Update to System Design Project Course Descriptor

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For consideration by the Board of Studies meeting on Wednesday 20th November 2019.

Background

Our undergraduate student numbers are rising: our current first year is 15-20% larger than the year before which in turn is around 6% larger than the year before that. SDP is the dominant user of much of the space on Level 4 of Appleton Tower in the spring semester. Level 4 is special in that it provides support facilities for students creating robots and working with hardware. Currently Level 4 is at capacity. Already students are squeezed in and it is hard to imagine squeezing in yet further students. How do we handle this rising number of students?

Some options that have been considered include:

- **Running SDP also in Semester 1**. This is problematic for several reasons:
  - Level 4 is already used by a number of courses in Semester 1.
  - SDP students currently start working on their projects at the end of Semester 1.
  - It does not work well with the industrial judging of projects – it is hard enough getting the judges to come in once per year and it is desirable to have all projects judged at once.
- **Expanding the lab space to part of Level 8**. Level 8 is currently incubation space. Perhaps this could be a long term solution, but currently the feasibility and timescale of this are unclear.

Therefore, on behalf of the Teaching Executive committee, I would like to propose as a back-stop measure to relax the requirement that all SDP groups must work in some way with custom robot hardware. If we have the opportunity to run some of the group projects using just standard hardware such as smartphones, laptops or desktop machines, then those groups could be based somewhere else other than in the specialist Level 4 lab space.

Proposed changes

The current course descriptor is at

`http://www.drps.ed.ac.uk/19-20/dpt/cxinfr09032.htm`

Changes are proposed to the *Course Description* and *Learning Outcomes* as follows.

Course Description

Current	Proposed
During this project students work in groups of about ten on the design and implementation of a complete system to solve some practical and useful problem. Each group can chose the specific task within the broad theme of 'assistive robotics', i.e., the system should have both software and hardware components to achieve a task in the real world, with a suitable user interface. Recent examples of projects include: a robot shopping trolley for the visually impaired; smart switches to convert any household switch to be remote controlled with an app; a robot chess opponent; robot rubbish collection and sorting; etc.	During this project students work in groups of about ten on the design and implementation of a complete system to solve some practical and useful problem. Each group **chooses a specific task within a designated broad theme and creates a system with involving both software and hardware components. Some groups might use just the common hardware found in smartphones and laptop computers. Others might also use a variety of sensors and motors to construct custom robots. Recently the theme was 'assistive robotics' and the projects included a robot shopping trolley for the visually impaired, smart switches to convert any household switch to be remote controlled with an app, a robot chess opponent and a robot for collecting and sorting rubbish.**
Each group is provided with the same facilities, including a dedicated working area. Available equipment includes Raspberry Pi, Arduino, cameras, other sensors, Lego mindstorms, Lego construction kit, access to 3D printing etc. They also have a small amount of money to spend in any way they choose on any extra items they feel might enhance their particular design.	Each group is provided with **a dedicated working area and appropriate facilities and equipment. For projects involving constructing dedicated hardware, available equipment includes Raspberry Pi and Arduino microcontrollers, cameras and other sensors, and Lego Mindstorms kit. Groups** also have a small amount of money to spend in any way they choose on any extra items they feel might enhance their particular design.
Workshops and dedicated office hours from domain experts will be available to advise and guide all aspects of the task, such as time and task management, robot construction, software libraries, interfaces, etc. Each group is assigned a mentor. The mentor's task is to advise and provide feedback on the progress of the group during the project but not to provide technical support. Groups meet with their mentors at least once a week. They also meet amongst themselves more frequently to plan and coordinate their activities. Specific demonstration points are timetabled regularly during the semester when progress will be assessed and feedback provided.	*Unchanged.*
Towards the end of the semester, a day is set aside for groups to demonstrate their implemented system and to give a formal presentation of it to an audience of the students, mentors, and visitors from industry.	*Unchanged.*
Relevant QAA Computing Curriculum Sections: Computer Based Systems, Systems Analysis and Design	*Unchanged.*

Learning Outcomes

Current	**Proposed**
On completion of this course, the student will be able to: 1. Working as members of a team in designing and implementing a complex and multi-faceted system 2. Planning and monitoring the effort of a project to meet milestones and deadlines, within a limited time scale 3. Drawing together knowledge and understanding of wide areas of software and hardware systems 4. Demonstrating and presenting the outcome from a practical project 5. Documenting the feasibility, design and development of a potential product	On completion of this course, the student will be able to: 1. work as a member of a team in designing and implementing a complex and multi-faceted system, 2. plan and monitor the effort of a project to meet milestones and deadlines, within a limited time scale, 3. draw together knowledge and understanding of wide areas of software **and/or** hardware systems, 4. demonstrate and present the outcome from a practical project, 5. document the feasibility, design and development of a potential product.

Additional changes

1. Correct "Quentitative" to "Quantitative" in *Reading List* section.