KirCCS

Kent Interdisciplinary Research Centre in Cyber Security
INTRODUCTION

The Kent Interdisciplinary Research Centre in Cyber Security (KirCCS) at the University of Kent harnesses expertise across the University to address current and future research challenges in cyber security.

KirCCS represents the University of Kent as a UK government recognised ACE-CSR (Academic Centre of Excellence in Cyber Security Research), one of only 19 such centres in the whole UK. The current recognition started from 2018 and will last until 2022. The Centre was also recognised as an ACE-CSR in the past from 2015 to 2017, one of only 13 such centres.

The Centre’s strategic objectives include to promote wide-ranging interdisciplinary research and to develop skills of students and the wider community in cyber security, through its research activities, degree programmes, external-facing events, visits to external organisations, public talks, and professional training.

Included in its remit is to work with external organisations including industry, government and NGOs to help produce and promote good products, systems, policies, practices and behaviours in cyber security.

KirCCS also works closely with international researchers, practitioners, policy makers and organisations, helping increase the international visibility and influence of UK researchers in cyber security.

KirCCS will be a core part of the larger and more interdisciplinary Institute of Advanced Studies in Cyber Security and Conflict, to be launched in 2020.

More about KirCCS can be found at: https://cyber.kent.ac.uk
The Centre currently has 16 Core Members from the School of Computing and the School of Engineering and Digital Arts, 42 Associate Members from 13 different schools, and a number of affiliated researchers (research associates, PhD students, and visiting researchers).

Core Members

**Budi Arief**  
Director of External Liaison, KirCCS  
Senior Lecturer and Director of Innovation, School of Computing

**Sanjay Bhattacherjee**  
Lecturer, School of Computing

**David Chadwick**  
Professor of Information Systems Security, School of Computing

**Farzin Deravi**  
Professor of Information Engineering and Head of School, School of Engineering and Digital Arts

**Theodosios Dimitrakos**  
Chair of Advisory Board, KirCCS  
Professor of Computer Science, School of Computing

**Virginia Franqueira**  
Lecturer, School of Computing

**Richard Guest**  
Reader in Biometric Systems Engineering and Deputy Head of School, School of Engineering and Digital Arts

**Julio Hernandez-Castro**  
Deputy Director, KirCCS  
Professor of Computer Security, School of Computing
PEOPLE (CONT)

**Associate Members**

**Pervaiz Akhtar**  
Professor of Management Systems, Kent Business School

**Chee Siang (Jim) Ang**  
Senior Lecturer in Multimedia/Digital Systems, School of Engineering and Digital Arts

**Samer Bagaeen**  
Professor of Planning, Kent School of Architecture

**John Batchelor**  
Professor of Antenna Technology, School of Engineering and Digital Arts

**David Barnes**  
Senior Lecturer, School of Computing

**Mark Batty**  
Lloyds Register Foundation and Royal Academy of Engineering Research Fellow and Senior Lecturer, School of Computing

**Laura Bocchi**  
Senior Lecturer, School of Computing

**Howard Bowman**  
Professor of Cognition and Logic, School of Computing

**Adam Burgess**  
Director of Critical Studies in Risk and Uncertainty research cluster and Professor of Risk Research, School of Social Policy, Sociology and Social Research

**Jack Cunliffe**  
Lecturer in Quantitative Methods and Criminology, School of Social Policy, Sociology and Social Research

**Lisa Dickson**  
Reader and Co-Deputy Head of School, Kent Law School
Karen Douglas
Professor of Social Psychology, School of Psychology

Christos Efstratiou
Senior Lecturer in Ubiquitous Computing, School of Engineering and Digital Arts

Alex Freitas
Professor of Computational Intelligence and Head of Computational Intelligence research group, School of Computing

Steven Gao
Professor of RF/Microwave Engineering and Director of Graduate Studies (Research), School of Engineering and Digital Arts

