

Centre for Intelligent Healthcare

Post Graduate Research (PGR)
Handbook

Edition: August 2023

Welcome:

The greatest challenge facing our global healthcare system is how to maintain the health of the population. This is especially important now when there is an increase in the prevalence of long-term conditions. Additionally, the increasing number of people with co-morbidities due to demographic changes and lifestyle choices further emphasizes the need for a transformation in our healthcare services.

This will require new approaches, new technologies and supporting evidence, new interventions as we all become responsible for ensuring we stay healthy, active and independent for as long as possible since all of us wish to age well.

The Centre for Intelligent Healthcare (CIH) through its dynamic staff, advisory boards, partner organisations and horizon scanning tools will be at the forefront of this research, improving and developing innovative healthcare technologies, AI-empowered healthcare solutions and digital self-management tools and interventions, creating wearable devices for the next generation of healthcare monitoring and management and providing the evidence for change.

Our research fits squarely with the UKRI strategic plan for a "Healthy Nation" and priority area of "Transforming Community Health and Care" and "Improving Prevention and Public Health", which calls for multi-disciplinary approaches to tackle national and global challenges in our society.

We are a multi-disciplinary research centre directed by Prof Dingchang Zheng with four key themes of work led by senior researchers.

PhD Journey:

Every PhD is unique, and the journey towards gaining a doctorate comes with its ups and downs but, as a centre, we are here to support you and help you navigate this path, so you achieve the title of Doctor!

The doctoral college provides much support and advice at a wider university level. This, together with detail of the regulatory requirements for completing a PhD, can be accessed through their website. (<https://www.coventry.ac.uk/research/research-opportunities/doctoral-college-and-centre/>). However, each discipline also has its own set of expectations as to what a PhD should contain and resources to facilitate you in your PhD journey, so here we provide a broad guide for those in the health field. Still, it is very important to follow the individual advice of your supervisors. We would typically expect your PhD to contain enough work to publish three academic papers; these are often three small studies that are related but are able to stand on their own. For example, one of these papers may cover:

- Systematic review
- Advanced RF signal processing and radar sensing
- Physiological measurement design

- Novel sensor and medical device development and evaluation
- Innovative bio-signal processing algorithm development
- Computational modelling
- AI in population health
- Crown sensing

Sometimes, these small studies might be more impactful if they are published together as one large paper, or indeed your PhD work may be just a part of a much larger study, e.g. the pilot phase of a large randomised controlled trial.

During your PhD, due to time limitations, you may not get all of these accepted for publication, and you can still be awarded a PhD even if all your work is unpublished. So, it is important to note that your PhD does not depend on publications. It does, however, depend on the quality and quantity of your work to be sufficient to merit publication, should time allow.

Perhaps the easiest way to think of this is to consider the three years of your PhD (or six if part-time) as three phases, and for each phase, there should be some research results worthy of publication. As you go through each of the tasks required to complete each phase of your PhD, e.g. writing a research proposal, submitting documents to obtain ethical approval, analysing a data set, you should find that your doctoral thesis pretty much writes itself!

An example PhD thesis in digital health interventions might include:

- an introduction chapter summarising the background literature underpinning your research (demonstrating understanding of the wider research context, how your research fits and why it is needed);
- a chapter demonstrating critical analysis of traditional methodologies, frameworks, techniques, approaches to particular healthcare interventions / health conditions of interest
- empirical chapter(s) describing the development phases of the intervention
- empirical chapter(s) reporting results from the intervention / pilot test / trial
- a chapter for conclusions including a summary of results and discussion of future work

It is important to highlight that every thesis will be different depending on the research design, participant population, health condition, and type of intervention.

Details of formatting and word limits are available on the doctoral college website; however, these are maximum, not minimum limits. Typically, a more quantitative PhD would be in the region of 40,000 words, but one that also contained qualitative analysis might be quite a bit larger. Always remember that a PhD is complicated enough, so keep your writing simple and easy for everyone to read!

Opportunities we invite you to consider your PhD journey as more than producing a thesis. We view PhDs as 'academic apprenticeships' and hope you will make the most of all the opportunities available to develop more broadly as an academic. We hope you will become well-rounded and highly employable, able to research in various

methods and across disciplines, practice writing for publication, present your research, develop skills in bid writing and have teaching experience in higher education. You may even be able to undertake a Higher Education Academy accredited course in teaching alongside your PhD.

The Centre also has a number of industry, government, charity, and health trust collaborations working on a range of activities from Knowledge Partnerships (KPTs), research projects, and consultancy activities that students will be encouraged to engage with during their studies. The Centre is committed to providing a creative, supportive and innovative research environment for our students, encouraging personal development, stakeholder engagement and collaboration.

PGR Lead:

As well as your director of studies and supervisors, we have a dedicated academic, Dr Syed Aziz Shah, the centre's lead for post graduate researchers. He is able to assist you with general enquiries and support you to get the most out of your research journey.



The PGR lead organises regular seminars, meetings and social gatherings among the PGRs. We also organise occasional training/talks by inviting external speakers or experienced senior researchers to develop a number of skills such as academic writing, presentation in a seminar, finding post-doctoral jobs and writing grant applications.

If there is an issue that you need independent advice on or want to discuss issues such as supervision, the label of support, PGR annual allowance, etc., please contact Dr Syed Aziz Shah (syed.shah@coventry.ac.uk).

Other Information:

The doctoral college provides much support and advice at a wider university level. This, together with detail of the regulatory requirements for completing a PhD, can be accessed through their website. (<https://www.coventry.ac.uk/research/research-opportunities/doctoral-college-and-centre/>).

