Principles and Design of IoT Systems

Assignment Brief

This document provides an overview of the three coursework submissions and how they map onto the learning outcomes of the course.

Course Information

Course acronym	**PDIOT**
Course code	INFR11150, INF11239
Credits	20
Course Organiser	Professor D K Arvind
Learning Outcomes	1. Perform the end-to-end design, implementation and demonstration of a typical Internet of Things system. 2. Demonstrate skills in data collection, cleaning, pre-processing, feature extraction and classification of noisy time-series sensor data, using machine learning techniques. 3. Develop Android apps and communicate with Bluetooth low-energy devices. 4. Gather information from primary sources, such as research papers, for a review paper on a given IoT topic. 5. Work productively in a team, where members have complimentary skill sets, and demonstrate competence in project management, requirements capture, negotiations, and oral and written presentations.

Mapping of Learning Outcomes onto Assessment

	LO1	LO2	LO3	LO4	LO5	LO6
CW1		+				
CW2					+	
CW3	+	+	+	+		+

Mark weighting for each coursework

Coursework	Weighting (%)
CW1	10
CW2	20
CW3	70

Brief for each coursework

CW1

Assignment name	Data collection
Task overview	You will collect labelled motion capture data for a selection of physical activities, types of breathing and social signals, using two sensor platforms. This contributes towards a shared repository of training data for the entire class.
Assessment criteria	We will assess your work based on the following criteria: • Completeness: did you submit data for all the required activities? • Correctness: Is the sensor worn correctly, does the sensor data match the label, is it the correct length and is the file correctly formatted and named? • Tidiness: Is the sensor data trimmed and cleaned, ready for others to use as training data?
Submission instructions	The submission should be uploaded as a zip file to Learn: *Assessment → CW1: Data collection* The zip file should contain all the files created during data collection, in a single folder named with you student ID. There should be 57 CSV files (45 activities, 12 of which are recorded on both sensors), plus the sleep questionnaire.
Guidance on size of submission	There is no size limit for the zip file, but please ensure that your recordings of each activity are of the correct length (28-32 seconds). Please note: the sleep activity does not have a maximum length.
Penalties for overlong submissions	N/A
Feedback procedure	**Individual feedback:** You will receive a report detailing marks awarded and any penalties for missing or

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<tr><td></td><td>incorrect data. You will have the opportunity submit corrections. You will then receive additional marks for the corrected data, but a penalty of 50% will be applied to these additional marks.
Queries on feedback and marks: You can raise queries about your work via private Piazza posts.</td></tr>
<tr><td>Support arrangements</td><td>Piazza questions: Please use Piazza if you have any questions about the assignment. By default, they should be private, to reduce the risk of sharing your solution with other students. A course lecturer or TA will be answering these questions in working hours (Monday to Friday 9am-5pm) and responses should be within a day during these hours.
Lab sessions: You can ask questions during the lab sessions in weeks 1 and 2.</td></tr>
<tr><td>Marking and moderation procedure</td><td>Your data files will be run through a validation script and graphs of sensor data will be visually inspected for correctness.
One marker marks the whole submission. The course organiser reviews a selection of the submissions to ensure consistency.
Please see the CW1 document (section 4) for a detailed list of requirements for each file. The number of correct files will be counted and you will be given a mark (out of 10, as follows:
<table><tr><th>Number of correct CSV files</th><th>Marks (out of 10)</th></tr><tr><td>0</td><td>0</td></tr><tr><td>1-10</td><td>1</td></tr><tr><td>11-20</td><td>2</td></tr><tr><td>21-30</td><td>3</td></tr><tr><td>31-35</td><td>4</td></tr><tr><td>36-40</td><td>5</td></tr><tr><td>41-45</td><td>6</td></tr><tr><td>46-50</td><td>7</td></tr><tr><td>51-53</td><td>8</td></tr><tr><td>54-56</td><td>9</td></tr><tr><td>57</td><td>10</td></tr></table>
Additional marks awarded after resubmission will be scaled by 50%. Example: You initially submit 52 files, 3 of which have errors, so your provisional mark is 7/10. You then resubmit 2 corrected files, giving a final mark of 7.5/10.</td></tr>
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CW2