Stuart Gibson
Senior Lecturer in Forensic Science, School of Physical Sciences

Radu Grigore
Senior Lecturer, School of Computing

Tim Hopthrow
Reader in Psychology, School of Psychology
Associate Dean for Research and Innovation, Faculty of Social Sciences

Stephen Kell
Lecturer, School of Computing

Timothy King
Senior Lecturer in Finance, Banking and Innovation, Kent Business School

Alan McKenna
Lecturer in Law, Kent Law School

Matteo Migliavacca
Senior Lecturer, School of Computing

Vince Miller
Reader in Sociology and Cultural Studies and Deputy Head of School, School of Social Policy, Sociology and Social Research

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PEOPLE (CONT)

Gareth Mott
Lecturer, School of Politics and International Relations

Dominic Orchard
Lecturer, School of Computing

Scott Owens
Reader, School of Computing

Thanos Papadopoulos
Professor of Management (Operations Management / Information Systems), Kent Business School

Palaniappan Ramaswamy
Reader and Head of Data Science research group, School of Computing

David Roberts
Reader in Biodiversity Conservation and Academic Head Conservation Biology, School of Anthropology and Conservation

Peter Rodgers
Professor of Visual Computing, Director of Research and Deputy Head of School, School of Computing

Jeremy Rossman
Honorary Senior Lecturer in Virology, School of Biosciences

Maria Paola Scaparra
Professor in Management Science and Head of Management Science research group, Kent Business School

Konstantinos Sirlantzis
Senior Lecturer in Intelligent Systems, School of Engineering and Digital Arts

Christopher Solomon
Reader in Physics and Head of Forensics Imaging Group, School of Physical Sciences
Simon Thompson
Professor of Logic and Computation, School of Computing

Paraskevi Triantafyllopoulou
Lecturer in Intellectual and Developmental Disability, School of Social Policy, Sociology and Social Research

Harmonie Toros
Reader in International Conflict Analysis, School of Politics and International Relations

Cristiano Villa
Senior Lecturer in Statistics, School of Mathematics, Statistics and Actuarial Science

Jiangzhou Wang FREng
Professor of Telecommunications, School of Engineering and Digital Arts

Shaomin Wu
Professor in Business/Applied Statistics, Kent Business School

Jian Zhang
Professor of Statistics and Head of Statistics group, School of Mathematics, Statistics and Actuarial Science

Zaki Wahhaj
Reader in Economics, School of Economics

More information about members and affiliated researchers of KirCCS can be found at: https://cyber.kent.ac.uk/people.html
RESEARCH

Research themes

Authentication and authorisation
Lead: Gareth Howells
Example topics: biometrics, passwords and new user authentication technologies, identity management, CAPTCHA, device authentication, authorisation and access control, autonomic authorisation

Communication and network security
Lead: Julio Hernandez-Castro
Example topics: IoT security, RFID security, cloud security, network security protocols, secure quantum communications, network intrusion detection, data loss prevention
Security testing and verification

Lead: Andy King

Example topics: software security analysis, malware code analysis, security metrics and automated testing, self-adaptive security in software systems, self-testing of quantum computing for next-generation quantum based security systems

Socio-technical security

Lead: Shujun Li

Example topics: usability, human behaviour, human profiling and modelling, cybercrime, privacy online social networks, risk management (eg, cyber insurance), insider threats, trust and reputation, socio-technical aspects of selected topics (eg, malware, blockchains and cryptocurrencies)
The Centre also has capabilities in some other important cyber security areas beyond and cross-cutting the four main research themes. Four such cross-cutting topics are:

**Applications of AI related technologies in cyber security**
Example AI technologies used: machine learning, data mining, data analytics, discrete optimisation, information visualisation

**Digital forensics and cybercrime**
Example sub-topics: computer forensics, network forensics, multimedia forensics, cybercrime prevention, cyber threat intelligence
Information hiding
Example sub-topics:
steganography, steganalysis, behaviour based information hiding, digital watermarking, joint watermarking and encryption

