MSc Projects Info Session

M. Usman Ilyas

Coordinators

- MSc Project Coord. (UK): Miqing Li (m.li.8@bham.ac.uk)
- MSc Project Coord. (Dubai): M. Usman Ilyas (m.ilyas@bham.ac.uk)

The Timeline

February - March	Supervisor-student discussion
March - April	Supervisor-student allocation
3 June	MSc Project Start
21 June (prov)	Project proposal deadline
19-23 August	Project demo week
2 September	Project report deadline

Project Components

Component	Suggested Word Count	Due Date	Submission Type
Project Proposal (10%)	1,000 words	21 June (provisional)	Canvas
Demonstration (10%)	N/A	19 - 23 August	Inspector Meeting
Final Report (80%)	10,000 words	2 September	Canvas

Getting Started

- Christian Dawson, *Projects in Computing and Information Systems: A Student's Guide (3rd Edition)*, Pearson Education, April 2015.
- Michael Alley, *The Craft of Scientific Writing (1st Edition)*, Springer, February 2018.

My favorite …

- Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams, *The Craft of Research, 3rd ed.*, University of Chicago Press
  - → *5th ed.* is out now

Most FAQ

- Students will be assigned a supervisor from their campus unless …
  - They can secure a mutual agreement with a supervisor on the other campus.

Expectations

- Must involve coding.
- Should have an intellectual contribution / novelty.
  - Will depend on the (type of) programme you are in.
- Supervisors will not chase you.
  - You are expected to stay in touch – do not fall off the face of the Earth.
  - Do not expect immediate last-minute replies.
  - You have the highest stakes in successfully completing the MSc Project.

Advice

- Be sure you have everything you need in terms of materials and domain knowledge.
- Start early
- Plan ahead

Dr. Kashif Rajpoot

Research Interests

- Medical AI, with particular focus on medical image analysis
- Computational pathology
- AI
- Image analysis

Research Objectives

- Develop AI / computational algorithms for insightful and objective analysis from data, in particular medical images/data
- Produce outputs with potential impact on clinical and/or medical research

- **Home page**
  - https://www.birmingham.ac.uk/staff/profiles/dubai/rajpoot-kashif.aspx
- **Google Scholar profile**
  - https://scholar.google.com/citations?user=Z37sAy8AAAAJ&hl=en

Prospective Projects

- **Generating high-quality medical images**
  - Explore modern generative AI methods to generate medical images for a particular problem (e.g., computational pathology, cardiology)
  - Application of recent generative AI methods (e.g., stable diffusion or dreambooth) for high quality medical image generation (and possibly quality publication)
- **AI-assisted presentation drafter**
  - Prepare a deck of draft slides using a sequence of prompts
  - A software or web interface which enables interactive drafting of presentation slides on a specified topic
- **Friendly speech bot**
  - Develop a speech bot, powered by language model, with a human friendly face interface (potentially consisting of computer vision abilities)
- **Image captioning**
  - Develop a deep learning model to automatically generate captions (e.g., for chest x-ray)
- **Skills needed**: deep NNs, Pytorch, image analysis / language understanding,
- **Resources**
  - **Data**: https://grand-challenge.org/All_Challenges; Kaggle
  - **Compute**: Google Colab, Birmingham Bear Portal

Dr. Mian M. Hamayun

Research Interests

- Virtualization
- Simulation & Modeling
- Internet of Things
- Cloud Computing and ML on Embedded Platforms (TinyML)

Research Highlights

- Native simulation of MPSoC using Hardware-assisted virtualization
- Distributed heterogeneous simulation using IoT
- Position-based emergency message dissemination for Internet of Vehicles

Project Ideas

- Modelling & Simulating 20-minute City Concepts
- Integrated Health Monitoring System with Activity and Fall Detection
- Secure Attendance Monitoring System using GPS and Smartphone Integration

Dr. M. Usman Ilyas

- Networking and communication
- Applied machine learning
- Social network analysis
- Sensor networks & the Internet of things

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- Mathematical modeling of communication systems / networks
  - Lifetime problem, Error modeling, MAC to Transport layer, Application layer (SN)
- Crowdsourced systems
- Physical Activity classification

Interested in exploring

- Algorithmic trading

Past work

- Google Scholar: https://scholar.google.com/citations?user=T12_rSIAAAAJ&hl=en
- Homepage: http://usmanilyas.info

