Environment template (REF5)

Institution: University of Lincoln

Unit of assessment: UOA 11: Computer Science and Informatics

a. Overview

Research in the School of Computer Science is organised into three established, well-respected centres: the Lincoln Centre for Autonomous Systems Research (**L-CAS**), the Laboratory of Vision Engineering (**LoVE**), and the Lincoln Social Computing (**LiSC**) Research Centre. Our work encompasses both research on the foundations of these areas and, equally importantly, applied research that impacts on RCUK research priorities; including developing visual inspection systems to reduce food waste, use of social media to moderate energy usage or provide support for mental health and wellbeing, and providing instrumentation for new forms of cancer treatment.

The School has developed, on all fronts, since its submission to RAE2008 when we submitted 9 staff and achieved an overall profile of 15% (4*), 35% (3*), 35% (2*) and 15% (1*). Our profile for outputs at this time was notably better that our overall one, possibly reflecting the embryonic nature of a new department but one that was producing good research. Since then, the University has made major strategic investments in computer science, enabling our submission to expand appreciably. This is set against the backdrop of the recent formation of a College of Science with the School as a founding unit. The establishment of a new School of Engineering, the first in several decades at a UK university, has further assisted us to open major joint research areas, including the development of custom integrated circuits and associated software (chiefly for healthcare and scientific applications). New appointments have been made during the census period to early career researchers and to established academics and commercial researchers, including the University's first Distinguished Professor. All new staff have been appointed to strategically strengthen one or more of our existing research areas – primarily on research track record and potential. Junior staff receive support and mentoring through our strong research centre culture. The School's research organisation and strategy is overseen by a Steering Group, which includes representatives from the three Research Centres.

Lincoln Centre for Autonomous Systems Research (**L-CAS**), led by Prof. Tom Duckett, specialises in the integration of perception, learning, decision-making and control capabilities in autonomous systems such as mobile robots and smart devices, together with the application of research in various fields including personal robotics, food and agriculture, security and surveillance, environmental monitoring, and intelligent transportation.

Laboratory of Vision Engineering (**LoVE**), led by Distinguished Prof. Nigel Allinson, MBE, specialises in the capture, transmission, processing and understanding of image, video and other high-dimensional data, extending and exploiting important facets of the image acquisition chain from the development of new imaging devices/systems, through image/video transmission, to image understanding. **LoVE** focuses on application areas including: healthcare, scientific, security and environmental monitoring; as well as developing novel processing algorithms and designing/supplying new imagers and systems. It is a joint activity with our School of Engineering.

Lincoln Social Computing (**LiSC**), led by Prof. Shaun Lawson, specialises in both theoretical and applied research around social media and user engagement with interactive, social and mobile digital systems. The centre's work is cross-disciplinary but is largely underpinned by human computer interaction (HCI) and experience-centred design approaches; the centre focuses on application areas including: health and wellbeing, energy and sustainability, media, entertainment and games, and the digital economy.

All staff submitted are members of one of these three centres. Outputs from 14.5 FTEs are submitted: 4.0 (Duckett, Hanheide, Mozos, and Bellotto) from **L-CAS**, 5.5 (Hunter, Al-Diri, Lambrou, Tzimiropoulos, Ye, and Anaxogoras) from **LoVE** and 5.0 (Lawson, Rowland, Kirman, Linehan, Foster) from **LiSC**. Given the cross-disciplinary nature of his personal research and our joint activity with Engineering, the outputs of the Director of **LoVE**, Prof Allinson, will not be submitted to UOA 11; instead these will be included in the University's submission to UOA 15.

b. Research Strategy

Our overall strategy is to pursue quality research spanning underlying theoretical studies to transformative applications in both scientific and commercial/social domains. We, of course, focus

on our specialities but remain open to developments and needs across our respective disciplines and beyond. Our activities and achievements since the RAE2008 submission are summarised below, together with additional indicators of our vision for future developments:

