The PDIoT coursework (worth 70% of the marks) is conducted by students working in pairs to develop an Internet of Things application based on wireless sensors. Students will experience the different stages in the design and implementation of a complex system, from its specification to the demonstration of a working prototype and evaluation of its performance. You will be exposed to aspects of embedded systems programming, sensor data analytics using machine learning techniques, wireless protocols, user interface design, system integration and testing.

Each pair is given a set of Mbed development board (NRF52-DK), Motion Tracking Sensor Device (MPU-9250) with 3-axis accelerometer and gyroscope, and an on-line software development environment – the ARM Mbed compiler. Your task is to implement a Step Tracker using the wearable sensor which interfaces to an Android App and demonstrate a working prototype by Tuesday, 28th November, 2017. Your final written report is due by 16:00, Friday, 19th January, 2018.

**Organisation:** Room 3.11 (PDIoT Base) in Appleton Tower (with lockers provided for the safe-keeping of the boards) is reserved for the exclusive use of PDIoT students for the duration of the course, until 19th January, 2018. Weekly tutorials will be held in Room 3.02 in Appleton Tower at 11:00, and 12:00. Student pairs should sign up for one of the two hourly slots and are required to attend the weekly tutorials.

**Week 1 Timetable:** All students wishing to take this course should attend the first lecture at 10am, Tuesday 19th September in LG.11 DHT, and the tutorial at 11am in Room AT 3.02.

**Schedule:**
**Discover -**
**Week 1** First meeting of the PDIoT students; Explanation of the assignment; Introduction to the platform and programming environment; Demonstration of an end-to-end IoT system as an exemplar.

**Define -**
**Week 2** Capture the requirements and use cases for the application; Assignment of responsibilities; Tutorial on programming the platform;

**Develop -**
**Week 3 – 5** Implementation of the reference design on the Mbed board and Testing, Definition of metrics for performance assessment and weekly review of progress

**Week 6** First system integration and demonstration to course Tutor of the Step Tracker on level ground [Feedback to the students]

**Week 7 – 8** [Extra Credit] Refinement and testing of the Step Tracker algorithm to count steps climbing stairs, with the option of using an additional sensor such as an atmospheric pressure sensor.

**Week 9 - 10** Second system integration and presentation to course Tutor; Performance analysis; Preparation of the presentation and final demonstration [Feedback to the students]

**Deliver -**
Principles and Design of IoT Systems (PDIoT) [INFR11150]

Week 11 (28 Nov. 2017) 10-minute presentation and demonstration by each pair to the Course Lecturer with a 5-minute Q&A session [Feedback to the students].

Submission: The .pdf version of the final individual report should be submitted (using the DICE “submit” command) no later than 19th January, 2018 (deadline - 4pm). ¹

Report: The report should not exceed 15,000 words (excluding Bibliography and Appendices) and should be organised along the following chapters:

Title page: PDIoT coursework (2017-18); Project title; Name; Matriculation Number;
Abstract.
Introduction: The project aims; brief description of the method adopted; summary of the results.
Literature survey: A review of the state-of-the-art for step counting methods and algorithms.
Methodology: A description of the system organisation and implementation: hardware and firmware, wireless communication, method and algorithm for step counting, mobile application, software structure, and testing.
Results: Critical analysis of the implementation using quantitative methods; benchmark used.
Conclusions: Reflection on the project, and how you may wish to extend the project or improve on your implementation.

You should use diagrams, drawings, photographs, and graphs where possible in the report.

Assessment:

Students will be awarded individual marks (out of 100) based on the oral presentation and the final report, and the breakdown of marks and criteria for assessment are as follows:

[Technical evaluation – 60%]: Completion of the project; degree of difficulty; quality and amount of work; justification of design decisions; software design for reusability. 20% of the marks (12 marks) for this section is assigned for the refinement and demonstration of the step tracker method when climbing stairs.

[Presentation – 20%]: Quality of the oral presentation (50% - 10 marks) and the written report, including the literature review (50% - 10 marks).

[Analysis – 20%]: Critical analysis using quantitative methods; performance analysis.

Final marks and feedback will be delivered by 2nd February, 2018.

¹ See the following School webpage for information about late penalties and extension requests - http://web.inf.ed.ac.uk/infweb/student-services/ito/admin/coursework-projects/late-coursework-extension-requests