5 Project Plan

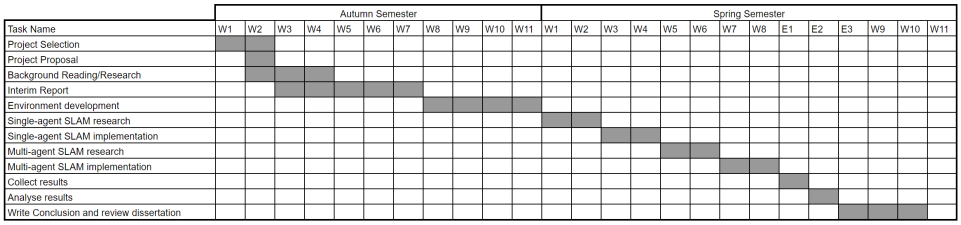

Figure 3: Gantt chart showing the project plan

The execution of my project will be split into various phases, where each phase will focus on an area of development. The majority of the project will be software development, therefore I have chosen to split this process into various stages. Figure 3 shows the project plan, where the grey bars represent the time spent at each phase. Should my project overrun, I will have contingency time built into both the Christmas break and prior to the due date, which is currently unaccounted for in the project plan.

5.1 Phase 1 - Research and Planning

The first phase of my project involves researching and planning. During this period I will create a project proposal, research single and multi-agent SLAM algorithms, and write my interim report. This phase will be completed by week 7. It is important to carry out this phase as it provides structure for the whole project, which will help ensure that the project is completed on time.

5.2 Phase 2 - Environment Development

The second phase of my project will be to develop the simulation environment. This will involve creating a graphical user interface, using the PyGame library, where the user can see the agent, the environment and a representation of the agents internal map. This phase will be completed by week 11 - putting me in a good place to work on implementing SLAM algorithms after the Christmas break.

5.3 Phase 3 - Single-agent SLAM

The third phase of my project will be to implement a SLAM algorithm on a single agent system. This will involve implementing graph-based SLAM, mentioned in my related work section. The algorithm will work by having the agent move around its environment, whilst taking measurements of its surroundings. These measurements will then be used to predict where objects may be, through feature extraction. Then, the features detected will be combined to define landmarks, which will be used to create a map of the environment. Finally, once the algorithm has been implemented, I will create a simple agent which will move around the environment, using a random walk algorithm. I aim to complete this phase by the end of week 4 of the Spring semester.

5.4 Phase 4 - Multi-agent SLAM

In the fourth phase of my project, I will implement a multi-agent SLAM. This will involve creating a centralized multi-agent SLAM algorithm, where the agents individually collect data and then feed to a global map. To achieve this, I will need to modify my single-agent SLAM algorithm to firstly allow for a central server to exist, and then I will need to implement a communication protocol between the agents and the server. To create a complete map, the server will need to combine the maps from each agent; implementing cross-agent feature matching. The server will also need to have a mechanism which resolves conflicts in data association, for example, when two agents have conflicting information about a landmark's position. This phase needs to be completed by week 8 of the Spring semester, which allows for a reasonable amount of time to work on the final report.

5.5 Phase 5 - Analysis and Conclusion

I will start the final phase of my project during the Easter break, where I will collect data which will be used to analyse the performance of the algorithm. I will then use this data to create a series of graphs and charts, which will be used to visualise performance and draw conclusions. After, a lot of time will be spent writing up my findings and analysing the performance of the algorithms. Finally, I will conclude my project by writing a conclusion, which will summarise my findings and discuss potential future work. Prior to submitting my report, I will also spend time proofreading and editing my work.