
University Course Management System

Project Description:
Design and Implementation of a system to manage courses/circulars using tools and technologies to develop Backend and frontend with web frameworks to streamline a development process. In

this project student need to do careful consideration of feature, security and comprehensive management systems to meet the need of university community.

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Details to be shared soon.

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Areas of Expertise and Interest:

- Big Data
- AI in Healthcare
- Generative AI
- AI in Sports
- AI in Geology
- Digital waste Management
- Digital Portfolio and AI
- AI based learning
- NLP
- RAGs, LLMs

Project Ideas

1. Big Data

- **Real-Time Big Data Analytics for Environmental Monitoring:**

Develop a system that collects and analyzes real-time environmental data from sensors (e.g., air quality, temperature, soil moisture) to detect patterns, trends, and potential environmental threats, helping in conservation and climate change analysis.

- **Predictive Maintenance in Industrial IoT using Big Data:**

Use big data techniques to analyze large datasets from IoT sensors in industrial machinery. This system will predict equipment failures before they happen, reducing downtime and maintenance costs by optimizing the repair schedules.

2. AI in Healthcare

- **AI-based Early Disease Detection System:**

Create a machine learning model that analyzes patient data (medical records, test results, images) to detect diseases at an early stage. The model can assist doctors by identifying early signs of conditions like cancer or heart disease.

- **AI-Powered Personalized Healthcare Recommendations:**

Develop an AI platform that analyzes a patient's medical history and lifestyle data (e.g., wearables, diet) to offer personalized healthcare advice, like preventive measures, treatments, or exercise routines.

3. Generative AI

- **AI-Generated Medical Reports:**

Use generative AI to automate the process of creating comprehensive medical reports by summarizing test results, patient history, and treatment data, reducing the burden on healthcare professionals.

- **AI-Generated Art and Music for Therapy:**

Build a generative AI model that creates personalized art or music to help patients with mental health conditions or trauma. The AI will adapt based on patient feedback, potentially enhancing therapeutic outcomes.

4. AI in Sports

- **AI-Powered Performance Analytics for Athletes:**

Create an AI tool that tracks and analyzes performance data (e.g., speed, endurance, recovery time) of athletes. The system will provide insights to optimize training, prevent injuries, and improve performance.

- **Generative AI for Simulating Game Strategies:**

Design a generative AI model that simulates different game strategies for team sports, helping coaches plan optimal tactics. The AI can analyze past games and player stats to recommend strategies for upcoming matches.

5. AI in Geology

- **AI-Based Earthquake Prediction System:**

Build an AI model that analyzes seismic data to predict earthquakes. The system could improve prediction accuracy and provide earlier warnings, helping to mitigate the impact of natural disasters.

- **AI for Mineral Exploration:**

Develop a machine learning model that analyzes geological data (satellite images, soil samples) to identify potential areas rich in mineral deposits, streamlining the mineral exploration process.

6. Digital Waste Management

- **AI-Powered Waste Sorting System:**

Create a smart waste sorting system that uses computer vision and AI to sort waste (plastic, glass, metal, etc.) more efficiently. This system could be used in recycling plants to improve recycling rates and reduce waste.

- **Predictive Analytics for Waste Collection Optimization:**

Develop a system that uses machine learning to predict the amount of waste generated in specific areas and optimize collection routes. This will help reduce fuel costs, emissions, and operational inefficiencies.

7. Digital Portfolio and AI

- **AI-Powered Career Portfolio Advisor:**
- Build an AI tool that analyzes a user's digital portfolio (GitHub, LinkedIn, Behance) and provides tailored recommendations for improving their skills, enhancing their portfolio, or suggesting career paths based on industry trends.
- **AI-Powered Portfolio Analysis for Artists or Developers:**

Create an AI tool that reviews artists' or developers' portfolios and provides personalized feedback, such as areas for improvement, emerging trends to follow, or skill gaps to fill based on current market demand.

8. AI-Based Learning

- **Personalized AI Tutor for STEM Subjects:**

Develop an AI tutor that provides personalized learning experiences for students in subjects like math, physics, or programming. The system adjusts lesson plans based on the student's strengths and weaknesses to improve learning outcomes.

- **AI-Powered Language Learning Assistant:**

Build an AI-powered language learning app that tailors lessons based on a learner's progress. The AI could offer real-time feedback, exercises, and pronunciation help, adapting to the user's learning style and pace.

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Moses Bankole

Areas of Expertise and Research Interest:

- Computer Security
- Cybersecurity
- Network Security
- Technology-Enhanced Learning
- Internet of Things (IoT)
- Intelligent Transport Systems (ITS)
- Intrusion Detection Systems (IDS)
- Software Defined Networks (SDN)
- Artificial Intelligence (AI) & Machine Learning (ML)

Project Ideas for Undergraduate Final Year Students:

1. **AI-Driven Intrusion Detection System for IoT Networks**
    a. Design and implement a lightweight IDS that leverages machine learning techniques to detect and mitigate cyber threats within IoT-enabled environments.
2. **Blockchain-Enabled Secure Intelligent Transport System (ITS)**
    a. Explore the integration of blockchain technology with intelligent transport systems to ensure secure communication and data integrity between connected vehicles and infrastructure.
3. **Adaptive Network Security Using Software Defined Networks (SDN)**
    a. Develop an SDN-based framework that can dynamically monitor, analyze, and respond to network security threats in real time using AI algorithms.

4. **Gamified Learning Platform for Cybersecurity Awareness**
    a. Create an interactive and gamified technology-enhanced learning platform aimed at improving cybersecurity knowledge and awareness among students and non-technical users.
5. **Hybrid Machine Learning Models for Malware Detection**
    a. Implement a hybrid malware detection system that combines supervised and unsupervised machine learning methods to identify known and unknown threats more effectively.
6. **IoT-Enabled Smart Campus Security System**
    a. Design and deploy an IoT-based campus surveillance and access control system with AI-powered anomaly detection to enhance safety and security within a university environment.

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Areas of Expertise and Interest:

- Cybersecurity, Cloud computing, Cryptocurrency, Quantum computing.
- Machine learning techniques for predictive modelling, AI tools in the financial/banking sector.
- Deep Learning, Natural Language Processing, Web designing languages.
- Structured Query Language, programming languages C, Java, C++.
- Data science (data visualization libraries) in the industry sector, Blockchain Technologies.
-

Project Ideas

Project Title: Digital Badge and Certification Generation Software

Project Description: Developed and introduced digital badge and certificate generation software on a web portal to allow users to register, log in to their dashboard, reset their password, monitor their acquired certificates, and request a new badge/certificate as per desired certificate template. Users could also share their acquired badges/certifications and download them as pdf printable versions. The roles and responsibilities involved -

- Assisting product owners and scrum masters in backlog management, sprint planning, and retrospective to ensure zero impact on delivery.
- Analysing, gathering requirements, requirement elicitations and developing application code in Django, Bootstrap 5, Python and Sqlite3.
- Performing unit, integration, and regression testing.
- Preparing detailed design documents, unit test plans, unit test reports and corresponding documents of understanding.
- Working on all phases of the project life cycle.

Organising workshops and reaching out to project stakeholders for queries and resolutions to meet the agenda.

Project Title: Music Streaming Cloud Architecture in AWS

Project Description: The project was built to enhance the music streaming service in a music organisation. The main agenda was to expand the organisation's customer business, developed their products, cost variance, flexibility, scalability of IT infrastructure, profitability, and many more through an AWS modern application architecture.

