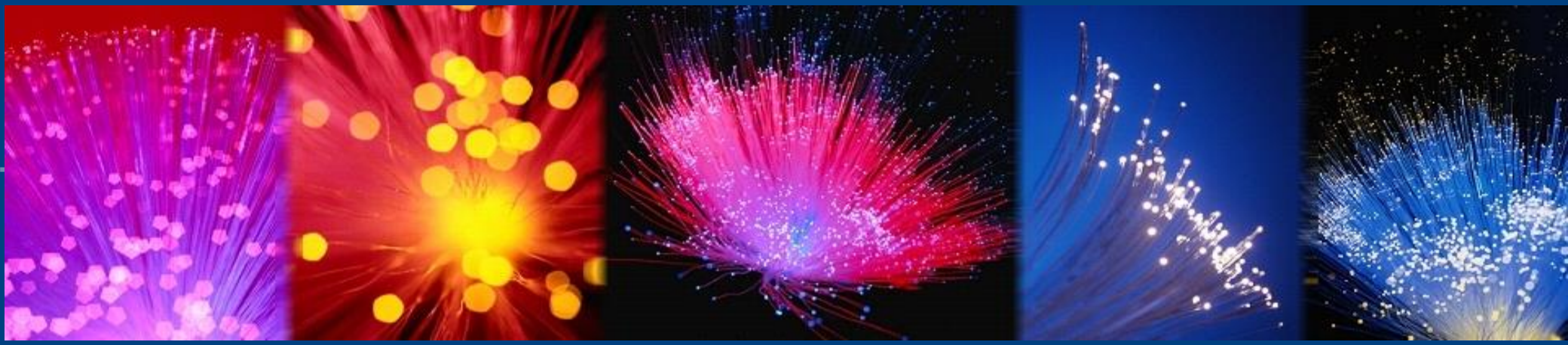
Queen Mary
University of London

Year 2 Short Semester Design & Build Project Summer 2022



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Year 2 Design & Build Project: Outline

Introduction

- Aims and Motivations
- Information: Phases 1 & 2
- Scenario
- Deliverables
- Grading Criteria
- Design recommendations

Year 2 Design & Build Project

Aim

- to solve engineering problems for yourselves
- to apply and use your knowledge in practice
- to gain experience working in a group with students from other programmes
- to understand the work in different aspects of a design project

Motivation

- to encourage your initiative and innovation

D&B project contributes to part of your engineering environment marks.

Year 2 D&B Project: Information

- Groupings:
  - 10/11 students per group (already allocated)
  - Mixed E-Commerce, Telecoms and IoT students (in an approximate ratio of 3: 5: 3)
  - Each group forms a small "engineering design company" of 3 departments.
- Competition: QM sponsors prizes for top three groups.
- Resources:
  - a hardware kit and electronic components: campus
  - handouts, coding examples, reading lists: BUPT instructors
  - Sample of project reports: QMPlus

Year 2 D&B Project: Phase 1

- Dates vary across programmes – please follow the announcements from International School.
- Students from each programme will be trained on their respective skills separately, either in campus or online.
  - Telecom: electronic design and microcontroller programming
  - E-Commerce: database and website development
  - IoT: HW-SW interfacing and client software development
- You can develop individual components of the whole project separately during this phase.
- By the end of training, you will be assessed by BUPT instructors on your skills and achievement.