L-CAS pursues several lines of fundamental research into autonomous systems, including (i) human-centred mobile robotics, (ii) long-term autonomy and adaptation in changing environments, (iii) machine perception and sensor fusion, and (iv) bio-inspired embedded systems. These developments share a common need to process and interpret large-volumes of real-world sensory data from different modalities in real time, as well as intelligent spatio-temporal decision-making. The centre specialises in systems integration, bringing together these technologies with other supporting components to tackle challenging real-world applications in food and agriculture, security, assistive care, and intelligent transportation. The centre is leading research on 4D mapping and navigation in the EU-funded collaborative project STRANDS (FP7 IP 600623), as well as contributing to an EU project on adaptive motion in the presence of humans, cognitive control and systems integration. Human-robot interaction is naturally a major interest within the group, including research on enabling technologies such as person detection and tracking, social robotics, and interaction studies. Cross-disciplinary agri-food technology research is undertaken in collaboration with the *National Centre for Food Manufacturing*, and links to local, national and global agri-food industries. This includes work on trainable vision systems with multiple applications from raw food products to food packaging; as well as in agricultural robotics, sensory systems for agricultural monitoring and automating control of agricultural vehicles. Several applied projects are funded by the TSB. The FP7 IP project STRANDS is also contributing to security (with G4S as partner) and assistive care.

Our future directions are to (i) continue basic research into technologies for perception, adaptation and learning, decision-making and control of autonomous systems, as well as the integration of these technologies with other components following a system's approach; and (ii) expand impact of our research in real-world applications, including establishing stronger links to the national and global industries in agri-food technology, security, assistive care, and intelligent transportation.

LoVE concentrates its activities on critical challenges across the imaging chain: from developing new CMOS-based imagers to understanding vast corpuses of imagery. As such we provide a rare meeting point for what are usually considered separate disciplines: understanding of semiconductor physics via embedded systems to robust data-mining. We possess full design platforms, both academic and commercial licences, and advanced characterisation systems for CMOS imagers. We produced the world's largest radiation-hard imager (EP/G037671/2). These wafer-scale imagers are primarily intended for healthcare; we lead the £1.6m PRaVDA Consortium to extend capabilities of proton therapy including the provision of real-time proton CT, as well as supplying commercial designs to multinational healthcare companies. We have developed embedded systems for autonomous intelligent sensor analysis, including assistive care (EU FP7 BRAINS, TOTALCARE). Further involvement in healthcare relates to the advancement and exploitation of medical imaging from understanding clinical needs to assisting in medical trials: e.g. a system for the detection of colonic polyps in CT imaging has been CE marked as well as gaining FDA approval for clinical use and is deployed at over 100 sites internationally. In addition an API for the detection of lung nodules in CT imaging has been CE marked and integrated into 3D visualisation workstations for clinical use across Europe. Other work includes the development of systems and techniques for vision-aided security and biometrics – including state-of-the-art facial location and emotional determination in challenging environments. Funded activities include (i) the £1.6m Wellcome Translational Grant (with 6 universities, 4 NHS Trusts and the national laboratories of South Africa), (ii) £2.1m EU FP7 Grant (with 9 partners across 4 European countries) to develop novel approaches to offer access, collection, and intelligent analysis of long term personal health status data through an integrated digital representation *in silico* environment and (iii) leading the £3.2m Marie Curie Integrated Training Network grant, REVAMMAD (16 partners across Europe) to integrate retinal vascular modeling with image processing and disease diagnosis.

Future directions will be to (i) support increasing use of proton and other hadron therapy for the treatment of cancer by providing advanced instrumentation and clinically-approved software platforms, (ii) exploit very large corpuses of medical imagery and supporting data, held by partner NHS Trusts, to provide better epidemiological understanding of diseases, (iii) extend automated

facial recognition and emotional assessment from humans to other species (contributing to improved animal husbandry/welfare), and (iv) integrate retinal imaging with physiological modelling including vascular flow dynamics for disease diagnosis, prognosis and screening.