- Analysing, gathering requirements, designing, and implementing the music streaming application in AWS cloud using services –

  a) Amazon Route 53, b) Elastic Load Balancing, c) Amazon Elastic compute cloud instances, d) Amazon Relational Database Service,

e) Amazon Elastic Transcoder, f) Amazon S3, g) Amazon Cloud Front, h) Amazon Simple Email Service, i) Amazon SNS notifications and

j) Amazon CloudWatch Alarms.

Project Title: **Retrieving YouTube data for developing a dataset to train a model and generating a visualization report**

Project Description: Building a public dataset for coaching, counselling, parenting, and mentoring conversations using Python.

- Retrieving the information of YouTube videos using API.
- Storing the downloaded videos in the AWS cloud platform using the S3 bucket.
- Reading the videos from the S3 bucket and extracting the transcript in JSON format
- Investigating the data trend and pattern by building a dashboard report using Power BI.
- Cleaning, filtering, and labelling the data to train a Bidirectional Encoder Representations from Transformers (BERT) model.
- Developing the model to perform a question-answering solution from the transcript data.

Project Title: **Large-scale Music Genre Analysis and Classification using Machine Learning with Apache Spark**

Project Description: Analysing and visualising statistical features of music from a single large GTZAN dataset.

- Developing and implementing an ensemble learning model Random Forest to classify the types of music (music genres).
- Using Apache Spark to process data parallelly and reduce the duration of machine learning predictions for better performance.
- Implementing multiple machine learning algorithms such as Decision Tree, Logistic Regression, and Naïve Bayes to compare the performance efficiency with Random Forest for the recognition of music genres.
- Developing music genre analysis and classification of the back-end engine using PySpark and Python based on requirements.
- Achieving 90% accuracy for the classification of music genres using the back-end engine.
- Creation of thesis proposal and report which included – the aim and objectives of the research project, literature review, data collection, implemented methodology, evaluating, discussing, and critiquing of the results.

Project Title: **Investigation of Medical Images Classification based on Deep Learning**

Project Description: The research project dealt with medical image classification of the human body in clinical diagnosis and the detection of the deadliest diseases in the world. It was executed in MATLAB which included -

- Designing, investigating, and implementing a convolutional neural network with a deep learning approach for the classification of medical images.
- Investigating the medical MNIST dataset (researched by a few image enhancement techniques to increase the percentage of correctly classified sample grayscale medical images.
- Analysing different combinations of learning rate sets and different optimization algorithms based on the convolutional neural network to increase the performance of the model.
- The experimental results showed that the designed convolutional neural network could solve the classification problem with high accuracy of 99.93%.

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Areas of Expertise and Interest:

- Predictive, modelling, Recommender systems, Fintech, Business analytics, strategy,
- Machine/Deep Learning
- Generative Artificial Intelligence
- Data Science and Big Data analytics
- Psychology + Ai

Project Ideas

Project Title:

Pain Detection using BCI

Project Description:

The project aims at using brain computer interface & interaction to detect pain from brain signals. Initially at simulation stage, we will be using simulated dataset and apply the machine learning models to detect the pain patterns from brain. In the last stage, hardware might be used to store the brain signals at the deployment stage.

Project Title:

The effect of social media on crypto market

Project Description:

The project aims at investigating the effect of the social media over crypto market. The crypto market being very skeptical to external noise is hugely effected by news and social media. The

projects aim at detecting the sentiment of social media towards crypto and predicting the trend of a stock using machine learning models.

Project Title:

Predicting stock market using social media, news, and business data

Project Description:

The project aims at investigating the effect of the social media, business news, and general news over stock market data. The project will be using deep learning blending techniques to fuse the different type of data into a model and predict the trend of a stock.

Project Title:

Recommender systems

Project Description:

The project aims at building scalable recommender systems algorithms and computer apps. The project might use existing algorithms to deploy the recommender systems to recommender certain products, e.g. movie, restaurant, cars, schools etc.

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Areas of Expertise

- Artificial Intelligence, Machine Learning, Deep Learning, Data Science
- Big Data Analytic and Data Visualisation
- Cyber Security Crime Mining through Social media, Anomaly Detection, Intrusion Detection
- Computer Vision & NLP
- Software Engineering

Project Ideas

In all of these projects, students will learn how to apply the AI/machine learning algorithms in areas such as cyber security, big data and computer vision. Preferred language is Python, but students can use any language of their choice. All of these project are for

- *Project Title Deep Fake video detection using GAN*

This project will apply GAN technology to detect the fake video on social media using KERAS or pytorch.

- *Project Title : Applying AI to prepare the lesson content for the students based on their prior knowledge about the module.*
  This project will used NLP and chatbot to create student specific content .

- *Project Title : Human Activity detection using IoT and Video image analysis*
- *Project Title : Emotion detection in Speech*
- *Project Title : Emotion ,anxiety ,lie detector etc using BCI sensors and simulated data.*

Project Title:
Deep learning algorithm using CT images to screen for Corona Virus Disease/lungs cancer etc

Project Title: Multimodal AI-Powered Diagnostic Assistant for Primary Care
Objective
Build an AI system that can assist in preliminary diagnosis by integrating:
Medical images (e.g., skin lesions, X-rays)
Patient voice input (symptoms described verbally)
Clinical text data (notes, history, prescriptions)

Key Components

1. Image Analysis Module
Use CNNs (e.g., ResNet, EfficientNet) to classify medical images.
Example: Detect skin conditions or pneumonia from chest X-rays.
2. Voice-to-Text Conversion
Use Whisper or Google Speech API to transcribe patient speech.
Input: “I’ve had a sore throat and fever for 3 days.”
3. Text Understanding Module
Use ClinicalBERT or BioGPT to process transcribed symptoms and clinical notes.
Extract entities like symptoms, duration, severity.
4. Fusion Strategy
Intermediate Fusion: Encode each modality into embeddings and fuse before prediction
2
.
Combine image features + text embeddings + voice-derived text.
5. Diagnosis Prediction
Use a multimodal transformer or ensemble model to predict possible conditions.
Output: “Likely diagnosis: Strep throat. Recommended: Visit GP, consider throat swab.”
6. Text-to-Speech Response
Use Google TTS or pyttsx3 to speak the diagnosis back to the user.

💡 *Project Idea*

Develop a multimodal AI system that detects patient emotions during teleconsultations by analyzing:

Text,Voice: Tone, pitch, and speech patterns,Facial Expressions: Real-time video feed The system will classify emotions (e.g., sadness, anger, fear, happiness, neutral) and flag potential mental health risks for clinicians.

Project Title:

Sentiment Analysis of social media focusing on fake news

Project Title:

"EEG-Based Emotion Recognition for Early Detection of Mental Health Disorders Using BCI"

💡 Project Idea

Develop a BCI-based system that uses EEG signals to detect emotional states (e.g., stress, sadness, happiness, fear) and flags potential mental health risks. The system can be used in:
Clinical settings for early diagnosis
Remote monitoring for vulnerable populations
Therapy support to track emotional progress

📦 Datasets You Can Use

DEAP: EEG signals labeled with emotional states
SEED: Chinese emotion dataset with EEG recordings
DREAMER: Multimodal dataset with EEG and physiological signals

Project Title:

"Medical Image Synthesis and Augmentation Using GANs for Rare Disease Diagnosis"

Real-World Problem
In medical imaging, especially for rare diseases, datasets are often small and imbalanced. This limits the performance of deep learning models used for diagnosis. GANs (Generative Adversarial Networks) can generate realistic synthetic medical images to augment datasets, improving model accuracy and generalization.