Assignment name	**Review paper**
Task overview	You will be invited to write a review paper on a given IoT-related topic.
Assessment criteria	We will assess your work based on the following marking scheme: • Introduction [10%] • Body [60%] • Conclusions [20%] • Bibliography [10%] The main body of the report will be assessed as follows: • Breadth of research [20/60] • Distillation of essential features in a scholarly manner [40/60]
Submission instructions	The submission should be uploaded as a PDF file to Learn: *Assessment → CW2: Review paper* The submission will be checked using plagiarism detection software.
Guidance on size of submission	Max. 3,000 words, no file size limit.
Penalties for overlong submissions	**Review paper:** We will ignore text over the first 3,000 words. Please note: the bibliography is excluded from the word count.
Feedback procedure	**Individual feedback:** You will receive comments on the quality of your report. **Group feedback:** N/A **Queries on feedback and marks:** You can raise queries about your work via private Piazza posts.
Support arrangements	**Piazza questions:** Please use Piazza if you have any questions about the assignment. By default, they should be private, to reduce the risk of sharing your solution with other students. A course lecturer or TA will be answering these questions in working hours (Monday to Friday 9am-5pm) and responses should be within a day during these hours. **Tutorials:** These take place in weeks 2-5 and you will receive guidance regarding CW2.
Marking and moderation procedure	Marking will be performed anonymously. One marker marks the whole submission. The course organiser reviews a selection of the submissions to ensure consistency.

CW3

Assignment name	**Implementation and Final Report**
Task overview	This coursework involves the development, demonstration, and final written report for the human activity classification system.

Assessment criteria	We will assess your work based on the following marking scheme:
	• **Presentation [5%]:** Quality of the oral presentation, slides and demonstration in week 10.
	• **Analysis [25%]:** Critical analysis using quantitative methods and performance analysis presented as graphs, with a balanced interpretation of the results.
	• **Technical evaluation [70%]:** The following factors will be considered when marking the technical merit of the project:
	  • Completion of the project to produce a working prototype
	  • Degree of difficulty
	  • Quality and amount of work undertaken
	  • Justification of design decisions
	  • Software design for re-usability

Submission instructions	The submission should be uploaded as a zip file to Learn: *Assessment → CW3: Implementation and Final Report* The zip file should include the following: 1. **Top level README file:** A brief overview of your submission and clear instructions explaining how to run your code in order to reproduce your results. 2. **Code:** All the source code that you have written for your implementation. This should be organised into sub-folders for each part of the system. Please ensure that your code is well commented so that it can be run by a marker. 3. **Final report:** A PDF file containing your final report, in its own sub-folder. Please note: Assessment of the oral presentation takes place during the Demonstration session in week 10 and is not included in the Learn submission.
Guidance on size of submission	There is no size limit for the zip file. The final report should not be more than 10,000 words (excluding bibliography and appendices).
Penalties for overlong	**Readme:** N/A

submissions	**Final report:** We will ignore text over 10,000 words. Please note: bibliography and appendices are not included in the word count. **Code:** N/A
Feedback procedure	**Individual feedback:** You will receive comments on the quality of your implementation and report. **Group feedback:** Formative feedback will be provided in the week 5 lab session, and final feedback after the demonstration in week 10. **Queries on feedback and marks:** You can raise queries about your work via private Piazza posts.
Support arrangements	**Piazza questions:** Please use Piazza if you have any questions about the assignment. By default, they should be private, to reduce the risk of sharing your solution with other students. A course lecturer or TA will be answering these questions in working hours (Monday to Friday 9am-5pm) and responses should be within a day during these hours. **Lab sessions:** You will work on your group implementation during the weekly lab sessions, which are compulsory. You can ask questions during these sessions and your group will receive feedback and suggestions from the course tutor.
Marking and moderation procedure	One marker marks the whole submission. The course organiser reviews a selection of the submissions to ensure consistency. We may run your code to verify that it performs as described. You will be marked on the quality of your group's report and implementation. The default is that all group members make roughly equal contributions and will received the same marks. In exceptional cases, the group can make a formal declaration at the head of the report confirming the contribution of each group member and a suggested weighting when the marks are allocated to each student. A detailed mark scheme is included in the CW3 document.