LiSC concentrates on two facets: (i) the basic understanding of people's use of interactive digital systems and, especially, social media; and (ii) experience-centred design, development and evaluation of experimental social software platforms and applications in applied areas of high societal and commercial concern such as physical and mental health, aspects of sustainable living, the convergence of traditional media, and entertainment/gaming. Formed in 2006, **LiSC** was the first group in the UK that set out to understand social media from a HCI perspective. Lawson was the UK's first appointed Chair in Social Computing. **LiSC** is recognised for conducting work in understanding the use, and application, of social media, and games and game-like experiences in serious contexts. We published some of the earliest work that sought to use social media (Facebook, in particular) as a platform to deliver behaviour change interventions in domestic energy consumption and have influenced many other international researchers, on the wider aspects of delivering positive behaviour-change using digital platforms. We have designed many serious-game applications often supported through EU funding such as FP6 PASION and LLP grants DreadEd and Learn2Lead. We led the recent EPSRC Healthcare Partnerships project ENACT which has delivered a social media solution for sleep therapy currently under trial with Nottinghamshire Healthcare Trust. We conduct, large scale, in-the-wild trials of our applications; this includes Fearsquare that has allowed thousands of UK Foursquare users to engage with the open UK crime data. We have close links with, and conduct collaborative research with, two of the UK EPSRC Digital Economy Hubs at Nottingham and Newcastle. We put great emphasis on forging novel interdisciplinary partnerships; perhaps most recently encapsulated in our work with garden designers and architects to deliver an RHS Gold Medal winning 'social media garden' at Chelsea Flower Show (2013).

Future directions are (i) to continue research into the use of social media across different contexts, demographics & cultures. This includes specific contexts: activism and democracy, retail and commerce, mental health and wellbeing (including cyberbullying) and engagement with arts (ii) to use such basic research to design new interactive, connected experiences that address issues of societal and personal importance including health and wellbeing (including issues of worldwide importance such as obesity, depression and diabetes) sustainable lifestyles, political activism, and entertainment, and (iii) develop new opportunities in the digital economy by conducting research at the interface between OpenData, digital arts and social media.

The unit has met many of the specific objectives set in RAE2008:

i. To achieve heightened international reputations for our research centres: Evidenced by **LiSC**'s sustained publication track record including best paper awards at ACM CHI (described in the 2012 EPSRC's Review of HCI as "the most reliable indicator of international excellence"); **LoVE**'s involvement with over £7m funding for research consortia for developing active pixel sensors, and our high citations and EU project leadership in retinal imaging.

ii. To increase research active faculty staff numbers to 16-20: Currently the School has 22 research active FT members of staff, 14.5 FTE of which are returned in this submission.

iii. To increase grant income to £0.6-1.0 million/year: External income has exceeded target for every year since 2008 rising to just under £600k pa currently, projected to reach £1m in 2014.

c. People

Staffing strategy

The School is supported by the University's People Strategy, a comprehensive range of policies around employment, equal opportunities, research management and ethics, each with an element designed to facilitate and support research activity among staff and students. The University is fully committed to the principles of the "Concordat to Support the Career Development of Researchers". It has introduced minimum academic standards regarding research productivity within its annual appraisal system. Each researcher has a nominated mentor as part of the research element of the *Continuing Professional and Personal Development Framework*, as well as access to a Further Study Fund. Staff at all stages in their career are supported through annual appraisals whilst an annual promotional round of opportunities is structured to capture growth in personal achievement and ability and, through promotion, boost the individual's level of

research activity. University-wide research pump-priming initiatives have included sandpit events to encourage cross disciplinary thinking with access to a £100k fund, and a further £500k annual fund set aside for responsive mode applications from, primarily, early career researchers (ECRs).