💡 Project Idea
Build a GAN-based system that:
Generates synthetic medical images (e.g., chest X-rays, MRIs, CT scans) for rare conditions.
Augments existing datasets to balance class distribution.
Improves diagnostic model performance by training on both real and synthetic data.
You can use DCGAN, StyleGAN, or CycleGAN depending on the image type and modality

🧪 Technologies & Tools
GAN Architectures: DCGAN, StyleGAN2, CycleGAN
Frameworks: PyTorch or TensorFlow
Datasets: NIH Chest X-ray, MIMIC-CXR, or COVIDx
Evaluation: FID (Fréchet Inception Distance), SSIM, classification accuracy

Project Title:
Building a University ENQUIRY CHATBOT

Project Description:
This project is focusing on creating a chatbot to be used by students to get their queries responded easily from the university website. It will involve machine learning, text mining and speech recognition.

Project Title:
Identifying Fraud Detection in Credit Card transactions

Project Description:
The aim of this project is to build a classifier that can detect credit card fraudulent transactions. We will use a variety of machine learning algorithms that will be able to discern fraudulent from non-fraudulent ones.

Project Title:
Network intrusion/ Android Malware Detection through Deep learning.

Project Description:
This project will be based on literature review in the field of the Network intrusion/ Android Malware and later will use dataset to detect the attacks, finding associations for the type of the attacks with the other features.

Project Title:
Uber Data Analysis & visualization

Project Description:
Data storytelling is an important component of Data Science to understand the background of various operations. In this project the objective is to understand insight of the uber data for storytelling. The student will learn techniques of data visualisation and will apply them to understand the complex data of uber pickups dataset.

Project Title:
Identifying Parkinson Disease

Project Description:
The objective is to differentiate the healthy people from the people having the Parkinson disease using Machine Learning techniques for classifications.

Project Title:
Object identification and detection for self driving cars

Project Description:
This project will provide an opportunity to learn how to apply the deep learning techniques for object classification and detection for self-driving cars. The focus will be to identify the traffic signs using AI.

Project Title:
Human Activity Detection using Deep learning for smart homes.

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Areas of Expertise and Interest:

- Multi-Agent Systems
- Machine Learning
- Deep Learning
- Home Automation Systems
- Crowd management and monitoring systems

Project Ideas

Project Title
Representing the movement and behaviour of pedestrians in crowded environments

Project Description
Different types of structures such as high-rise buildings, shopping malls, train stations, airports amongst others typically comprise of large numbers of pedestrians or commuters. To ensure that these buildings and structures are safe, it is important to demonstrate that these buildings allow safe movement and circulation of pedestrians. Computational simulation models (based on multi-agent systems), are used in industry, to assess whether these buildings are safe, especially during emergency situations. This project involves development of a multi-agent system that can represent the movement and behaviour of pedestrians.

Project Title
Real-time detection of pedestrians in crowded environments

Project Description
It is crucial to be able to detect the movement of pedestrians especially in crowded environments such as music concerts, festivals, underground train stations amongst others. This can help detect the occurrence of excessive crowd levels and potential bottlenecks. This project involves the use of computer vision techniques and technologies to help detect scenarios with excessive crowd levels.

Project Title
Home Automation Systems: Intruder detection within smart home environments

Project Description
Ensuring surveillance within residential environments is indispensable and the ability to detect potential intruders is becoming an increasing concern. Nowadays, houses can be equipped with CCTV cameras, however intelligent systems are required to detect potential intruders and provide real-time notifications. This project will involve the use of IoT based sensors/technologies and computer vision techniques to detect intruders in smart home environments.

Project Title
Students are also encouraged to propose their own titles in related areas e.g. Intelligent Systems, Machine Learning, Deep Learning, IoT.

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Areas of Expertise and Interest:

- Operating Systems and Virtual Machines
- Computer Network
- Systems Administration
- Internet of Medical Things
- Education/Learning enhancement using New Technologies (AI, Machine Learning, Cloud Computing, Virtual Lab, Online Teaching,…)
- Bring Your Own Device (BYOD)

Project Ideas

Project Title:
Complete Administration of Charitable organisations via the Internet

Project Description:
This project will provide a client (An International charitable organisation) with an administration tool to manage its membership, voting system, funding application, etc. An All-in-One system that gives directors/trustees, different categories of members of an organisation a secured tool to contribute to its management and allows the public to fund its activities.

Project Title:

Gamification approach to education compared to traditional teaching methods

Project Description:
This project will explore the viability of the gamification approach to teaching by analysing gamification against traditional teaching methods. The aim is to develop a mobile system that can be used as a helpful utility for teachers to engage students while ensuring that learning is still taking place.

Title: BYOD in Classrooms – A Mobile App for Collaborative Learning

Aim: To design a mobile app that supports collaborative learning in BYOD classrooms.

Objectives:

- Research BYOD adoption and challenges in education.
- Design app for live polls, quizzes, and file sharing.
- Implement real-time collaboration features.
- Evaluate adoption and usability with students.

Tools/Technologies: Android Studio, Firebase, Flutter, Node.js backend.

Methodology: Literature review, app design, prototype implementation, classroom pilot testing.

Expected Outcomes: Collaborative mobile app, student participation improvement, BYOD adoption strategies.

Title: BYOD Security Risk Analysis with Machine Learning

Aim: To develop an ML-based system that evaluates BYOD (Bring Your Own Device) connections to a network and assigns risk scores to enforce security policies.

Objectives:

- Collect device usage and behaviour data (apps, OS version, network access).
- Train models to classify devices into trust categories (high/medium/low risk).
- Integrate trust score with network access policies.
- Test system in a simulated BYOD environment.
- Provide recommendations for institutional BYOD deployment.

Tools/Technologies: Python, scikit-learn, Android/Linux devices or simulators, Network Access Control (NAC) frameworks.

Methodology: Literature review, build dataset from device/network simulations, Train classification models (Naïve Bayes, Random Forest), Test access control integration with NAC tools, Evaluate accuracy and usability.

Expected Outcomes:

- ML-based device trust scoring system.

- Improved network security in BYOD contexts.

- Prototype for use in educational or corporate networks.

Pedram Jahed

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With professional experience as a Data Analyst across different industries, my academic and supervisory interests focus on areas that combine computer science with applied, data driven approaches. I am particularly interested in Data Analytics, Machine Learning, Cloud Computing and Big Data Technologies, as well as Data Visualisation, Natural Language Processing and Geospatial Analysis.

For undergraduate projects, I encourage students to take on challenges that are practical, relevant and achievable, regardless of whether they are more interested in programming, applied analysis or conceptual problem solving.

Potential project areas include:

- **Data Analysis & Machine Learning**: Forecasting trends, predicting outcomes or uncovering hidden patterns in real world datasets.
- **Data Visualisation & Communication**: Designing interactive dashboards, reports or infographics that communicate findings clearly to different audiences.
- **Natural Language & Social Media**: Sentiment analysis, opinion mining or exploring public conversations around social issues.
- **Geospatial Applications**: Mapping transport networks, environmental patterns or tourism activities using location-based data.
- **Cloud & Scalable Systems**: Developing simple cloud based solutions for processing or storing large volumes of data.

- **Interdisciplinary/Creative Approaches**: Applying computational methods in health, business, education or creative fields.

These topics are designed to give students flexibility. They may be approached in a more technical way by those wishing to strengthen their coding and analytical skills or in a more applied and creative way by those drawn to problem solving, communication and real-world impact.

Ragulgowtham Panneer Selvam

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Areas of Expertise and Interest:

- Big Data Technologies
- Machine Learning and Data Science
- Real-time Data Processing and Streaming
- Predictive Analytics in Transportation and Road Safety
- Spatial Data Analysis
- Cloud Computing (AWS and Azure)
- Data Visualization Techniques
- Data Engineering and ETL Processes

Happy to discuss any additional project ideas you might have related to the above-mentioned areas of interest.

