Research careers

Questions - individual personal answers

What is a research career?

* What do you think researchers do – “Bald men in white coats”
* How do you think a research career differs from an industry career – “They don’t do it for the money”
* What personal benefits could I get from a research career?
* How long does a research career last?

Questions – group discussion

Short material presentation about research careers

Vacancy

Review questions

* What do you think researchers do – “Bald men in white coats”
* How do you think a research career differs from an industry career – “They don’t do it for the money”
* What personal benefits could I get from a research career?
* How long does a research career last?

Personal reflection / conclusions

Links

http://www.rcuk.ac.uk/skills/percase

## Summary

**THIS OFFER IS NOW CLOSED**

PhD Vacancy in The Intelligent Systems Group supervised by Dr. James D. O’Shea

Lie detection is a crucial process in law enforcement and national security (e.g. in offender management). Verbal Features from speech offer subtle cues for deceptive intent. This project will be the first to develop a systematic, fine-grained analysis of Verbal Features for a real-time, automatic deception classifier using Artificial Intelligence.

## Aims and objectives

The Silent Talker (ST) lie detector was developed by the MMU Intelligent Systems Group (ISG) using mainly facial microgestures and has had a remarkable public awareness impact. The objective of this project is to produce a new version of ST using Verbal Features (VFs) as cues for deception. The verbal version will not only be a breakthrough in its own right, but could be combined with the current ST to provide a more accurate detector.

ST is MMU’s contribution to the Horizon 2020 iCROSS border security project (€4M). Our additional objective is to extend the research base of the Intelligent Systems Group and develop you as a new researcher who could participate in future projects on this scale.

Original attempts to detect lies from speech used voice stress analysis. This uses the pitch of the speaker’s voice. Although this technique has been highly publicized by the insurance industry to deter fraudulent telephone claims, it has been criticized in scientific reviews.

Our project will move from signal processing to analyzing the syntax, semantics and pragmatics of spoken utterances for features that can be used as inputs to an automatic lie detection system, used to train an AI component to classify an interviewee’s behaviour as deceptive or truthful.

Research in linguistics and psychology has revealed a set of candidates you could use to create VFs, for example a large-scale meta-analysis of 44 studies identified 79 potential cues to deception. That study found evidence that liars experienced greater cognitive load, expressed more negative emotions, distanced themselves more from events, expressed fewer sensory-perceptual words and referred less often to cognitive processes. These conclusions were reached in terms of summary statistics and could not be exploited to design an automatic real-time detector.

However, our project will follow the ST approach of breaking down candidate features into their simplest components and combining these over a time interval to generate complex features for AI classification. This has worked well in NVB, where it has been shown that single indicative features (such as eye contact) are not meaningful, but ST’s complex vectors are effective.

This new project aims to answer the primary research question “Can human VFs be used in the automated psychological profiling application of lie detection?” It also aims to answer the secondary research questions: “How do VFs compare with facial microgestures?”, “Are some VFs better than others for classification” and “Can an AI algorithm using VFs explain how it takes its decisions to human practitioners in fields such as law enforcement and border control?”

Your PhD research plan will be based on the following objectives:

1. Produce a catalogue of VFs, based on a comprehensive evaluation of the literature on state of the art of psycho-linguistic deception research.
2. Select software and hardware environments to implement a VF lie detector, from an investigation of techniques for VF feature extraction from audio streams
3. Establish a baseline for evaluation of the work, by re-implementing an existing microgestural (facial) lie detector on the platform identified in (2)
4. Design and conduct experiments to collect a corpus of audio/video streams combining verbal and non-verbal behaviour in a new deceptive scenario
5. Identify potential VFs to deception to train the new system
6. Train a sophisticated AI system to analyse audio streams and classify the human behaviour (truthful / deceptive) based on the VFs
7. Analyse the experimental findings to test the hypotheses and answer the research questions
8. Investigate a combination of VFs with Facial microgestures for a hybrid system
9. Replace the final classifier with decision trees, to investigate the explicability of the classification process to a human practitioner

## Specific requirements of the project

This project crosses the disciplines of Artificial Intelligence (AI) and Forensic Linguistics (FL).

You should have a 1st or Upper 2nd class honours degree, or a Master’s degree with good subject grades in Computer Science or a related Engineering discipline

The following skills are essential for your application:

* Coding - The product of this work is a robust AI classifier operating in real time. Strong object-oriented programming skills are required; previous real-time coding skills are useful but not essential.
* AI development skills - You are expected to have studied AI as part of an undergraduate or master’s degree (e.g. Artificial Neural Networks or Decision Trees).
* Interpersonal communications skills - You will have the versatility, ability and enthusiasm to work with the specialist supervisors and advisors outside of Computer Science in the additional discipline of Forensic Linguistics.

These additional skills or traits will be developed during the programme, but familiarity with one or more from the start will be useful:

* A background, or demonstrable interest in Linguistics or Psychology
* Coding experience in C++ (or C#)
* Familiarity with Automatic Speech Recognition
* Knowledge or experience of qualitative & quantitative research methods and ethics

## Student eligibility

This scholarship was open to UK, EU and International students

**THIS OFFER IS NOW CLOSED**