Dr. Ahmad Ibrahim

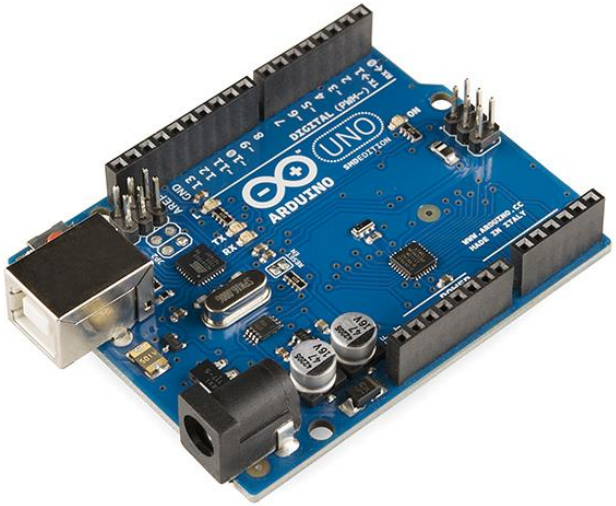
- IoT Applications
- Full Stack Application Development
- More Project Ideas …

Research Interests

IoT Applications

- Smart Bird Feeder
- Home Intrusion Detection System:
- Smart Door/Lock
- Smart Fridge
- Smart Parking System Project
- Health Monitoring System

- **Novelty:** Cloud provider (Microsoft Azure, Amazon Web Services etc), IoT device (Raspberry Pi, Arduino etc), Smart Bands & Fitness Trackers



Research Interests

Full Stack Application Development

- Object Oriented Design
- JavaFX
- Java Spring
- Databases
- Network programming
- Multi-Threads and Data structures

Examples:

- Social media based Fitness tracker.
- Recipe app
- Expense tracker
- Event planner
- Travel app

- **Novelty:** Use of third-party API, Social media integration, Microservices, Docker container, Blockchain, Security & encryption, Artificial Intelligence (recommendation systems), Geo-location.

Dr. Anis Zarrad

Research Interests

- 3D Visual Environments for Inherent Learning and Societal Anxiety
  - Investigating the role of immersive 3D environments in facilitating inherent learning processes.
  - Examining the impact of 3D visual environments on societal anxiety and stress reduction techniques.
  - Wireless Network Protocols for 3D Environments and Games
- Delving into the intricacies of wireless network protocols optimized for seamless integration with 3D environments and gaming platforms.
  - Exploring novel approaches to enhance network performance and reduce latency in immersive virtual environments.

Research interest

- Network Software Testing Using AI
  - Leveraging artificial intelligence techniques for test selection and classification in network software testing.
  - Integrating genetic algorithms and machine learning algorithms to automate and optimize network testing processes.
- Software Testing Using AI
  - Leveraging artificial intelligence techniques for test selection and classification in network software testing.
  - Integrating genetic algorithms and machine learning algorithms to automate and optimize software testing processes.

Dr. Niloofer Shahnavas

Research Interests

- Text mining
- Machine Learning,
- Natural Language Processing
- Semantic Computing

Research Highlights

- Graph-theoretic Approaches to Text Classification
- Knowledge-driven Graph Similarity for Text Classification
- Ontology-based Enriched Concept Graphs for Medical Document Classification

Supervisory Focus

Interested in supervising projects related to:

- Text Classification
- Sentiment Analysis
- Information Retrieval
- Semantic Similarity Measures
- Text Summarization

Dr. Hamid Mukhtar

Research Interests

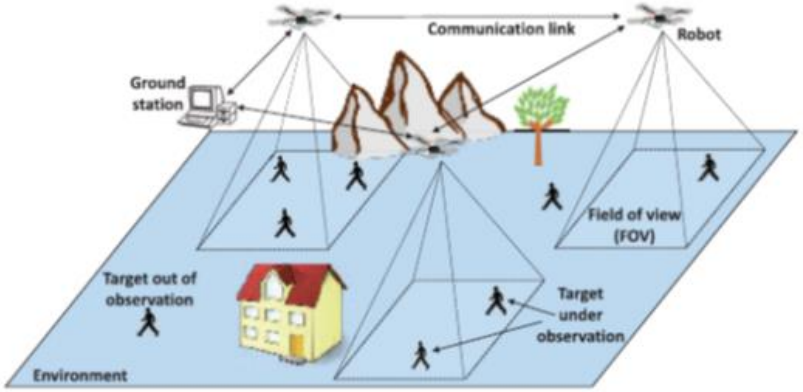
- Artificial Intelligence and Deep Learning
- Healthcare Analytics
- Mobile and Web Computing
- User Behavior Modeling and Human-Computer Interaction
- Natural Language Processing
- Persuasive computing
- Example research work can be found at:
- Hamid Mukhtar - Google Scholar