The School itself has a well-established, transparent, workload allocation model that takes into account all facets of research activity including project management, grant authoring, and PhD supervision. All newly appointed staff have substantially reduced teaching allocations to assist the early establishment of independent research activities. Active encouragement and mentoring support is offered to aid successful application to first grant schemes and other opportunities. The School operates a research leave scheme, open to all categories of staff on an annual basis and also offers its own funding, through a bidding process, to support staff conference attendance, research training and specialist equipment purchase.

Recruitment

Since RAE 2008, the School of Computer Science has received significant investment through core and QR funding to increase its staff base; all recruited staff are active researchers with strong publication records and have been strategically appointed to pursue the remits of the three research centres. Appointments during the REF 2014 period include the University's first Distinguished Professor, Prof Nigel Allinson, MBE, and a Reader, Dr Xujiong Ye, both appointed to lead research in LoVE. The majority of other appointments have been ECRs. Roughly half of these ECR roles have been filled through successful promotion of postdoctoral researchers from within the School thus demonstrating concrete, tangible commitment to the career development of our own researchers. Others were primarily sourced from research roles at highly ranked research-intensive UK and international institutions including Imperial College, Oxford, UCL, Bielefeld (Germany) and Kyushu (Japan). Three members of existing academic staff, Profs Lawson, Duckett and Yue were promoted to Personal Chairs during the REF period. The School has a diverse cultural background: of our total 25 FT academic staff, 13 are UK nationals, with a further 7 from the EU, 2 from Middle East and 3 from China. In terms of gender, 23 FT are male and 2 female. We are aware of the wider challenges facing computer science as a discipline around gender and we will submit for a Bronze award under the Athena Swan charter in 2014. In addition to academic appointments, 3 posts during the reporting period have been filled by electronic and CMOS designer engineers to support work primarily in LoVE on imager and imaging system development. There is a further network of CMOS designers across Europe who contribute to our microelectronic activities.

Visiting scholars

Award of three FP7 PEOPLE/IRSES grants (EYE2E, LIVCODE, and HAZCEPT) during the REF period has given rise to major joint research activities including several bilateral international exchanges with Universities in China. For instance, these projects have supported Yue's secondment to Tsinghua University and Xi'an Jiaotong University for 6 months during 2011-2012; Murray's secondment to Tsinghua University for 2 months in 2012-2013; and Ahmed's secondments to Tsinghua University and to XJTU (2013) as well as visits to partner institutions in China for several Lincoln-registered PhD students of 10 –12 months each. Incoming extended visits have been supported for 8 visiting faculty members from China including three full professors (Prof Rong Liu (Beijing University), Prof Zhuhong Zhang (Guizhou University), and Prof Jigeng Peng (XJTU)) and around 12 PhD students/researchers. In addition to China, the School has hosted visiting senior researchers from Germany (Prof Jianwei Zhang, University of Hamburg), and Japan (Dr Yoshifumi Yamawaki, Kyushu University) as well as a host of more junior staff from a range of international partners.

Research students

All senior members of the School have responsibility for supervising postgraduate research students (PGRSs) and our recruitment strategy has ensured that our supervisory capacity has increased. Hence, we have substantially increased numbers of such students since RAE2008 with 40 PGRSs currently registered (compared to 15 reported at time of RAE2008 submission); this is comprised of 29 PhD/MPhil students (22 of whom are FT) and 11 MSc by Research students. We have supervised 13 PhD completions over the census period (from a standing-start of none during the RAE 2008 period). We will further increase our investment in postgraduate research students through university-funded collaborative studentships, securement of further EU funding, and partnerships with universities in China and elsewhere.

