**IDMEC – Centre of Intelligent Systems**

**REPORT ON ACTIVITY 2008**

**Aims of the Centre**

The aims of this Centre are to engage in research in the areas of systems and control theory and related engineering applications. Its research has a national and international orientation and at times involves collaboration with other research institutions and industry both national and international.

Its activities are evenly balanced over the three complementary areas of (i) fundamental research, (ii) systems development and applications, and (iii) transfer of technology to industry.

**Structure and Staffing**

The Centre is now organised into three main areas (previously two): Systems and Control, Complex Systems and Robotic Systems. This increase in sub-groups reflects the increase in staff within the Centre. It now consists of 20 senior staff and PhD and MSc researchers.

The area of Systems and Control has a stronger bias towards theoretical development and is addressing such areas as life sciences, hybrid systems, fractional systems, automation and renewable energy systems. The subgroup of complex systems is directed towards distributed intelligent optimisation of complex systems, co-operative behaviour in transport and robotics, fault tolerance in network control and intelligent data analysis. The Robotics Systems sub-group is focussed on the dynamics and control of rigid-flexible systems and flight control, which includes the novel area of airships.

Application domains range over chemical processes, building energy management, irrigation systems and mechatronic systems.

**Research Funding**

In this one year period, the Centre has been successful in attracting 316,000 Euros of research funding, of which 50-60% has come from the National Science Foundation. Awards from the European Union totalled 37,000 Euros in this period. While the rate of research funding has significantly increased, funding from the European Union has experienced a dip this year which may be due to special circumstances.

**Research Outputs**

***Publications***

In total 53 research papers have been published in this period, 8 of which were in high quality international journals. These journals include *Journal of Guidance, Control & Dynamics, Engineering Applications of Artificial Intelligence* and *IEE Transactions on Control Systems Technology.* The Centre contributed to a major publication in the *Journal of Instrumentation* on 'The ATLAS Experiment' at the CERN Large Hadron Collider.

***Impact***

The Centre continues to enhance its facilities. In this year a CSI Humanoid Robot Lab has been established, together with an image acquisition system for capturing human motion (gait) and a multiprocessor real time infrastructure to support robotics research. One patent has resulted and useful software tools developed, two of which are associated with the MATLAB suite.

***Research Degrees***

Over the period one PhD programme was successfully completed and 6 MSc projects have been reported on.

***Esteem***

The excellence of the Centre's research continues to be recognised in a variety of ways. Staff members are represented on 24 International Programme Committees of conferences and one staff member was an invited Plenary Speaker at a major conference. A young member of staff was recognised for the quality and significance of their applied research and received the Riemann-Liouville Award.

**Summary**

The Centre retains its influence as an important member of the Systems and Control research community. Its activities continue to be well balanced, and it is already addressing the temporary shortfall in EU funding. The three new groups appear to be functioning well and have coherent roles. New areas which will be addressed include the medical application of robotics. Within IST, the Centre is making valuable contributions with other Centres: Transports, Energy and Aeronautics.

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