Dr. Syed Fawad Hussain

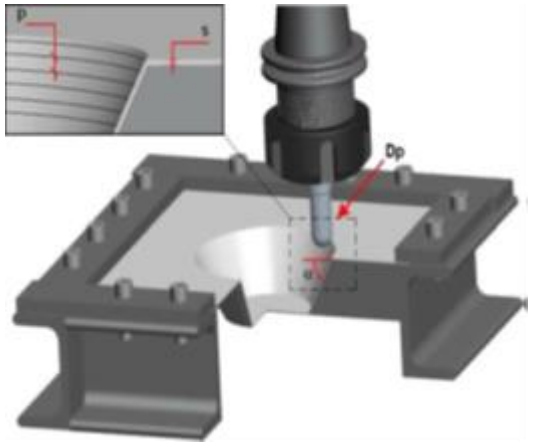
Research Interests

- Machine Learning
- Medical AI
- Social media analysis
- Interdisciplinary research

Research Highlights



1. AI-based integrated autonomous cooperating UAVs.
2. AI-based optimizations of engineering processes
3. Detecting fake news and trends on Twitter.



Dr. Panagiotis Andriotis

- Human factors in cyber security;
- Digital forensics;
- Fairness in recommendation systems;
- Social computing;
- VR/AR secure applications

Research Interests

- Defending from Shilling Attacks against Recommendation Systems
- Mapping Influencers Harmful Impact on Social Media
- Digital Forensic Analysis of VR devices
- Side-channel Attacks on VR Devices
- Indoors Navigation for Accessibility Augmentation
- System Security for Industrial Control Systems

More Info …

- We can also discuss your ideas and interests.

- My personal web page for further information about my prior work: https://andriotisp.github.io/

- You will find related work (related research papers in the proposed areas in the following page: https://andriotisp.github.io/teachingproj/)

Dr. Abdul Wahid

Research Interests

- Edge Computing and Fog Computing
- UWSN (Underwater Sensor Networks), WSN (Wireless Sensor Networks)
- VANET (Vehicular Adhoc Networks)
- IoT (Internet of Things)
- Software Defined Networks
- Machine Learning in Computer Networks: Enhancing Security, Optimization, and Performance

Representative Projects

- Big data analytics for mitigating broadcast storm in Vehicular Content Centric networks
  - published in Future Generation Computer Systems journal
- ESOT: A new privacy model for preserving location privacy in Internet of Things
  - published in Telecommunication Systems journal
- Holistic approach for coupling privacy with safety in VANETs
  - published in Computer Networks journal

Dr. Ruchit Agrawal

Research Areas

- Natural Language Processing
  - LLMs
  - Information retrieval
  - Sentiment analysis
  - Information extraction
  - Machine translation
  - Question answering
- AI for Healthcare
  - Multi-modal Machine Learning
  - Deep Learning on wearables data

Project Topics

- **Large Language Models (GPT-x, Falcon, LLaMa)**
  - LLMs for (including but not limited to):
    - Arabic
    - FinTech/Healthcare
- **Multi-modal deep learning for healthcare**
  - Using data from multiple modalities (eg: wearables + scans) for effective healthcare applications
- **Natural Language Processing**
  - Arabic Dialect Identification
  - Machine Translation
  - Speech processing (transcription/translation/analysis)
  - Automatic Post Editing (editing MT outputs to enterprise ready quality)
- **AI for audio/music processing**
  - Automatic style transfer
  - GenAI for audio/music

Dr. Akila Subasinghe

Research Areas

- Image Analysis
- Deep Learning and Machine Learning Applications
- Generative models.

Current ongoing Projects

Students are currently working on these

- Landslide Detection System
- Maritime Security Surveillance
- Breast Cancer Detection
- Human Behavior Analysis
- Fetal Ultrasound Image Segmentation
- IoT Sensor Platform Development
- Chromosome Image Analysis
- Gaze Detection and Pupil Localization.

Dr. Ahmad Ibrahim Kamel

Research Interests

- Software attestation for large-scale networks of embedded devices
- Software/execution integrity using runtime attestation techniques
- Automatic discovery of microarchitectural side channels

Scalable & Secure Control-Flow Attestation

- Investigate the security of existing control-flow attestation schemes.
- Design secure control-flow attestation schemes based on the identified security flaws
- Scale these attestation protocols to large networks of embedded devices

Automatic Discovery of Side Channels

- Investigate the usage of long code sequences in side-channel fuzzing
- Explore the application of side-channel fuzzing to new architecture
- Leverage code templates as a grammar for side-channel fuzzing

Dr. Safdar Abbas Khan

Research Interests

- Theoretical Computer Science
- AI
- Networking