Project Ideas:

These projects require a curious and self-motivated individual ready to engage in the entire process, including dataset collection, ETL processes (data cleaning, processing, and transformation), creation of machine learning models, and effective visualisation of results, often utilising cloud services like AWS or Azure. Knowledge of, or interest in learning, key IT skills such as Python, SQL, Power BI, and cloud computing will be essential, depending on individual project requirements.

Project Title 1: ETL Process Optimisation for Big Data Analytics

Project Description:

Investigate ways to improve ETL processes in big data environments by simplifying data extraction and transformation workflows using tools like AWS Glue, Azure Data Factory, or Cloud Data Fusion in health care or finance domain.

Note: This project may help students pursue roles in data engineering and ETL development. **Recommended for Students Aspiring to These Career Roles:** Data Engineer, ETL Developer, Big Data Architect.

Project Title 2: Predictive Road Safety Analytics with Machine Learning

Project Description:

Develop a predictive analytics model to analyse road safety data, using machine learning to identify trends and high-risk areas. The aim is to provide useful insights for improving road safety measures and reducing accident rates, using tools like Python and Azure services.

Note: This project may help students pursue roles in road safety analysis and data science in transportation.

Recommended for Students Aspiring to These Career Roles: Road Safety Analyst, Data Scientist in Transportation, Transportation Safety Consultant.

Project Title 3: Real-time Traffic Monitoring System

Project Description:

Create a system that collects data from various sources, such as weather APIs and sensor data, to provide real-time traffic conditions and predictive insights. The goal is to improve road safety and optimise traffic flow using cloud-based solutions and machine learning algorithms.

Note: This project may help students pursue roles in transportation analytics and urban planning.

Recommended for Students Aspiring to These Career Roles: Transportation Analyst, Urban Data Scientist, Smart City Planner.

Project Title 4: Predictive Maintenance of Lifts and Escalators Using Machine Learning

Project Description:

This project involves building a predictive maintenance system for lifts and escalators using machine learning. By analysing sensor data, operational metrics, and historical failure records, the system will predict potential breakdowns and suggest maintenance actions in advance to reduce downtime and improve equipment reliability.

Note: This project may help students pursue roles in maintenance analysis and IoT solutions.

Recommended for Students Aspiring to These Career Roles: Maintenance Analyst, Data Scientist in Engineering, IoT Solutions Architect.

Project Title 5: Climate Change Impact Analysis

Project Description:

Analyse the effects of climate change on agricultural productivity using historical climate data and crop yield information. The data will be processed in Azure Data Factory and modelled using Azure Machine Learning.

Note: This project may help students pursue roles in environmental analysis and agricultural research.

Recommended for Students Aspiring to These Career Roles: Environmental Data Analyst, Agricultural Data Scientist, Climate Change Analyst.

Project Title 6: General Visualisation Dashboard in Finance / Healthcare

Project Description:

Design an interactive dashboard to display key metrics and insights from historical data across different sectors. The dashboard will use tools like Power BI to provide meaningful visualisations for decision-making in areas like finance, business analytics, environmental monitoring, or healthcare.

Note: This project may help students pursue roles in data analysis and business intelligence.

Recommended for Students Aspiring to These Career Roles: Data Analyst, Business Intelligence Developer, Data Visualization Specialist.

Reena Popat
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Areas of Expertise and Interest:

- Cloud Computing
- Machine learning with real-time systems and its potential in healthcare for personalized treatments, diagnostic advancements, and proactive care systems.
- Data visualization, statistical analysis.
- Database Management system.
- Distributed System using Blockchain.
- Software development lifecycle (SDLC)
- Big data

"As you start your research, the most important step is choosing a topic that truly interests you. Once you have a few ideas, immediately check two things: Can you find the necessary data, and can you actually complete the project within the academic year? Below are a few ideas to consider.

Project Title: **Anomaly Detection in Large-Scale Datasets: A Comparative Study of Machine Learning, and Deep Learning Techniques.**

Project Description: This project aims to investigate and compare the effectiveness of various machine learning and deep learning algorithms in detecting anomalies within large-scale datasets. The focus will be on anomaly detection techniques that can be applied to a wide range of domains, including but not limited to:
The focus will be on anomaly detection techniques that can be applied to a wide range of domains, including but not limited to:

- **Credit card fraud detection:** Identifying unusual patterns in credit card transactions, insurance claims, or stock market data.
- **Network intrusion detection:** Detecting malicious activities in computer networks.
- **Healthcare outlier detection:** Identifying unusual patient records or medical outcomes.

Project Title: Heart Failure Prediction at an Early stage using Machine Learning.

Project Description: This paper refers to the research and development of methods to predict the onset of heart failure in individuals before they exhibit severe symptoms. It implies the use of advanced techniques, such as machine learning, to analyse various medical and lifestyle factors to identify individuals at high risk for developing heart failure early in life.

Early Detection: The focus is on predicting heart failure before it becomes a major health problem using Machine Learning.

Project Title: **Unveiling Healthcare Insights using visualization Power BI Dashboard:**

Project Description: This project aims to develop a comprehensive Power BI dashboard to analyse patient outcomes and identify areas for improvement in healthcare delivery. By leveraging the power of data visualization and analytics, this dashboard will provide valuable insights into patient demographics, diagnoses, treatments, outcomes, and associated costs.

Data Sources:

- Electronic Health Records (EHRs
- Clinical Trials
- Administrative Databases
- Surveys and Feedback

Project Title: **Security Challenges in Multi-Cloud Environments**:

Project Description: This research project aims to identify the security risks associated with multi-cloud environments and propose practical solutions to mitigate these risks. By analysing real-world case studies and existing frameworks, the project will provide a comprehensive understanding of the security landscape in multi-cloud architectures.

Project Title: Predicting Stock Market Trends Using Apache Spark:

Project Description: The goal of this project is to predict stock price trends based on historical time-series data, helping traders make informed decisions.

Project Title: AI for Medical Image Diagnosis

Project Description: Develop a model to classify medical images (e.g., X-rays, MRIs) for early disease detection.

Programming Language: Python

Skills: Deep learning, computer vision, medical imaging.

Project Title: Sentiment Analysis for E-Commerce Reviews

Project Description: Developing and comparing different NLP models to classify customer reviews as positive, neutral, or negative.

The project would involve data cleaning, feature engineering, model training, and performance evaluation.

Project Title: Image Recognition for Retail Inventory
Description: Building a model to automatically identify and classify small product images for automated inventory tracking.

Requires image data collection/augmentation and training a deep learning model.

Project Title: Customer Churn Prediction in Subscription Services

Description: Developing a model to predict which customers in a telecom, streaming, or SaaS business are most likely to cancel their subscription.

Skills: Survival analysis or common ML classification algorithms.

Dr Rawad Hammad

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Areas of Expertise and Interest:

- Artificial Intelligence
- Human Computer Interaction
- Technology-Enhanced Learning
- Smart Health
- Analytics
- Business Process Management (I.e., Modelling and Enactment)
- Multimodal Learning Analytics

Project Ideas

Project Title:
Multimodal learning analytics

Project Description:
Using different sources of data coming from different devices connected to certain learning environments/contexts can be used to analyse student's interaction with various tools to improve his/her learning in various ways including recommending resources or linking with peers. This project requires knowledge in education, sensors, data analytics and ML.

