Internship Opportunities: 2019-2020

Computing Enterprise Centre
Artificial Intelligence Research (AIRe) Group
and
Advanced Automotive Analytics Research Institute

Projects

Academic Contact:

Professor Daniel Neagu

AI Research (AIRe) Group Leader

Co-Director of the Advanced Automotive Analytics (AAA) Research Institute

Co-Director of the Computing Enterprise Centre

University of Bradford	**+44 (0) 1274 23 5704**
Department of Computer Science	+44 (0) 7902 13 8550
Faculty of Engineering and Informatics	d.neagu@bradford.ac.uk
Bradford BD7 1DP, West Yorkshire, UK	http://computing.brad.ac.uk/staff/dneagu
http://orcid.org/0000-0002-7038-106X	LinkedIn Daniel Neagu

Project Title:

UoB1. Automotive Engineering Big Data Analytics and Machine Learning Applications

with [Advanced Automotive Analytics (AAA) Research Institute](#)

Context of Project:

This topic proposes a number of projects that involve statistical analysis, visualisation, processing, transformation of automotive engineering data and applications of machine learning and image processing algorithms for data modelling. Topics include warranty and fault prediction, Engine Control Unit and driver data (made available from the automotive industry and NASA) for vehicles (such as cars, trucks, buses) augmented with data about their use and faults. The projects will be developed as part of the AAA team, and will involve coordination with PhD students and academic staff.

Activities Involved:

Review the relevant work in the literature for interfaces to complex databases.

Design of prototype that aims to browse contents of a database in a multimedia manner

Implement the design using an appropriate high level language (Python, R, Java) and/or tool (Tableau, Weka, KNIME)

Testing the prototype: there are possibilities to work with a research team on real data sources and case studies from automotive industry

Document the literature review, own models and code.

Opportunities to learn and research and co-author research publications.

Deliverables:

Weekly progress reports. Literature review

Scrum meetings with the PhD, RA and academic staff; weekly reports.

A prototype system, dashboard or collection of scripts

Report and other relevant user, maintenance and deployment documentation

Prerequisites:

Good software development and statistical analysis knowledge and skills are expected.

Familiarity/expertise and opportunities to learn s/w tools such as Python, R, Tableau, Weka, Knime, Java, Matlab.

Project Title:

UoB2. Big Data 3D Visualisation using Virtual Reality and Data Augmentation

with Artificial Intelligence Research (AIRe) Group in collaboration with
Advanced Automotive Analytics (AAA) Research Institute

Context of Project:

Gamification and Virtual Reality are currently increasingly applied to serious applications such as Engineering and Business Analytics and Data Mining.

The project aims to create a virtual reality environment prototype to visualise various data and machine learning models and their performance (for example benchmark data sets from UCI ML and Kaggle repositories, and also proprietary sources such as Engine Control Unit and driver data (made available from the automotive industry) for vehicles (cars, trucks, buses or e-bike systems) augmented with data about their use and faults, in an interactive way.

Part of the Advanced Automotive Analytics Institute, these projects will benefit of collaborations with a multidisciplinary team of academic staff, post-doctoral researchers and PhD students from Computer Science and Engineering schools and possibly with automotive industry representatives.

Activities Involved:

Current Literature and s/w solutions Review.

Scrum meetings with the PhD, RA and academic staff; weekly reports.

Design and implementation of a prototype on benchmark data.

Documentation writing.

Deliverables:

Prototype using Oculus Rift, Oculus Rift-ready desktops in Computing Enterprise Centre and AAA, Unity3D, R, Python, TensorFlow, Tableau and other relevant software for processing

Weekly progress reports. Report on the literature review; User Documentation; Final Report.

Prerequisites:

Prerequisites skills: programming and problem solving, enthusiasm; previous experience in game programming, user interfaces and/or machine learning & data mining may be a bonus though are not compulsory.

Familiarity or interest in R, Python, Tableau, Java will constitute a plus.

Project Title:

UoB3. Responsible Artificial Intelligence: ethics, efficiency, explainability metrics for AI tools

with Artificial Intelligence Research (AIRe) Group and Division of Psychology.

Context of Project:

The project will research and test computation measurements for AI tools (mainly chatbots) and also use of social media data mining to understand and leverage advanced statistical and qualitative metrics and social aspects to AI tools and algorithms. These include ethics and efficiency of chatbots, efficiency and explainability of Machine Learning algorithms involved in decision support.

Activities Involved:

To review and analyse the current AI market and identify the providers of AI measuring tools for the responsible AI dimensions such as efficiency, explainability, ethics etc.

