**1. Introduction**

For a certain project to succeed, an overall aim is required to be set to maintain focus during the course of the project. Specifically, the main objective of this project is to construct and develop a microcontroller-based buggy capable of autonomously following a white line around a track. The task is accompanied by a numerous set of challenges to provide further motivation including and not limited to 17 mm white line width, line breaks of up to 6 mm, vulnerability to sunlight and a possible 20 cm tunnel in height. To understandably create the desired embedded system, various technical aspects are considered in depth, with all falling mainly under three categories: software, hardware and circuitry.

This proposal document formally summarizes the findings of the previous reports along with all the demonstrated research. It mainly illustrates the core design decisions taken to proceed into the final stages of the project. Preceding any technical verdicts, the main objective is broken down into a list of smaller aims to address the deliverables required easier along with the accompanied milestones. Following that, the report provides an outline of the technical talking points and decisions covering motor characterization software system design, sensor characterization, control algorithm selection and chassis design. Moreover, the interconnection of the several areas is discussed along with the proposed winning features.

Next, a look at the team organization is taken with details and evidence of how the members cooperate, communicate and share files. The specific individual roles are mentioned to ensure a clear view of responsibilities is available. The final section of the report highlights the plan put in place, shown using a Gannt chart, to deliver accurately and within enough time for any unexpected contingencies. Also, a Health and Safety risk assessment for the final race day is included as part of the formality along with a detailed interpretation of the project costing and budgeting giving rise of the expected total project cost, with respect to contingencies.

Breaking down the main objective, the derived aims of the project include compiling the buggy hardware with the given constraints and to make it as compact as possible for turning smoothness. Also, an aim is to connect all the electronic components in the optimal way to achieve the required circuitry and sensing. Furthermore, the task of developing an efficient program to control the motors, wheels and ensure correct line navigation is necessary. Final aim is to ensure the buggy fulfills its full potential by not just completing the race but also the fastest possible.

The project deliverables and milestones are given by the four technical demonstrations in place. Four major milestones are available within 12 weeks with the first one in week 4 where initial buggy movement needs to be delivered. The next milestone is in week 7 where the sensing circuitry is due along with required software deliverable. Two weeks later, a milestone is identified to ensure navigation is delivered with most components fitted on buggy. The final milestone occurs in week 11 where the final buggy needs to be ready for successful completion of all the set challenges.