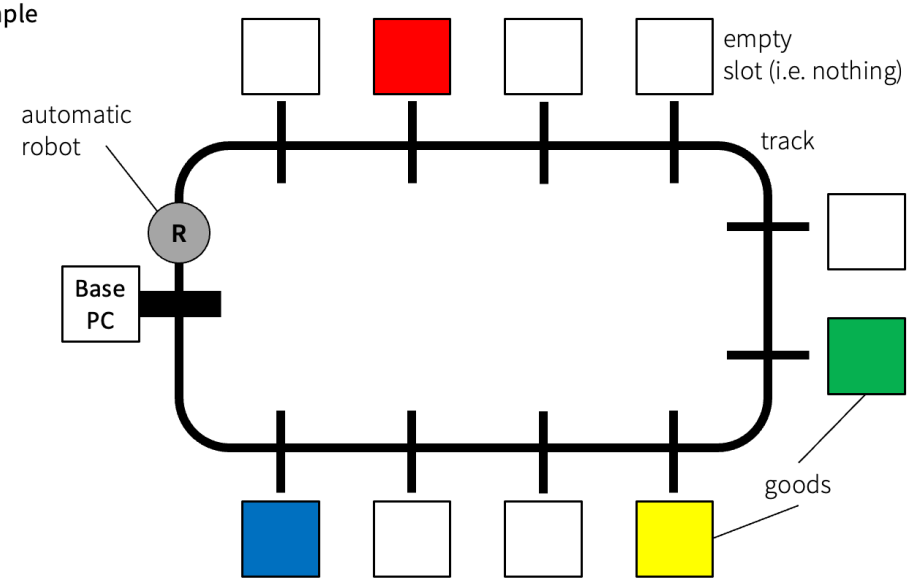
Year 2 D&B Project: Phase 2

- After all students in a group had completed their training, you can start integrating the components together and produce a complete system.
  - You can further modify/develop the finished components from phase 1
  - You can also add extra features and innovations to your project
  - Focus on communication and teamwork
- Submission deadline (exact date to be announced) Enough time will be given for you to work together with your teammates and produce all deliverables.
- Presentation & Demonstration (format to be confirmed) Details to follow at the beginning of phase 2.

Scenario

Your company is requested to design and build a prototype of a warehouse monitoring system that uses an automatic robot to work in place and report the status of the warehouse to a web application for monitoring. There are a web (or mobile) application provides current and historical information (e.g. name, type, positions, etc.) of the goods to the workers and a management web system for the managers. A database should be designed to manage all information for the whole system.

Warehouse Floorplan Example



Technical details:

- Width of the black track: 3 cm
- Dimension of the goods: 8 cm x 8 cm x 8 cm
- Minimum separation between goods: 4 cm

Deliverables [Telecom]

Design and build an automatic robot hardware

- Basic requirements:
  1. follows black line tracks on the floor;
  2. stops at marked positions and records the position of the goods of four possible colours (red, blue, yellow and green) along the track;
  3. stops when it is back to the base PC;
  4. offloads the recorded positions to the hardware-database interface software
- Possible advanced functions:
  - connect to the host PC wirelessly and transmit the positions of the goods in real time.
  - self-designed other functions.

Deliverables [IoT]

Design and build hardware-database interface & client-side software

- Basic requirements:
  - Co-design the database with the E-commerce students;
  - Complete the software interface to receive the recorded data from the automatic robot (assuming it is working in one of the warehouses) and enter them into the database;
  - create an interface to display goods and stock information for workers in the warehouse
- Possible advanced functions:
  - create a mobile App instead of a web interface;
  - self-designed other functions.

Deliverables [E-Commerce]

Design and build database management and administrator-side Software

- Basic requirements:
  - Co-design the database with the IoT students; and
  - create a web application that has the following functions:
  1. allow managers to log in and out;
  2. allow managers to create warehouses and add/delete workers from the system
  3. display the good status (e.g. positions of goods) and information (e.g. the kind of goods) for each of the warehouses;
- Possible advanced functions:
  - generate data analysis reports and visualisations
  - self-designed other functions

Deliverables [Group]

- A marketing advertisement:
  a short video (no longer than 30 seconds)
- A project report for all deliverables (not just the hardware)
  - Explain the design process and choices (Phase 1)
  - Planning and management (Phase 2)
    e.g. project time line, Gantt chart
  - Brief minutes for team meetings (Phase 2)
- For the above deliverables, pay attention to
  - layout
  - clarity
  - use of oral and written English language

Criteria

Innovative design

Comprehensive documentation

Excellent teamwork

Careful planning

Effective marketing

- Not just circuitry/software...
- Consider all aspects of the product/system:
  - Aesthetics (“how it looks”)
  - Ease-of-use, user-friendliness
  - Maintainability, sustainability.
  - Costs

Reflect on your design …

- Functionalities? Materials? Appearance?
- How will the user interact with your device/product/website?
  - e.g. controls and layout of controls
- What features differentiate your product from other groups?

Further Information on QMPlus
https://qmplus.qmul.ac.uk/course/view.php?id=7939

Let's catch up when we enter Phase 2.
Wish you all a wonderful summer!

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THANK YOU