Quantum cyber security
Quantum-resistant cyber security systems using quantum mechanics (beyond the existing quantum based key exchange/distribution systems)
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<td>2012</td>
<td>Interdisciplinary Research Centre in Cyber Security was established, with over 20 members from seven schools.</td>
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<td>2015-2017</td>
<td>The University of Kent was recognised as an Academic Centre of Excellence in Cyber Security Research (ACE-CSR) by GCHQ and EPSRC.</td>
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| 2017 | The Centre supported the School of Computing’s MSc programme in Cyber Security to be provisionally certified by NCSC, part of GCHQ.  
Cyber Security was recognised as a university wide area of research excellence (one out of only two).  
The Centre’s name was changed to Kent Interdisciplinary Research Centre in Cyber Security (KirCCS).  
Shujun Li joined as the new Director.  
The membership structure changed to accommodate more people who are interested in Cyber Security research. |
| 2018 | The University of Kent was re-recognised as an ACE-CSR (2018-2022) by NCSC and EPSRC.  
The Centre’s Advisory Board was established. |
| 2019 | KirCCS hosted a number of events in July-September:  
Summer School on The Human Aspects of Cyber-crime and Online Fraud, Network Defenders’ ‘Hacking’ competition, PriCom 2019 (5th International Symposium on Privacy Computing), ARES 2019 (14th International Conference on Availability, Reliability and Security), and Kent Cyber Security Forum (KCSF) 2019 |
SELECTED RESEARCH PROJECTS

Since its establishment in 2012, the Centre has secured over £7m research funding from different external sources. Some selected research projects are:

- Kent as lead, a number of PhD studentships funded by NCSC/GCHQ, Dstl, and industry

- Kent as partner, A Platform for Responsive Conversational Agents to Enhance Engagement and Disclosure (PRoCEED), funded by EPSRC, competitive grant, value to Kent £163,555, 2019-2021

- Kent as lead, Robust Video Watermarking, funded by Huawei Technologies, value to Kent £230,000, 2019-2020

- Kent as lead, PriVELT: PRIVacy-aware personal data management and Value Enhancement for Leisure Travellers, funded by EPSRC, competitive grant, value to Kent £429,069, 2018-2021

- Kent as lead, ACCEPT: Addressing Cybersecurity and Cybercrime via a co-Evolutionary approach to reducing human-related risks, funded by EPSRC, competitive grant, value to Kent £162,044.34, 2017-2019

- Kent as co-lead, EMPHASIS: Economic, Psychological, and Social Aspects of Ransomware, funded by EPSRC, competitive grant, value to Kent £344,547, 2017-2019

- Kent as partner, INCASE: Industry 4.0 via Networked Control Applications and Sustainable Engineering, funded by Interreg IV 2 Seas Programme (North), competitive grant, value to Kent £561,824, 2016-2019

- Kent as partner, C3ISP: Collaborative and Confidential Information Sharing and Analysis for Cyber Protection, funded by European Commission (H2020), competitive grant, value to Kent £448,300, 2016-2019

- Kent as partner, SPIRIT: Security and Privacy for the Internet of Things, funded by EPSRC (CHIST-ERA), competitive grant, value to Kent £174,413, 2016-2019

- Kent as lead, AMBER: Enhanced Mobile Biometrics MCSA ITN, funded by European Commission (H2020), competitive grant, value to Kent £585,783, 2016-2020

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SELECTED RESEARCH PROJECTS (CONT)

