Group Y4- Document Charter

Project Purpose and Benefits

The purpose of this open-ended, lift-modelling, project is to stretch and apply the knowledge learned in the ES2D7 – System and Software Principles – module. It will help develop and improve students understanding of a systems approach along with developing and integrating a complex system model.

The project is also a good opportunity to improve upon personal development. Use of such tools will help reinforce existing and develop new skills amongst members of the team, as well as helping strengthen inter-personal communication.

Project Objectives/Deliverables

The objective of the project is to produce an executable file containing a lift-model that incorporates an app-user interface integrated with the Stateflow/Simulink environment. Furthermore, a presentation that presents the functioning lift-model will be conducted.

In order to deem the project a success, the final product must be both validated and verified. Whilst the criterion for validation is more uncertain as it depends on more qualitative factors and user-product interaction. Verification can be fully conducted through predetermined tests.

Project Scope

The scope of this project includes:

- Identifying Stakeholders and their needs.
- Transforming needs into requirements (Functional, Non-Functional, Interface).
- Identifying key features to suit users.
- Creating the Stateflow and Simulink model.
- Designing an app interface that integrates with the Simulink model.
- Test, through verification and validation, the executable file.

The following are outside the scope of this project:

- Design of the physical lift, along with its sub-systems and components.
- The build and testing of a physical lift.
- Considering budgetary constraints when designing the system

Tools and Processes

There were several possible process methodologies that could have been followed for the development of the system: Waterfall, The Vee model and the Agile Model. The Agile Approach was selected as the iterative approach will ensure that a foundation-model is gradually improved upon; Thus, improving the performance and reliability of the system, through pre-determined test stages.

Quality techniques and processes including test driven development, FMEA and P-diagrams will be used to ensure the model fully captures the system requirements, that the final system has both the intended behaviour and meets all of the stakeholder explicit and implicit needs.

Additionally, to capture the behavioural perspective of the system, behavioural SysML Diagrams such as use-case and state-machine diagrams will be created.

Equipment and Constraints

As the project is software-based, no physical equipment apart from office supplies are required. The executable file will use MATLAB versions 2021a, making use of internal packages such as Simulink and App Designer. Furthermore, as part of Simulink, the Stateflow environment and inbuild test feature will be used to help develop and verify the model.

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As the model will principally be developed at the homes of team members. Not all members will have equal/enough processing power. Thus, tasks will be distributed accordingly. Furthermore, there are limitations on types of software, such as creating SysML Diagrams.

Another constraint which must be considered when distributing tasks is the capabilities of each team member: some members will be more adept at certain tasks (e.g. Simulink modelling, Procedural Coding, Object Oriented Programming, App Development). As such, task distribution should also factor this into the equation.

Time constraints for the project must also be considered; With the deadline for the project being the 28th of May, the team must ensure that tasks set are both manageable and achievable in the timeframe for the project. This also includes considerations for other team member commitments, such as coursework or examinations from other academic modules.

Other equipment constraints which must be considered are file-size limitations. For Microsoft Team shared folder there exists a overall limitation of 25 TB and a per-file limitation of 100 GB. For GitHub there exists a per-file limitation of 100 MB.

Team Members and Roles

The team members are Alex Woodsford, Casilda Serrano Villalobos, Hayden Bunce, Matteo Penlington and Taimur Munir. A Kanban Board will be used to keep track of tasks; Whether they have been started or completed and who is working on them. This will help with transparency, knowing whether we are ahead or behind schedule, and who is available to support on lagging tasks.

Organisation and Timeline

As previously mentioned, the Agile approach will be followed. Thus, 4 sprints, each of length 2, 4, 4 and 2 days respectively. Before the first sprint, the requirements and standards will be defined and found. The first sprint will focus on developing a foundation with the basic functions of the lift-model (e.g. Buttons and lift operations, logic and its states). The following sprints will focus on implementing more features. Sprint 2 will implement the various sensors and introduce the emergency and fault states. Sprint 3 will focus on developing an app GUI for users and introduce the network between the lift and service stakeholders. At the end of each sprint, the model will be combined and tested, verifying it against the pre-determined requirements.

To ensure proper asset organisation document control tools such as Microsoft Teams Shared Drive and a custom GitHub Repository for storing MATLAB/Simulink files and the Kanban board will be used. The live-editing feature will ensure that changes will be made simultaneously, thus preventing inconsistencies. These also have the advantage of regular backup and roll-back functionality in case of loss of data or undesired alteration of files.

Standards

The model will follow the ISO 8100-32:2020 standard, which essentially lays out the minimum safety and regulations for the design and implementation of a lift. However, certain sections such as 5.2-5.5, 6.1, 6.2, and 9 which include the physical design, inspection and testing are outside the scope of this project.

Gant Chart

As mentioned previously, there exists both project time constraints as well as prior team member commitments. To help better organise team time, a Gant Chart will be used once the tasks have been created for each sprint. This will help ensure other deadlines or project tasks do not clash, and that the team members are able to dedicate their full focus to their allotted tasks.

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Initial Ideation and Project Planning

To initially grasp and understand the project and its sub-components, the team used a mind-map creative technique. The mind-map elements were then categorised into 4 sections based on priority: “A”, “B”, “C” and “D”, with “A” being factors of greatest importance. These categorised factors were then used to determine the tasks per sprint, as well as plan the Document Charter. While this formed a good starting point for the initial planning, the team will conduct further requirement and specification research before the first sprint, as this will play an important role for successful validation at the conclusion of the project.