Every research student is a member of the University's Graduate School, which fosters the development of postgraduate research and skills, together with championing the interests of research students. This School offers research education and career development programmes and a supportive network for all research students. Students are encouraged to present their work at School seminars and at an annual University-wide Postgraduate Student Conference, to get work published, to identify potential research funding and to acquire skills transferrable to their own careers. The University's International Office offers a full range of networking and support events for overseas students, and provides access to professional support services when required. Within the School, support funding is made available – on a competitive bidding basis - for existing PGR students to travel to conferences and, where deemed appropriate, to attend UK/European Summer Schools. Fee and bursary funding has been made available for PGR students within the School during the reporting period through full, partial, and fee waiver bursary schemes. Furthermore, our FP7 IRSES projects, coordinated by Prof Yue and a recently awarded Marie Curie Training Network REVAMMAD coordinated by Prof Hunter have facilitated both exchange, and recruitment of PhD students from a range of international sources.

d. Income, infrastructure and facilities

Income

Research income targets are set annually, whilst delivery is supported by the University Dean of Research, and a centralised Research and Enterprise team. This is a two-way process as they assist us in identifying opportunities for funding and collaborative ventures, and in developing effective grant applications. In addition, our College of Science has a Director of Research with dedicated administrative support to lead and encourage a strong local research culture. This model, established during the census period, has seen annual income generation rise from £221k in year preceding the RAE2008 submission to £600k in 2012/13, with approximately £1m already secured for 2013/14. The total reported income for the RAE2008 period was £650k and for the REF2014 period will be c.£1.85m – representing more than a three-fold increase. Each of our three research centres has won substantial research income during the REF period (only grants where the PI is unit based are recorded):

i. Major grants held by **L-CAS** include 3 FP7-IRSES projects (FP7-IRSES EYE2E project (€798k, Coordinator: Yue) and FP7-IRSES LIVCODE project (€725k, Coordinator: Yue)), Technology Strategy Board project TADD (£412k, PI: Duckett), FP7 IP project STRANDS (€868k, PI: Hanheide/Duckett), Home Office DiPP Project (£150k, PI: Yue), EPSRC Industrial CASE Award (£81k, PI: Duckett).

ii. Major grants held by **LoVE** include an EPSRC First Grant (£105k, PI: Dickinson), the TSB BRAINS project (£170k, PI: Hunter), the TSB TOTALCARE project (£120k, PI: Hunter), the EPSRC Translation MI-3 Plus (£989k, PI Allinson) and Pravda (Wellcome Translation Grant - £1,598k, PI Allinson), Marie Curie ITN REVAMMAD (€3.8m, PI: Hunter),

iii. Major grants held by **LiSC** include EPSRC Healthcare Partnerships ENACT project (£470k), the Horizon Digital Economy Research Hub funded Automics project (£140k, PI: Rowland), FP6 IST PASION project (£250k PI: Lawson/Rowland), HEFCE LGM project Electro-Magnates (£75k, PI: Lawson), two EU LLP Leonardo projects DREAD-ED (£60k, PI: Rowland/Lawson) and Learn2Lead (£50k, PI: Lawson).

Future plans and strategies regarding funding are centred on establishing key lasting partnerships with major UK and international universities and with health authorities, national research laboratories and industry. The intention is to focus on realising significant grant income through such partnerships on major projects such as large-scale RCUK, TSB and EU projects. The School is particularly well-placed to target future EU funding, through Horizon 2020, with its cross-cutting attention on tackling societal challenges such as health, food, energy and inclusivity, and its focused activities on areas such as robotics, creative industries, social media and advanced digital gaming technologies. An existing major focus of activity, as well as research capacity, across all three major groups in the School, is on healthcare and food technology; we will seek to continue funding for such work through further applications to the research councils, NIHR, Wellcome Trust and other leading charities. This activity will be bolstered by the establishment of the Lincoln Institute of Health, a cross-university interdisciplinary research collaboration founded as a result of the University's wider investment in health.

