Project proposal template
Graduate School studentships
March 2015

Project title	Robots in Domestic environments
First Supervisor	Dr — Redha Benhadj-Djilali
Second Supervisor	Olga Duran
School	Mechanical and Automotive Engineering
Other member of supervisory team (no more than three KU supervisors in total)	
Specific requirements beyond 2:1 degree	

Project summary

(max 4,000 characters)

The aim of this proposal is to enhance the state of the art of robots in human environments. Recent years have seen a large number of robotic applications in industrial controlled environments, where researchers have accumulated knowledge of the field of robotic integration within their environment with great certainty. However the application of robots in household environments is still in its early development stages. Human environments have a number of challenges including the fact that robots need to work in the presence of people so compliance is important. Moreover, environments built for humans are not necessary compatible with robots shape and capabilities. Domestic environments are prone to dynamic variations. In order to match such variations, the robots need to operate with real-time constraints.

This project tackles these problems by studying robot human interaction. The idea is to use a range of sensor including advanced vision sensors together with innovative algorithms and artificial intelligence to help robots to recognise an unstructured environment and to learn from it. The project will tackle some of the existing challenges in robotics such as data capture, interpretation and adaptive behaviours under complex and changing situations. Vision systems including depth sensors will be used. Intelligence should then be applied to detect changes (e.g. new actors, changes in environment, etc) and adapt with the help of sensory data and behaviour learning. In order to achieve a robust behaviour sensor fusion and artificial intelligence are to be used.

Some of the applications that will be investigated include the use of household accessories with variations in appearance, placement and pose using computer vision and intelligence. The system should be robust and should automatically monitor and learn from its environment, and be capable to build knowledge from experience.

This is an interdisciplinary project, where the student will research and innovate in image processing, artificial intelligence and robotics areas.