Individual Term Project
Assessment Weighting: 25%
Updated Version [Released June 20]

Important notes

- This is the updated version of the term project specs. No further versions will be released, but student queries will be answered separately in Moodle forum.

- Although students are encouraged to discuss among themselves in the Moodle forum, they must remember that it is an **individual** project and as such all individual submissions must contain **original contents** including **original datasets**, analyses, etc.

- To complete the project, students need access to two mobile devices, such as a laptop and a mobile phone with WiFi interfaces, and tools, e.g., Wireshark, that can extract the radio information of the WiFi interface (such training will be provided early in the labs).

- Students need to perform some basic statistical analysis of captured data. These analyses can be easily done using widely available packages such as Excel, Python, or MATLAB. Teaching of such packages, however, are outside the scope of this course.

Project Title: Distance Estimation using Wireless Signal Strength

Introduction and objectives: Estimating the distance between two mobile devices has many real-life applications. A notable example from recent times is the COVIDSafe app, which must estimate the distance between two people. There are different techniques and methods to estimate distance. The objective of this project is to estimate the distance between two mobile devices using the received signal strength (RSS) of the packets exchanged between them.

The project will run throughout the term, but the students will be required to show incremental progress and seek feedback from the tutors in three stages as they make progress towards the final outcome.

Stage 1 [Due Week 5; worth 10%]: Comprehensive measurement, data collection, and analysis of RSS distributions for a given distance (collect for many different distances both indoor and outdoor); you can reuse any data you collected during your labs; propose a naïve approach (very simple and easy to implement) to estimate distance based on raw RSSI measurement/distribution (e.g., select the most probable distance) and analyse confidence level of distance estimation; both indoor and outdoor.

Submission: Submit your datasets (CSV files) as well as a report explaining your datasets, distance estimation algorithm, and error reports by Week 5 at the latest and receive feedback (about the quality and comprehensiveness of your data collection, your analysis) as well as a mark. The feedback you receive for this stage should be used to enhance your datasets and report for Stage 3.

Stage 2 [Due Week 7; worth 5%]: Literature review for RSS-based (WiFi/Bluetooth) distance estimation algorithms. It is a task training you to search for good algorithms from the existing literature, a skill that you will frequently rely on in your career. You will prepare a short report of 8-10 pages long in 12 font with proper citations and bibliography. You are welcome to start the literature review well before completing Stage 1, i.e., *it is perfectly acceptable to have an overlap between*

Stage 1 and Stage 2 activities.

Submission: A PDF report only.

Stage 3 [Due Week 10; worth 10%]: Select an algorithm from your literature search in Stage 2. Compare performance improvement, for indoor and outdoor, achieved using the new algorithm compared to the naïve one used in Stage 1. All performance evaluations in this stage will use the updated datasets (you are encouraged to update the original dataset collected in Stage 1 using the feedback received after your submission).

Submission: Submit improved datasets (CSV files) and a PDF report showing distance estimatatin improvements and providing your own explanations for why the improvements were achieved.

The following table shows the timeline of the three stages of the project (note the overlaps):

Stage	W3	W4	W5	W6	W7	W8	W9	W10
Stage 1								
Stage 2								
Stage 3								

Late Submission Policy

Timely submissions and feedbacks of all stages are paramount for effective student learning. Penalty at the rate of 10% for each day late will be enforced for all stages. Stage 2 cannot be submitted until Stage 1 is submitted and Stage 3 submission will not be accepted until Stage 2 is submitted.

End of Project Specifications