Infrastructure and Facilities

The School has benefitted from the University's continued investment in high-quality accommodation, and through the capital bidding process we have secured substantial sums annually for new technical resources. Grant-funded projects have additionally secured further budgets to invest in new research-centred facilities. Specialist facilities and infrastructure supporting the individual research centres include:

L-CAS possesses state-of-the-art research equipment including a MetraLabs SCITOS G5 mobile robot, an ActivMedia P3-AT outdoor mobile robot, a swarm of micro-robots including UAVs and table-top robots, various interaction robots, and many different sensors (including various 2D and 3D imagers, laser-range finders, thermal imaging, telemetry, etc). Additionally the Centre has a flexible food processing line equipped with sensors for food quality measurement, as part of the joint research with Ishida Europe Ltd. **LoVE**, for its CMOS imager design work, hosts comprehensive academic and commercial software platforms for design, simulation and characterisation. It also possesses a custom "universal" characterisation unit for comprehensive imager characterisation – performed to European Machine Vision Association standards or better; and traceable to primary reference standards. For more extensive testing, especially for radioactive and non-visible radiation, it has access to STFC Diamond Light Source, University of Birmingham Cyclotron, iThemba Laboratory for Accelerator Based Sciences, South Africa (Proton Therapy Facility), NHS Radiotherapy Suites and several industrial test facilities. For some aspects of imager and imaging system development and realisation, we have agreements with our industrial partners (UK/Europe) for access to their specialised processes and equipment. Due to enduring relationships with several NHS Trusts and other bodies, **LoVE** has good access to clinical data and imagery (consistent with meeting all ethical regulations and guidelines). Complementary to information access, we hold strong personal relationship with leading clinicians, medical scientists and others – important for guiding research directions and providing 'ground truth' interpretations, where we maintain some internationally-known datasets (e.g. "REVIEW" in retinal imaging) **LiSC** also has strong relationships with healthcare providers including the commercial entity Ultrasis plc who are able to advise on delivery of mental health and wellbeing interventions outside of the state-funded healthcare sector.

On an estate-wide prospective, the University has made step-change investment in facilities during the REF period (£20m during 2008-2013) and this will continue with £14m scheduled over the next three years. This includes a multi-million pound investment in the Lincoln Science and Innovation Park which will provide not only state-of-the-art research infrastructure for research but closer involvement with industry. The School of Computer Science is scheduled for a new building in 2015-16, which will not only include integrated research space but will be collocated with the School of Engineering to further strengthen the Schools' joint work and relationship.

e. Collaboration and contribution to the discipline or research base

Scope of activity

Much of the School's success in research income generation has been based around key strengths of collaboration and conducting societally/industrially relevant research. The School collaborates with many other academic disciplines both within the University (e.g. engineering, biological sciences, health, and psychology) and outside it (for instance with UCL, Liverpool, Surrey, Birmingham, Loughborough, Nottingham, Newcastle, Sussex, Institute of Cancer Research, Leeds, KTH (Stockholm), RWTH Aachen, Vienna University of Technology and others throughout the EU) and has forged long-lasting partnerships with range of local and global industries (e.g. e2v plc, Branston Ltd, Ishida Europe Ltd., PGRO, the Agriculture and Horticulture Development Board (AHDB), Frontier Agriculture Ltd., Household Sprayers, Ltd., Microsoft Research, Ultrasis plc, Perkin-Elmer Corp). Most of the School's funded research is focussed on societal issues that have high political profile e.g. work in ageing, obesity, mental health, medical imaging, assistive care, agricultural robotics and precision agriculture, food quality and security, intelligent transportation, biodiversity monitoring as well as in the emerging proliferation of the use of social media. The School's research profile, in many respects, fits not only with the RCUK's emphasis on health, society and the digital economy but also with the wider UK research agenda around societal impact and healthcare. Activities range from sponsored R&D work and consultancy to protected IP generation and company formation. Two companies were formed

during the census period – ISDI Ltd (commercialisation of large-area CMOS imager technology; founded 2011, company no. 07314677) and Immersive Forensics Ltd (provision of forensic workflow software; founded 2008, company no. 06596798).