Project is suitable for the following programmes of study:
Computer Science

Project Title:
Predicting health from personal data

Project Description:
Data gathered about personal medical history can be used to get further insights into current and future personal health conditions. This can be useful to describe current health situation and to predict future unknow conditions such as depressions.

Project is suitable for the following programmes of study:
Computer Science

Project Title:
Predicting micro and macro-economic factors using AI

Project Description:
Using large data sets about specific economic-related concerns to predict future actions. For instance, predicting house prices based on large data sets available from authorised sources can be done using various AI techniques. This will be extremely beneficial for individuals as well as communities. Students need to be aware of digital economy, ML, AI and analytics.

Project is suitable for the following programmes of study:
Computer Science

Project Title:
Big Data/Analytics for game-based learning

Project Description:
Using big data and analytics algorithms to customise and personalise gamified learning journey for various learners. The target audience for such a project include university students, school pupil and any citizen who would like to engage actively in their learning journeys. The area you want work in could be in design, analytics, evaluation or other areas. In general, students need to be aware of AI, ML and analytics.

Project is suitable for the following programmes of study:
Computer Science, and other programmes based on interest

Project Title:
Predicting micro and macro-economic factors using AI

Project Description:
Using large data sets about specific economic-related concerns to predict future actions. For instance, predicting house prices based on large data sets available from authorised sources can be done using various AI techniques. This will be extremely beneficial for individuals as well as communities. Students need to be aware of digital economy, ML, AI and analytics.

Project is suitable for the following programmes of study:
Computer Science

Salma Soofiyan
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Areas of Expertise and Interest:

- Blockchain & Smart Contracts
- AI & Deep Learning for Object Detection
- Cybersecurity & Malicious Activity Detection in Networks
- Machine Learning for Threat Detection
- Decentralized Applications (DApps)
- AI-Powered Automation in Cyber Defense
- Cloud-based AI and Blockchain Integration
- Edge Computing and AI for Real-time Detection

Project Ideas

Project Title:

Simple Blockchain System for Detecting Fraud in Supply Chains

Project Description:

This project will create a basic system using blockchain to track products in a supply chain (from suppliers to retailers). The system will use smart contracts, which are simple programs that automatically check if the products meet certain conditions (like correct labeling or quality). If there's any issue, the system will alert the users. This will help make the supply chain more secure and transparent by reducing the chances of fraud.

Project Title:

Developing a Basic Smart Contract for Payment Automation

Project Description:

This project involves creating a simple smart contract using Solidity to automate payments between two parties. The smart contract will be programmed to release funds only when certain conditions are met, such as delivery of a product or completion of a service. This contract can be used for small-scale transactions, ensuring that both parties follow the agreement without the need for a middleman.

Essential Technical skills:Solidity,Python

Dr. Shahera Hossain

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Areas of Expertise and Interest:

- Data science
- Healthcare
- AI and Machine Learning
- IoT and Sensors
- Image Processing

Project Ideas:

Requirement:

- Good programming language (**python,** or C/C++)

 # Project Title: Medical Applications Derived from Gait Analysis

Project Description:

Gait analysis research focuses on examining and understanding the patterns and mechanics of human walking. This research involves studying the way people move, including the timing, rhythm, and coordination of their steps. By analysing these patterns, researchers aim to gain insights into normal and abnormal gait patterns, which can help diagnose and treat various medical conditions, improve rehabilitation processes, and enhance the design of supportive devices like prosthetics and orthotics.

Reference:

Gait-based Human Attributes Estimation from Various Angles, *IEICE Technical Report*, IEICE Tech. Rep. 119 (214), pp. 27-29, 2019.

 # Project Title: Machine Learning Techniques for Detecting depression and mental health

Project Description:

Machine learning techniques for detecting depression and mental health issues involve the application of advanced algorithms to analyse data from various sources, such as social media posts, online interactions, and personal behaviours. This research aims to identify patterns and indicators of mental health conditions by examining textual content, user activity, and engagement metrics. By leveraging large datasets and sophisticated analytical methods, researchers can develop models that predict depression and other mental health concerns more accurately. This approach helps in early detection and intervention, potentially improving treatment outcomes and providing valuable insights into mental health trends.

Reference:

Understanding Mental Health Using Ubiquitous Sensors and Machine Learning: Challenges Ahead", *Human Activity and Behavior Analysis*, 1st edition, Taylor and Francis, pp. 222-257, 2024.

 # Project Title: Parkinson's Disease using Sensors

Project Description:

Research on Parkinson's Disease using sensors focuses on employing various types of sensors to monitor and analyse the symptoms and progression of the condition. This research typically involves using wearable sensors, such as accelerometers, gyroscopes, and smartwatches, to collect data on motor functions, movement patterns, and tremors. By continuously tracking these parameters, researchers aim to gain a deeper understanding of the disease's impact on daily activities and physical abilities. The data collected can be used to develop more accurate diagnostic tools, enhance disease monitoring, and personalise treatment plans, ultimately improving patient care and quality of life.

Reference:

An LSTM-based Approach for Predicting Parkinson's Disease Wearing-Off Phenomenon Using Time-Sequence Data", *Activity, Behavior, and Healthcare Computing*, Taylor and Francis, 2024.

 # Project Title: Sensor Based Human Activity Recognition

Project Description:

Sensor-Based Human Activity Recognition for Elderly Care Homes involves the use of various sensors to monitor and analyse the activities of elderly residents within care facilities. This research aims to improve the quality of care by implementing sensors such as motion detectors, wearables, and environmental sensors to track physical activities, movement patterns, and behavioural

changes. By recognising and analysing these activities, caregivers can better understand the residents' needs, detect potential health issues early, and provide timely interventions. The data collected through these sensors can also be used to enhance safety, personalise care plans, and ensure a more responsive and supportive environment for elderly individuals.

Ms Shaheen Khatoon

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Area of Interest My main interests are listed below, but I am generally happy to supervise any data science / software development related project. I am particularly interested in the projects related Development of AI-based models and computing frameworks to derive insight and measurements from terabyte-sized data (text, images and videos)

- Machine learning
- Deep Learning
- Edge Computing
- Computer vision
- Generative AI
- Natural Language Processing

- Information retrieval and Knowledge discovery

Required skills for the FYP Programing language (Python, Flask APIs)

Other Comments Note: I am happy to discuss any topic covers above research interests. A brief description of potential projects is provided at the next page

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Natural Language Processing Projects:

Social media has become an important channel for communication. The ubiquitousness of smartphones enables people to announce real-time phenomenon they are observing. Many agencies are interested in programmatically monitoring social media channels such as Twitter, Facebook etc.,(for example disaster relief organizations, news agencies, health care and so on). There can be multiple projects in this direction. Student shall choose an interesting use case like the below to discover insight from social media textual data.

Project Goal(s)

- Dynamic knowledge extraction from heterogeneous information sources (e.g., news, social media) to facilitate disaster-related operations and activities.

Actions

- Support of humanitarian organizations and local emergency response entities in case of natural or human-made disasters.
- Inform the public of current/upcoming disasters and enable suitable response (through an interface).

Data

- Crawling of publicly available news and social media data (e.g., Google News, Twitter) in real-time.

