Reducing Medication Errors through Intelligent Safety Reasoning - Funded PhD Studentship in partnership with Bradford Royal Infirmary

University of York

**Qualification type:** PhD

**Location:** Department of Computer Science, University of York

**Funding for:** UK/EU candidates

Non-EU candidates will be considered for this studentship but will be required to self fund the difference between the home and overseas tuition fees

**Duration:** Funding is available for 3 years

**Funding amount:** Full coverage of tuition fees (at UK/EU rate) and annual stipend at RCUK rate ie £14,553 for 2017/18

**Hours:** Full Time

_The project_

It is now well established that the safety of critical services is a dynamic property [1][2]. In healthcare, this dynamism is often attributed to variation in the health and care services, and their underlying systems, as well as in the environments within which they are deployed. Although variation can be seen as a negative attribute, e.g. a sign of noncompliance, increasingly more emphasis is placed on the necessity of variation to enable, and sometimes empower, people and technologies to adjust and adapt to ensure continuous safe care. The ability to adapt and adjust is a key enabler for resilience in healthcare [3] (also referred to as Safety 2.0 [4]).

However, despite the increasing interest in the notion of resilience, significant gaps remain between its theoretical underpinnings and practical methods and tools for implementing, maintaining and assuring resilient services. In this proposal, we focus on developing an assurance methodology and toolset for developing dynamic safety cases for clinical services [5]. Unlike traditional safety cases [6], which often remain static and updated in a reactive manner, both the justification and evidence base of the dynamic safety cases will evolve based on real-time data that is collected, proactively, from diverse sources, particularly covering and combining clinical, organisational and technological factors [9].
The new Electronic Patient Records (EPR) deployed at Bradford, Calderdale and Huddersfield hospitals will provide a data-rich experimental and translational setting for this research. The focus of the project will be on medication management, which is supported by the EPR, in which every step in the medication process (i.e. prescribing, dispensing and administering) is error prone. Medication management is inherently a safety-critical service in which errors are a leading cause of patient harm worldwide [7].

The proposed research will build on the Safety Modelling, Assurance and Report Toolset (SMART) that is currently being developed and evaluated by the University of York and NHS Digital [8]. The research will extend SMART through new dynamic risk models and uncertainty assessment algorithms for proactively computing the confidence in, and update the reasoning about, the safety of the medication services based on real-time data, e.g. using Bayesian networks. This will be combined with a set of update rules triggering actions in response to changes in the services, clinical settings, the safety argument or the confidence in that argument, prompting action on leading indicators/precursors before they potentially develop into errors and patient harm. Usability and user acceptance is a primary requirement. Data and risk communication interfaces will be adapted to suit the different needs and concerns of various stakeholders, e.g. patients, clinicians, managers, researchers and engineers.

Mixed methods will be utilised in this research, covering qualitative criteria (user acceptance, quality of incident reporting, clarity of safety justification and strength of evidence) and quantitative measures (rate of medication errors, categorised by severity, phase and detection, and frequency of incident reporting). The project will engage with partners in healthcare, e.g. NHS Digital, and other safety-critical domains, e.g. NASA Ames, that maintain interest and active research in dynamic safety cases.

The PhD candidate is expected to have excellent modelling and programming skills and interest in interdisciplinary research and patient safety.

References:

Research supervision
If successful, you will conduct your research under the supervision of:

- Dr Ibrahim Habli, Lecturer in Safety-Critical Systems
- Dr Tom Lawton, Consultant in intensive care and anaesthesia at Bradford Royal Infirmary

Award funding
If successful, you will be supported for a maximum of three years. Funding includes:

- £14,553 (2017/18 rate) per year stipend
- Home/EU tuition fees
- RTSG (training/consumables/travel) provision

Funding requirements
To be considered for this funding you must:

- meet the entrance requirements for a PhD in Computer Science
- be a UK/EU citizen*
* Non-EU candidates will be considered for this studentship but will be required to self fund the difference between the home and overseas tuition fees. At 2017/18 rate, the total difference equals £15525 (ie £19720 - £4195)

The PhD candidate is expected to have excellent modelling and programming skills and interest in interdisciplinary research and patient safety. The PhD student will join interdisciplinary researchers, who work closely with the NHS and technology firms, with interest in designing intelligent healthcare systems that have the potential to improve patient safety and quality of care.

Apply for this studentship

1. Apply to study
You must apply online for a full-time PhD in Computer Science

You must quote the project title (Safe Medication Management) in your application.

There is no need to write a full formal research proposal (2,000-3,000 words) in your application to study as this studentship is for a specific project.

2. Provide a personal statement
As part of your application please provide a personal statement of 500-1,000 words with your initial thoughts on the research topic.

Applications currently being accepted.

Informal enquiries

Project enquiries
Dr Ibrahim Habli
ibrahim.habli@york.ac.uk
+44 (0)1904 325566

Application enquiries
cs-pg-admissions@york.ac.uk
+44 (0)1904 325404