Selected committee memberships, invited talks and presentations

Duckett was Program Chair of the Fifth European Conference on Mobile Robotics (EMCR'11), and will be the General Chair of the Seventh Conference when we host the event at the University (ECMR'15). Lawson gave invited keynote at the BMW-sponsored Karlsruhe Service Summit 2013, is a member of the organizing committee of ACM CHI 2014 and 2015, was General Chair for the 3rd (2013) IEEE International Conference on Social Computing and Its Applications (Karsluhe, Oct 2013), was Programme Chair for 2nd SCA 2011 (Sydney, Dec 2011) on organizing Committee 2010 IEEE International Conference on Social Computing (SocialCom-2010), and 2011 5th International Conference on Communities & Technologies (C&T 2011). Kirman gave an invited keynote at the Games Convention Online 2010 games industry conference in Leipzig. Dickinson was General Conference Chair of 17th Annual EUROMEDIA 2013 and will be local Chair for GameOn to be hosted by the School in 2014. Hanheide is Workshop and Tutorial Chair, HRI, 2014. Cobham was invited speaker at the NATO Joint Air & Space Power Conference October 2013 Linehan was invited speaker at the 1st Seminar on New Methods of Business in Social Networks (Mashad, Iran, Oct. 2013). Hanheide gave invited talks at Philosophy and Robotics, 2010 and 2011 and at Cognitive Technical Systems (CoTeSys), 2008. Hunter was General Chair for the Embedded Computer Vision Workshop at CVPR2011.

Participation in editorial and peer review process

Allinson, Duckett and Lawson are members of the EPSRC College. Allinson has also chaired (e.g. Basic Technologies Translation), and been a member of, EPSRC prioritization panels and is, also, member of BBSRC, STFC and MRC Colleges; he also reviews research proposals for USA Department of Energy, Swedish Research Councils, South African Research Councils, Wellcome Trust and is a permanent member of the Hong Kong Universities Research Council Review Committee, and an International assessor for the Polish Foundation for Science awards, and was panel member for Royal Society Wolfson Laboratory Refurbishment scheme (2012). Lawson is an assessor for the Italian Research Assessment Exercise (National Agency for the Evaluation of Universities and Research Institutes) and additionally reviewer for ESRC, FP7 (ICT), Leverhulme Trust, Royal Society, Canadian National Research Council (NRC), Swiss National Research Council, and NIHR/ NHS programmes. Duckett has been an external reviewer for several FP7 projects during the REF period (FP6-IST-6-045350 'robots@home', FP6- IST 045269 'Guardians', FP6- IST 045541 'Viewfinder'). Hunter has reviewed for the National Research Council of Canada, and the UK-India Educational Research Initiative (UKIERI). Hanheide was guest editor of Journal of Social Robotics (2012). Bellotto was Associate Editor of the IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS), and is Editorial Board Member of the ROBOTICS Journal. Al-Diri is editor-in-chief of the Int Journal of Advances in Computer Science & its Applications (IJCSIA). Tzimiropoulos is Associate Editor for the Image and Vision Computing Journal. Lambrou is an Associate Editor for the journal of Computers in Biology and Medicine and was an Editorial Board Member for the journal of Computers in Biology and Medicine. Allinson was the UK representative for the European X-FEL (X-ray Free Electron Laser) Detector Advisory Committee, was a member of UK delegation for joint UK-USA bilateral programme on Anomaly Detection (National Security) – sponsored by RC-UK and Department of Homeland Security (2009), is a Board member of STFC Centre for Instrumentation and of the Technology Gateway Centre Detector Systems.

Fellowships and awards

Allinson was awarded MBE for Services to Engineering in 2012 and awarded the IET Innovation Prize for Electronics (2012) for wafer-scale CMOS imagers, is UK representative for the European X-FEL (X-ray Free Electron Laser) Detector Advisory Committee, was a member of UK delegation for joint UK-USA bilateral programme on Anomaly Detection (National Security) – sponsored by RC-UK and Department of Homeland Security (2009), was a Board member of STFC Centre for Instrumentation and of the Technology Gateway Centre Detector Systems. Mozos held a fellowship for foreign researchers from the Japanese Society for the Promotion of Science (JSPS) in 2010.