Analysis (each can be a different project)

- (Binary) classify data (e.g., Google News article) as disaster/emergency-related or not.
- If disaster/emergency-related, then classify into different (pre-defined) types of disaster.
- Depending on the type of disaster, identify which (helpful) information can be extracted from the given data, e.g., location, time, human injury, etc.
- How to track/follow-up a disaster over time and update the collected information for better emergency response.
- Credibility analysis of the data (fake or real information)
- Sentiment analysis of the given information (e.g., based on user comments)
- Social media crowdsourcing data to improve situational awareness
- aggregate data (text and images) from multiple channels and provide analytics for sentiment, summarization and other relevant aspects in order to reduce manual operations and multiple workflows.
- Human-AI interaction through conversational user interfaces (conversational agents and chatbots)
- Data visualization
-

Machine Learning/Deep Learning/edge computing

ML and AI projects can be categorized by their objectives. These projects focus is development and application of AI & ML models for image, video and other data analysis for multiple application domains for solving real world problems. The key aim is to adapt AI & ML models for basic tasks such as object detection, action recognition, and classification for domain specific datasets. Projects includes but not limited to the following:

- DL training and inference in the customized edge computing framework for domain specific application from face recognition to smart factories, manufacturing and cities.

- Edge based deep learning models for medical image processing, precision agriculture, smart cities and energy optimization.
- Develop a machine or deep learning-based model to classify diseases of commonly grown crops, minimize water and fertilizer waste and increase yield.
- Developing Artificial Intelligence/ Machine Learning/ Deep Learning Models to predict risk among patients, as well as studying the process of AI implementation. Developing simulation models in socio-technical aspects of healthcare.
- Deep learning for medical imaging-based diagnosis and subsequent (on-going) treatment planning and outcome prediction.
- AI for smart sustainable transportation (parking prediction, smart city traffic management etc.)
- Video based livestock detection, tracking and behaviour analysis.
- Video based occupancy detection to optimize HVAC (Heating, Ventilation and AirConditioning) operations.

Generative AI

Text Chatbot

Text chatbots are AI-generated projects that engage in natural language conversations with users. These AI-driven systems mimic human interactions and offer information, assistance, and help across numerous industries.

- Text chatbots use natural language processing (NLP) to understand user input and generate applicable responses.
- They can handle a wide range of queries, from answering FAQs to offering personalized tips.
- Some advanced chatbots make use of machine learning to analyze from user interactions, constantly improving their responses over time. These chatbots may be included in websites, messaging apps, and customer service platforms.

YouTube Video Summarizer

A YouTube video summarizer is a generative AI tool that extracts key content from videos, condensing lengthy content into concise summaries. This technology holds immense value for content creators, researchers, and viewers by presenting efficient access to video information.

- YouTube video summarizers employ audio transcription, image analysis, and natural language processing (NLP) techniques to investigate video content.
- They identify critical segments, keywords, and visual cues to generate a condensed summary that captures the video's essence. These summaries usually consist of key factors, topics discussed, and timestamps of relevant sections.

Image Generator

An image generator is a generative AI project that creates images autonomously, showcasing AI's capability to imitate human artistic creativity. These generators employ complex algorithms to produce visual content, ranging from realistic landscapes to abstract artwork.

- Image generators use deep learning techniques such as Generative Adversarial Networks (GANs) or Variational Autoencoders (VAEs).
- These algorithms learn from big datasets of existing images and generate new visuals by figuring out patterns, styles, and functions.
- Some photograph generators allow customers to input precise parameters to influence the generated content, while others produce original compositions.

Video Generator

A video generator powered by a generative AI project is an innovative tool that creates videos autonomously, transforming the landscape of content creation and storytelling. These AI-driven systems use algorithms to generate visual sequences, animations, or even complete videos.

- Video generators use techniques like neural networks, GANs, and reinforcement learning to analyze current videos and learn patterns of motion, scene transitions, and visual elements.
- They then generate new videos based on these learning patterns, often with user-defined parameters to influence content style, duration, and themes.

Article Summarizer

An article summarizer powered by a generative AI project is a valuable device that condenses lengthy content into concise and coherent summaries. These AI-driven structures analyze the content of articles, extracting key information and the most important factors to offer readers an efficient evaluation.

- Article summarizers utilize natural language processing (NLP) techniques to analyze the textual content of articles.
- They identify important sentences, key terms, and relevant data. Using these elements, the AI generates a summary that captures the essence of the unique article, while preserving the original meaning.

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Areas of Expertise and Interest:

- Cyber Security and Privacy
- ML/Dl techniques for defensive cyber security
- Healthcare systems privacy and security
- Biometrics applications
- Social Media Behaviour analysis for security
- Smart Transportation security and surveillance
- Critical Infrastructure Security
- Cyber security awareness

Project Ideas: As a final year student, your project is an opportunity to demonstrate the knowledge and skills you've gained throughout your studies. It's a chance to showcase your expertise in a specific area. I'm available to supervise projects in software development, simulations, and evaluating machine learning models. I'm particularly interested in supervising projects related to cyber threats, IIoT Security, Digital forensics, developing mitigation techniques, detecting vulnerabilities, Intrusion Detection Systems, Cyber Security awareness and cyber security risk assessments.

Project Titles:

Project Title 1: UEL-Multilingual app for Cyber Security awareness

Description:

In this project, a mobile app will be designed and developed to provides a cybersecurity awareness. This app will focus on common threats like phishing, malware, SQL injection, and DDoS attacks. To enhance understanding, it will incorporate interactive simulations that mimic real-world cyberattacks, allowing users to assess their responses. Based on these assessments, the app will offer personalized recommendations for mitigating cybersecurity risks. Additionally, it will have the capability to generate tailored educational campaigns to raise awareness about emerging cyber threats among students and staff.

References:

[1] Abu-Amara, F., Hosani, R. A., Tamimi, H. A., & Hamdi, B. A. (2024). Spreading cybersecurity awareness via gamification: Zero-day game. *International Journal of Information Technology*, *16*(5), 2945-2953.

[2] Abdelhamid, S., Mallari, T., & Aly, M. (2023, June). Cybersecurity Awareness, Education, and Workplace Training Using Socially Enabled Intelligent Chatbots. In *The Learning Ideas Conference* (pp. 3-16). Cham: Springer Nature Switzerland.

Project Title 2: Event management- Data Traffic Monitoring and Security Analysis

Description:

This project aims to develop a software application, either web-based or mobile, designed to monitor the network of an ongoing event to prevent/ generate alerts in case of cyber-attack. The application will identify malicious network traffic, analyse network protocols, and investigate data exfiltration techniques.

References:

[1] Singh, N. J., Hoque, N., Singh, K. R., & Bhattacharyya, D. K. (2024). Botnet-based IoT network traffic analysis using deep learning. *Security and Privacy*, *7*(2), e355.

[2] Arjunan, T. (2024). Real-Time Detection of Network Traffic Anomalies in Big Data Environments Using Deep Learning Models. International Journal for Research in Applied Science and Engineering Technology, 12(9), 10-22214.

Project Title 3: Deep fake video detection and Analysis

Description:

Deepfake videos, created using AI techniques, are a growing social concern. Malicious actors exploit these technologies to spread misinformation, jeopardizing politics, security and privacy. This project focuses on developing ML/DL techniques to detect deepfake videos, which pose significant security risks. By comparing various methods proposed in the literature, the project aims to summarize their performance accuracy.

References:

[1] Kaur, A., Noori Hoshyar, A., Saikrishna, V., Firmin, S., & Xia, F. (2024). Deepfake video detection: challenges and opportunities. *Artificial Intelligence Review*, *57*(6), 1-47.

[2] Heidari, A., Jafari Navimipour, N., Dag, H., & Unal, M. (2024). Deepfake detection using deep learning methods: A systematic and comprehensive review. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, *14*(2), e1520.

[3] Passos, L. A., Jodas, D., Costa, K. A., Souza Júnior, L. A., Rodrigues, D., Del Ser, J., ... & Papa, J. P. (2024). A review of deep learning-based approaches for deepfake content detection. *Expert Systems*, *41*(8), e13570.