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Facilities:

Richard Crossman Building – 4th Floor

CIH staff and PGRs sit on the 4th floor of Richard Crossman Building – it's a light and airy atmosphere and modern open space to collaborate, meeting rooms to meet for presentations, seminars or research collaboration with stakeholders and partners. This floor has two kitchens and ample space to store your lunch in the fridge and facilities for making hot drinks and microwaves to heat your lunch. Some photos of the facilities at 4th floor of Richard Crossman during different activities (e.g., seminar, supervision, research collaboration) are given below.

CIH has a unique healthcare sensing development facility on the Ground floor of the HDTI Building at the Coventry University Technology Park. This includes four aligned development and evaluation spaces: Wearable Healthcare Sensing Lab, Healthcare Electronics Workshop, Radio Frequency Lab, and Microvascular Sensing Research Facility. Specialists in the HTI theme oversee each space to perform next-generation wearable sensor development, device prototyping, experimental measurements, physiological data collection and data analysis involving a wide range of healthcare technology project areas.



The Wearable Healthcare Sensing Lab consists of a chemical workspace and an ISO-7 clean room. This has multiple devices for producing and testing nanomaterials and wearable sensor substrates. The cleanroom is equipped with advanced devices, including a plasma etching system, a nanomaterial inkjet printer, a contact angle goniometer, It is the major place for healthcare wearable sensors fabrication. Ahmed Albagdady (ae0710@coventry.ac.uk) | Senior Technician (Chemistry and Nanotechnology) oversees these facilities.



CIH have a close clinical link with University Hospital of Coventry and Warwickshire (UHCW) and other universities across UK. Staffs and PGRs from CIH with projects related to clinical aspects collaborate with UHCW and other centres.

The healthcare sensor/device development lab has three key development workspaces: Wireless sensing testbed development workspace for developing 5G and Beyond (B5G) wireless sensing systems; Microelectronics development workspace for prototyping micro-electronic healthcare sensors and devices; Vascular optical sensor and device test workspace for prototyping vascular optical sensors and interfacing to optoelectronic test systems. Dr Syed Aziz oversees the lab. The portfolio of measurement modalities in the facility continues to grow. The Microvascular Sensing Research Facility has vascular optics capability, including capillaroscopy, optical coherence tomography (OCT), thermal imaging, tissue oxygen saturation (TOS) for superficial and deep tissue assessments, laser Doppler flowmetry (LDF), multi-site photoplethysmography (MPPG), and beat-to-beat blood pressure and heart rate variability autonomic assessment. This clinical grade room is temperature controlled. A state registered Clinical Scientist oversees the clinical facility (Prof John Allen, Professor of Biosensors and Bioinstrumentation (<https://pureportal.coventry.ac.uk/en/persons/john-allen>)).

Themes:

Healthcare sensing technology

Led by Prof Dingchang Zheng and Dr Syed Aziz Shah. Dingchang is a leading research expert in innovative healthcare technology development through the pathway of physiological measurement, bio-signal processing, and technology evaluation.



Dr Syed is a co-theme and PGR Lead. An interdisciplinary researcher focusing on advanced radio frequency (RF) sensor design and signal processing using RF and THz sensing, specifically for physiological measurements.



He is the PI on an EPSRC-funded project developing radar sensing technology for monitoring multiple participants in indoor settings.

PURE link: <https://pureportal.coventry.ac.uk/en/persons/dingchang-zheng-2>

PURE link: <https://pureportal.coventry.ac.uk/en/persons/syed-aziz-shah>

Vascular Optics and Microvascular sensing

Led by John Allen is a Professor of Biosensors and Bioinstrumentation.

A leading researcher in the field of vascular optics and novel microvascular sensing, with world-class expertise in photoplethysmography (PPG), thermal imaging and capillaroscopy, as well as extensive experience in physiological measurement, device innovation and signal/image analysis.



PURE link: <https://pureportal.coventry.ac.uk/en/persons/john-allen>

AI in Health



Led by Robyn Tapp, who is a Professor in Epidemiology and Evidence-Based Healthcare. Her research focuses on using AI and epidemiological-based precision medicine.

PURE link: <https://pureportal.coventry.ac.uk/en/persons/robyn-tapp>

Digital Health Interventions

Led by Dr Hayley Wright. Her research background is in cognitive psychology, and have interests in neuropsychology, neuroscience and psychosocial outcomes after acquired brain injury (ABI). Her recent work has focussed on cognitive ageing, sexual wellbeing and cognitive function in older adults, and peer-supported self-management of long-term conditions including acquired brain injury (ABI), cancer and Long COVID. She is the PI on an NIHR-funded project developing and testing a digital programme to support sexual wellbeing after ABI.



PURE link: <https://pureportal.coventry.ac.uk/en/persons/hayley-wright>

Student Allowances:

When studying at Coventry University you will be entitled to a Research Development Allowance of £875, which will be available for the duration of your studies. This allowance is used to purchase items to support your research. To use this allowance you will need approval from your director of studies and PGR lead (Dr Syed Aziz Shah – syed.shah@coventry.ac.uk), before purchasing the items (you will also need proof of purchase i.e. receipts). Your PGR lead will then send the approval and proof of purchase to the operation's team to process the claim.

During your studies you will also be entitled to a one-off conference allowance of £300, which is available if you are presenting at conference from your second year (full time) or third year (part time) of study onwards. This allowance can only be accessed once, and you will need proof that you are presenting at the conference. You will also need the same approval as you would for the development allowance before the claim is

sent to the operation's team. If costs for the conference you are presenting at, amount to £300+ you will be able to use your development allowance if available.

All general enquiries relating to this procedure should be sent to either the Director of Studies or the Health & Wellbeing admin team: ihw.admin@coventry.ac.uk.

Staff Contact List:

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Doctoral College

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