To develop chatbot prototypes for a specified problem and run qualitative and quantitative evaluations of the AI tools.

To test the system against case studies.

To document the literature review, chatbot construction, metrics, experiments and case studies.

Deliverables:

1. weekly progress reports. 2. s/w prototype or scripts. 3. the project report, including introduction on current approaches, review on methods to be used, description of the problem to be studied, and deployment, user and maintenance documentation.

Prerequisites:

Suitable for any student who has studied Software Development, Programming, AI and Machine Learning. Interest or expertise in Python, R, Tableau and Java are a plus.

Project Title:

UoB4. Mind Power: EPOC+ driven mobile applications

with [Computing Enterprise Centre](#)

Context of Project:

Innovative applications of Emotiv EPOC+: mind-controlled mobile applications, sentiment, mood or EEG hands-free HCI. See for details and examples: https://www.emotiv.com/epoc/ and https://www.brad.ac.uk/ei/computer-science/student-projects/

The topics can be research for game or mobile application interfacing, supporting users with disabilities, hands-free interfaces or sentiment analysis in a number of applications, including engineering, driving, smart city, digital health and gamification. Applications currently of interest involve displaying emoticons on a mobile device, and control of Arduino Zumo devices or a drone.

Activities Involved:

Literature and s/w Review Report;

Scrum meetings with the PhD, RA and academic staff.

Weekly progress reports. User Documentation; Final Report.

Prototype using Emotiv EPOC+ and mobile devices or simulators in Computing Enterprise Centre.

Deliverables:

Prototype and user documentation of the various software applications.

Prerequisites:

Java or C# programming experience and problem solving enthusiasm; mobile application development is a bonus but is not compulsory. Devices and libraries are made available. May involve contacting and communicating with the technical support team of Emotiv EPOC+ and working in team (should the period allow) with local students working on similar projects.

Project Title:

UoB5. AAA Transport/Aviation Logistics Using Mobile and Big Data Applications

with [Advanced Automotive Analytics (AAA) Research](#) Institute and [Computing Enterprise Centre](#)

Context of Project:

System for supporting transport and logistics companies to implement their own ideas for vehicle routing in automotive or aviation projects. The project will provide mobile device interfaces and database solutions that will include third party software, devices, and interaction with company representatives.

Activities Involved:

Literature and s/w Review Report;

Scrum meetings with the RA, academic and industry staff, as applicable.

Weekly progress reports. User Documentation; Final Report.

Prototype mobile devices or simulators in Computing Enterprise Centre.

Deliverables:

Usable prototype for mobile devices.

User documentation.

Report.

Prerequisites:

Enthusiasm, problem solving, programming.

Java or Swift software development, APIs, web and/or mobile (Android, iOS) technologies are a plus.

Project Title:

UoB6. Smart City mobile device applications

with [Computing Enterprise Centre](#) and [Internet of Things Lab](#)

Context of Project:

The Computing Enterprise Centre works with the ERDF funded project SCORE on smart cities applications. The projects range from using Raspberry Pi, smart sensors and mobile device programming for dashboards, management information systems and data mining, and demonstration purposes, IoT and app development at Bradford City Council.

Activities Involved:

To review literature on IoT use for smart cities and particularly flooding/ flood monitoring.

Deliverables:

1. weekly progress reports. 2. a working prototype. 3. the project report, including introduction on current approaches, review on methods to be used, description of the problem to be studied, and application of design methodologies to develop the prototype.

Prerequisites:

Suitable for any student who has studied Software Development and Programming.

Mobile Application Developing, IoT knowledge, while not compulsory, are an advantage.

Project Title:

UoB7. Intelligent Network Services

with [Computing Enterprise Centre](#) and Department of Computer Science

Context of Project:

The Computing Enterprise Centre works with the ERDF funded project Xalient on smart capacities additions for intelligent network services.

The project requires to design and build a cloud hosted, web-based system prototype integrating various services such as monitoring systems, device orchestration toolsets, AI components and an IT Service Management platforms.

The prototype platform will utilise a number of isolated existing platforms with data visualisation component extracting significant data from the monitored systems and exploiting advanced data analytics techniques.

Activities Involved:

To review literature and industry projects on intelligent networks, data mining, machine learning and their use in IT Service Management solutions.

To design, run and test scripts to gather, analyse and visualise relevant data.

To provide documentation and deployment of solutions.

Deliverables:

1. weekly progress reports. 2. a working prototype. 3. the project report, including introduction on current approaches, review on methods to be used, description of the problem to be studied, and application of design methodologies to develop the prototype.

Prerequisites:

Suitable for any student who has studied Software Development and Programming, Computer Networks, Cloud services.