Project Title 4: Analysis of cyberattacks on smart vehicles

Description:

This project involves learning data analysis techniques through the examination of malware datasets related to cyberattacks targeting smart vehicle networks. By analysing various cyber-attack scenarios, this project aims to identify potential risks and developed effective mitigation techniques.

References:

[1] Dewangan, K. K., Panda, V., Ojha, S., Shahapure, A., & Jahagirdar, S. R. (2024). Cyber Threats and Its Mitigation to Intelligent Transportation System (No. 2024-26-0184). SAE Technical Paper.

[2] Alqahtani, H., & Kumar, G. (2024). Machine learning for enhancing transportation security: A

comprehensive analysis of electric and flying vehicle systems. *Engineering Applications of Artificial Intelligence*, *129*, 107667.

Project Title 5: AI based Intrusion detection system for Smart Home

Description:

This project aims to develop an AI based Intrusion detection system capable of analysing network traffic to detect malware signature and abnormal behaviour. Additionally, the project will compare the performance of existing commercial intrusion detection systems.

Project Title 6: Smart phone forensics for criminal investigation

Description:

This project involves conducting a simulated digital forensics investigation; by compromising a system, you will have the opportunity to practice forensic techniques such as recovering deleted files, analysing logs, and reconstructing the seps of a cyber-attack.

References:

[1] Almuqren, A., Alsuwaelim, H., Rahman, M. H., & Ibrahim, A. A. (2024). A Systematic Literature Review on Digital Forensic Investigation on Android Devices. *Procedia Computer Science*, *235*, 1332-1352.

[2] Alblooshi, A., Aljneibi, N., Iqbal, F., Ikuesan, R., Badra, M., & Khalid, Z. (2024, April). Smartphone Forensics: A Comparative Study of Common Mobile Phone Models. In 2024 12th International Symposium on Digital Forensics and Security (ISDFS) (pp. 1-6). IEEE.

[3] Moreb, M., Salah, S., & Amro, B. (2024). A novel framework for mobile forensics investigation process. International Journal of Computing and Digital Systems, 16(1), 125-136.

Project Title 7: Design of an AI based Honeypot for training purposes

Description:

This project aims to establish an Ai enabled honeypot environment to lure and record cyber-attacks. By analyzing the attack vectors employed by hackers, it will document effective defence strategies

for real world environments. The proliferation of sophisticated threats necessitates innovative and rapid defensive measures to protect vulnerable infrastructure,

References:

[1] Rashid, S. Z. U., Haq, A., Hasan, S. T., Furhad, M. H., Ahmed, M., & Ullah, A. B. (2024). Faking smart industry: exploring cyber-threat landscape deploying cloud-based honeypot. Wireless Networks, 30(5), 4527-4541.

[2] Wu, Q., Wen, S., Li, F., Liu, B., & Zhong, W. (2024). Web Attack Detection Based on Honeypots and Logistic Regression Algorithm. Journal of Electrical Systems, 20(3), 814-822.

[3] Lanka, P., Gupta, K., & Varol, C. (2024). Intelligent Threat Detection—AI-Driven Analysis of Honeypot Data to Counter Cyber Threats. Electronics, 13(13), 2465.

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1. Daily Expense Tracker App

Problem Statement:

Students often struggle with managing their monthly money or everyday expenses. Many rely on manual methods like notebooks or spreadsheets, which are not user-friendly and get ignored over time.

A simple mobile app can help track expenses daily, categorise spending (food, travel, entertainment), and provide monthly summaries to improve financial habits.

2. QR Code Based Attendance App

Problem Statement:

At UEL the "Tap-in" system is misused. Whilst in many universities, attendance is still taken manually, wasting time in classrooms. Paper-based methods are prone to errors and misuse.

A mobile app with QR code scanning can simplify attendance by allowing students to scan a lecturer -generated QR code, automatically marking them present in the system.

3. Language Learning App

Problem Statement:

Current apps like Duolingo do not focus much on other small scale languages.

A language learning app can provide bite-sized lessons, quizzes, and audio support to help users learn commonly used phrases in regional languages.

4. Blood Donation Finder App

Problem Statement:

People often struggle to find blood donors in emergencies. Many rely on word of mouth, WhatsApp forwards or local contacts, which is slow and unreliable.

A blood donation app can connect donors and seekers in real-time. Donors can register their blood group and availability, while seekers can search nearby donors in emergencies.

5. AI-Powered Personal Health Coach App

Problem Statement:

With busy lifestyles, young professionals and students often neglect their health. While fitness apps exist, they are often generic and do not provide personalized advice.

A personal health coach app can track daily steps, water intake, and sleeping patterns and give AI-based recommendations for improvement.

6. Digital Healthcare Records App

Problem Statement:

Most patients still carry physical reports when visiting doctors, which are often misplaced or damaged. There is no standardized system for storing healthcare history accessible across hospitals.

A digital healthcare records app can allow patients to store prescriptions, lab reports, and vaccination history securely and share them with doctors when needed.

7. Student Performance Prediction

Problem Statement:

Universities often struggle to identify students who are likely to underperform in assessment/exams. Lecturers rely on mid-term results, which does not give a full picture of learning progress.

A predictive model that considers attendance, assignment scores, and past performance can help lecturers identify at-risk students early and provide timely interventions.

8. Healthcare Analytics – Disease Prediction System

Problem Statement:

Hospitals often have patient history records but fail to leverage them for predicting diseases early. Patients only get treatment after symptoms worsen.

A disease prediction model using patient records (age, symptoms, medical tests) can help doctors identify high-risk patients early and improve preventive care.

9. AI-Powered Resume Screening Tool

Problem Statement:

In recruitment, HR professionals spend hours scanning resumes manually. This leads to delays and sometimes overlooking good candidates. An AI system can automate this by quickly filtering resumes based on job requirements.

10. AI Chatbot for University Queries

Problem Statement:

Universities get hundreds of repetitive queries daily (admissions, hostel info, course details). Staff spend time answering the same questions repeatedly.

An AI chatbot can automate query responses, improve efficiency and reduce staff workload.

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Research interest:

- Cybersecurity and Information Security
- Data Communication and Computer Networks
- Wireless Networks
- Wireless Sensor Networks and medical body area networks
- Internet of Things
- Cloud Security
- Networks security, firewalls, IDS, IPS
- Machine learning and its application to cybersecurity.
- Infrastructure Monitoring
- DevOps

Research topics:

Project Title:

Machine learning based Intrusion detection system (IDS) for IoT networks and implementation on single board computer.

Project Description:

Intrusion Detection System (IDS) is used to defend against a variety of attacks. The project aims to develop an IDS system based on machine learning (supervised or unsupervised learning) to

detect the incoming anomalies. The practical implantation then can be applied to a single board computer, e.g. Raspberry pi, to evaluate and analyse the based on actual network traffic.

Project Title:

IoT device Identification, authentication, and secure data transfer

Or

CIA in IoT infrastructure based on federated identity management.

Project Description:

In IoT networks, inclusion of the devices is often not regulated and if it is, it requires manual interference. The aim of the project is to create an automated and secure identity management system to detect rogue devices.

Project Title:

Implementation of a Decentralized Infrastructure Monitoring Simulator Platform

Project Description:

The aim of the project is to create an environment where the logging and monitoring of network infrastructure can be simulated and studied.

Project Title:

Event Correlator – Event Correlation Tool (ECT)

Project Description:

A Python based Event Correlation Tool (ECT) for advanced event processing which can be harnessed for event log monitoring, for network and security management, for fraud detection, and for any other task which involves event correlation. Event correlation is a procedure where a stream of events is processed, in order to detect (and act on) certain event groups that occur within predefined time windows.