- Kent as partner, **RAMSES: Malware analysis for digital forensics**, funded by European Commission (H2020), competitive grant, value to Kent £305,815, 2016-2019
- Kent as lead, **SEEK (Steganalytic vidEo-rEsearch frameworK)**, funded by EPSRC, competitive grant, value to Kent £273,996, 2016-2019
- Kent as partner, **NeCS (European Network for Cybersecurity) MCSA ITN**, funded by European Commission (FP7), competitive grant, value to Kent £388,645, 2015-2019
- Kent as lead, **Vulnerability discovery using abduction and interpolation**, Singapore-UK joint research project, UK part funded by EPSRC, competitive grant, value to Kent £199,130, 2016-2019
- Kent as lead, **Improving cyber security using realistic synthetic face generation**, Israel-UK Cyber Research project, UK part funded by EPSRC, competitive grant, value to Kent £155,087, 2015-2017
- Kent as lead, **Horizontal cloud security and network capabilities for accredited cloud application and data**, funded by BT, value to Kent £170,000, 2015-2017
- Kent as partner, **Authenticated Self – The ‘aS’ Platform**, funded by Innovate UK, competitive grant, value to Kent £115,957, 2015-2016
- Kent as partner, **PIDaaS: Private Identity as a service**, funded by European Commission (FP7), competitive grant, value to Kent £145,103, 2014-2017
- Kent as lead, **Se-Ma-Match: semantic malware matching**, funded by EPSRC, competitive grant, value to Kent £245,526, 2013-2016
- Kent as lead, **Compositional security analysis for binaries**, funded by EPSRC and GCHQ, competitive grant, value to Kent £261,718, 2013-2016

More research projects of the Centre can be found at:
https://cyber.kent.ac.uk/projects.html
COLLABORATIONS

The Centre has been working with many external organisations and researchers in the UK and from all over the world. Some examples of such collaborations are given below.

UK research community

- Other ACEs-CSR
- 4 NCSC (co-)funded UK Research Institutes in Cyber Security
  - RISCS (Science of Cyber Security)
  - VeTSS (Automated Program Analysis and Verification)
  - RITICS (Trustworthy Industrial Control Systems)
  - RISE (Secure Hardware and Embedded Systems)
- Wider cyber research groups in UK universities

International research community

- Europe: France, Germany, The Netherlands, Spain, Italy, Austria, Poland, Norway, Portugal, Belgium, Hungary, Croatia, Lithuania, …
- Asia: China, Singapore, Japan, Malaysia, Saudi Arabia, Israel, …
- Oceania: Australia
- Americas: United States, Canada, Brazil, …

Industry

- CyberInvest companies: BT, IBM UK, Thales UK, NCC Group, Corporate Risk Associates Limited (CRA), Crossword Cybersecurity plc, …
- Other companies: Huawei Technologies, SecureData, NHS, Lloyds Banking Groups, TRL Ltd, …
COLLABORATIONS (CONT)

- Innovate UK KTP (Knowledge Transfer Partnership) programme
  - Three-way partnership: A company + A university (at least two academics) + An associate (a person employed by the university but fully embedded at the company)
  - Solving real-world problems of the company + Giving academics access to real-world problems + Developing the associate as a professional
- Industry funded PhD studentships
- Industry funded research projects
- Secondments and internships in industry

Governmental bodies
- National Cyber Security Centre (NCSC)
- Defence Science and Technology Laboratory (Dstl)
- Department for Digital, Culture, Media and Sport (DCMS)
- Law enforcement agencies
  - Home Office
  - Local police forces
  - Europol

If you are interested in discussing collaborations with us, please find how to contact us at: https://cyber.kent.ac.uk/contact.html
INNOVATION AND WIDER IMPACT

The Centre has been conducting innovation and wider impact generation activities as well. Some examples of our activities in innovation and impact are given below.

**Technology Transfer**
- Patenting
- Spin-offs
- Collaboration with industrial partners
- Working with tech transfer companies
- Special tech transfer programmes such as DCMS and Innovate UK jointly funded CyberASAP programme

**Wider Impact**
- Annual Public Engagement Events (eg, Kent Cyber Security Forum 2019)
- Expert comments on public media
- Cyber security awareness activities
- Education and professional training
- Industrial consultancies

We work closely with Kent Innovation and Enterprise (KIE), a dedicated department of the University supporting innovation activities and collaborations with industry.

If you are interested in commercialising or helping us increase the wider impact of our research work, please find how to contact us at: https://cyber.kent.ac.uk/contact.html
FURTHER
INFORMATION

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