Many traditional event log management systems store events in a database and execute database queries for implementing event correlation. However, such systems are heavyweight solutions and often involve a complex database infrastructure on dedicated hardware.

In contrast, ECT must be a lightweight and platform-independent event correlator which can run as a single process. The user can start it as a daemon, employ it in shell pipelines, execute it interactively in a terminal, run many ECT processes simultaneously for different tasks, and use it in a wide variety of other ways.

It must be able to lines from files, named pipes, or standard input, match the lines with patterns (like regular expressions or subroutines) for recognizing input events, and correlates events according to the rules in its configuration file(s). SEC can produce output by executing external programs (e.g., SNMP trap or mail), by writing to files, by sending data to TCP and UDP based servers.

Reference: https://simple-evcorr.github.io/

Dr Umaima Haider

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Areas of Expertise and Interest:

- Cloud Computing
- Data Centres
- ICT Sustainability
- Web Development
- Software engineering / Software Architecture
- Cybersecurity
- Computer Networking

Project Ideas

Project Title: Energy-efficient storage in the ICT Infrastructure

Project Description:
Create the data set for the storage equipment that exist in the ICT infrastructure and analyse and model the reliable energy efficient framework.

Project Title: An analysis of networking equipment on a cloud platform

Project Description:
In this project, the networking equipment (routers, switches) offered by the top-tiered cloud service provider (MS Azure/Amazon Web Services/Google Cloud Platform) will be analysed how sustainable they are, particularly, in terms of their energy efficiency.

Project Title: Data Centre Sustainability Best Practices Tool

Project Description:

A web-based tool that allows data centres operators/owners to check the level of their sustainability and its compliance with existing ICT sustainability policies, regulations and standards.

Project Title: Trade-off between data centre sustainability and cybersecurity best practices

Project Description:
Develop a conceptual framework based on the existing best practices to analyze the tradeoff between sustainability and security in a data centre.

Project Title: A detailed analysis of circular economy in IT

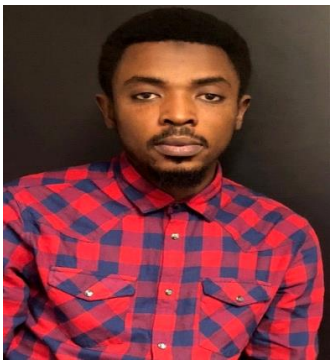
Project Description:
Study the current state of IT recycling and reuse and its impact on the environment.

Project Title: A holistic framework for Network Traffic Analyzer

Project Description:
Study the current network traffic analyzer and build the holistic model

Project Title: A comparative tool for the EU regulations related to sustainability in the ICT sector

Project Description:
Study the current EU regulations and summarise in form of automation that how it impacts different organisation. Any programming skills can be used to build the tool.



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Areas of Expertise and Interest:

- Information Security Audit and Forensics
- IoT and Cloud Computing
- Cyber Physical Systems and Cyber Resiliency
- Security and Privacy Requirements Engineering
- Threat Discovery and Security Attack Modelling
- Actionable Cyber Threat Intelligence (ACTI)

Project Ideas

Project Title:
Cyber Security Incident Handling, Warning and Response System Critical Infrastructure

Project Description:
The project requires students to carry out extensive research on ways to enhance the security and resilience of Critical Information Infrastructure by providing a warning and response system that supports and guides operators to identify, analyse, and respond to advanced persistent threats (APTs) and handle their daily cyber incidents using structured and unstructured data such as logs, network traffic, or data coming from social networks.

Project is suitable for the following programmes of study:
Computer Science, Computing for Business, Applied Computing

Project Title:
Application of Machine Learning Techniques for Threat Recognition and Common Weakness Enumeration

Project Description:
The project requires students to explore the application of Machine Learning (ML) in the area of Cyber Physical Systems (CPS) security for intelligent threat recognition and vulnerability enumeration to enable run-time risk assessment for dynamic situation awareness in cyber-physical systems security monitoring.

Project is suitable for the following programmes of study:

Computer Science, Computing for Business, Applied Computing

Project Title:
Trust, Accountability and Transparency Computation for Cyber Threat Intelligence Platforms

Project Description:
The project aims at exploring methods for improving trust, accountability and transparency in cyber intelligence in cyber threat intelligence platforms. This can be achieved by defining a set of metrics for quantifying trust, accountability and transparency.

Project is suitable for the following programmes of study:
Computer Science, Computing for Business, Applied Computing

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Areas of Expertise and Interest:
Artificial Intelligence & Machine Learning
CNN and Deep Learning
Transfer Learning
Internet of Things
Smart Cities and Services
Smart Transport, Smart Agriculture, Smart Buildings
Environment monitoring in smart cities
Arduino, Raspberry pi
Full stack development (MERN)
Programming with Python, PHP, React JS and React Native
Database development
Ecommerce application development with Payment gateway integration
Software systems for Education Industry
Mobile application development using React Native

As a FYP, you are open to choose any project of your choice from the above domains or contact me to discuss your idea or questions.

Md Abu Sufian

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Areas of Expertise and Interest:

Artificial Intelligence & Machine Learning in Cardiovascular Health:

1. Medical Imaging (Cardiac MRI, Echocardiography, Advanced MRI including DTI)
2. Heart MRI Segmentation & Structural Analysis
3. Multimodal Fusion (Imaging, EHR, Genomics, Physiological Data)
4. Arrhythmia & Electrophysiology (ECG analysis, signal processing)
5. Heart Failure (HF) Prediction & Monitoring
6. Cardiomyocyte Ageing & Dysfunction
7. Generative AI for Cardiovascular Applications

Project Title 1:

Deep Learning for Cardiac MRI Segmentation and Structural Analysis

Project Description:

This project investigates the segmentation of heart structures from cardiac MRI and advanced MRI (including DTI) using deep learning models, such as U-Net, nnU-Net, and Vision Transformers. Students will evaluate performance metrics (Dice, IoU) and extend segmentation outputs to assess cardiac morphology for conditions such as hypertrophic or dilated cardiomyopathy. Explainability methods (Grad-CAM, LIME) will be applied to enhance interpretability.

Project Title 2:

Multimodal AI for Cardiovascular Risk Prediction

Project Description:

This project develops a multimodal framework that integrates imaging (MRI, echocardiography), electronic health records (EHR), genomics, and physiological data to predict outcomes, such as the progression of heart failure. Students will compare fusion strategies (early, late, cross-

attention) and apply survival analysis to estimate patient-specific risks. Emphasis will be placed on interpretability and clinical translation.

Project Title 3:

AI-Driven Arrhythmia Detection and Electrophysiology Signal Analysis

Project Description:

Using ECG and electrophysiological signal datasets, students will design deep learning pipelines (1D CNN, LSTM, and Transformer models) to classify arrhythmias and conduction abnormalities. The project will involve preprocessing (denoising and feature extraction), model development, and the use of explainable AI techniques to make predictions transparent for clinical use.

Project 4:

Diffusion Tensor Imaging (DTI) for Cardiac Microstructure Analysis Using AI

Project Description:

This project investigates the use of Diffusion Tensor Imaging (DTI), an advanced MRI technique, to study myocardial fibre orientation and microstructural changes in the heart. Students will develop deep learning models to process DTI data, perform segmentation, and extract structural biomarkers related to arrhythmia, heart failure, or cardiomyopathy. Comparisons with conventional MRI segmentation will be made to demonstrate the added value of DTI. Explainable AI methods will be applied to highlight clinically relevant features, bridging imaging biomarkers with cardiovascular outcomes.