Project Deliverable E: Project Schedule and Cost

Shahid Awati
Hammad Butter
Laurent David
Yassir Gueddi
Aidan Mountain

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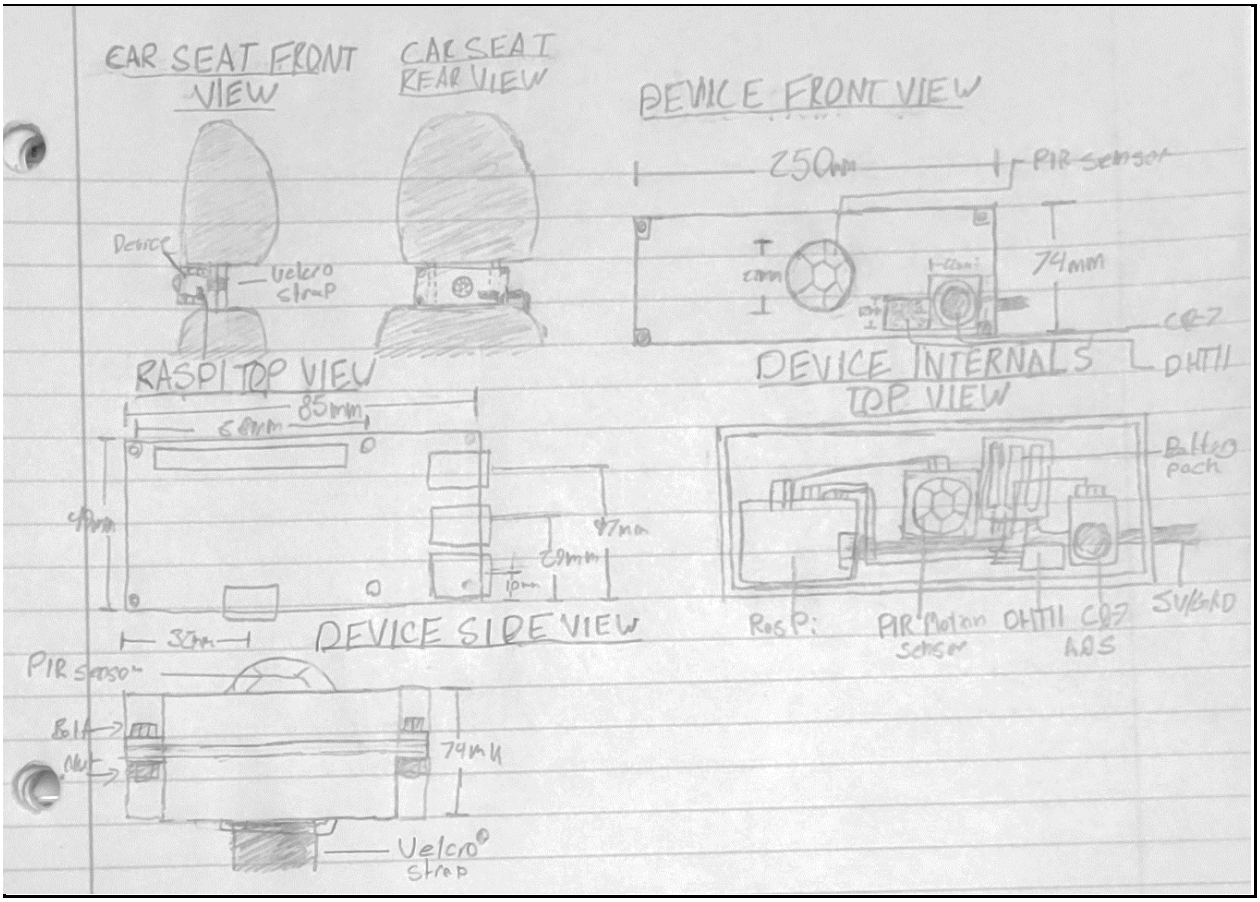
1. Introduction

In the preceding deliverable, a final design concept was chosen from different global design options generated using individual concepts emitted by each team member and based on the client's needs. This objective of the present deliverable is to organize the remainder of the project in a manner which will ascertain the development of our final product will comply with our final concept. More precisely, this document will showcase a complete drawing of our chosen final concept, a table containing every task needing completion, the approximate time they will require and their owners. Also included will be a table used to display significant project risks and our plan to mitigate them, a bill of materials, relating to possible production costs, a list of equipment for each prototype, as well as a detailed prototyping test plan (outlining our team goals for the second half of the semester) in preparation for the upcoming prototype phase.

2. Final Concept Design Drawing



3. Project Task Plan

Task	Deadline	Estimated Duration	Assigned Member
Complete idea for product design is thought of (with modifications after feedback from client meet II)	11/01	7 days (Reading Week)	Everyone
Prototype I and Customer Feedback (Deliverable F)	11/04	7 days	Everyone
Prototype II and Customer Feedback (Deliverable G)	11/11	7 days	Everyone
Prototype III and Customer Feedback (Deliverable H)	11/25	14 days	Everyone
Design Showcase Presentation (Deliverable I)	12/01	7 days	Everyone
Final Presentation (Deliverable J)	12/02	7 days	Everyone
User and Product Manual (Deliverable K)	12/08	6 days	Everyone

4. Risks and Contingency Plan

Risk prevention is critical to ensure consistency in the organization of our project, as potential risks could disrupt the project's progression or team dynamics, the latter being especially important as it relates to how our team performs and moves forward. Creating a contingency plan allows us to at least partially safeguard our project from undesirable situations the team could come across, such as team issues or technical anomalies occurring in the OS we will be creating the code in, so we will necessarily have to attribute high priority to solving these problems.

When it comes to managing cases which involve one or many team members not completing their work on time, our team contract, written up and signed at the very beginning of the project, stipulates the team expects every member to finish their work on time. If a teammate fails to fulfill this expectation, it is stated in the contract that he would first receive a single verbal warning. (A confrontation and a report to the TAs would follow were this behavior to repeat itself.) It was also established that the work which was initially assigned to the team member would have to be completed as soon as possible by the other team mates to ensure sanctions wouldn't occur.

Additionally, it's quite likely we will face issues related to the software used for this project, as the associated systems may not function consistently through every team member's computer, which could happen, for example, because different versions of the software are used.

As we will be working with physical components, it is possible for them to malfunction or break; thus, they would need to be replaced. There is another possibility that the client may express needs unheard of in previous meetings, which could compel us to add new components to the design. In this case, spending more than the allocated budget is likely.

Consequently, we must set specific guidelines, of which every team member needs to be aware, to ensure undesirable situations are handled properly and the project moves forward without obstruction. As shown in the table below, some risks may have a bigger impact on the project, and are more probable than others.

Table 1: Anticipated Project Risks and Related Contingency Plans

Risk	Contingency Plan	Impact	Prospect
A teammate is unable to finish his task	Reorganization of tasks to other group members based on time available.	High	Moderate
A part of the project is not feasible	Decide on a more feasible option, including cutting back on project scope or removing infusable items on the device to make the final product working.	Moderate	Moderate
Issues with Raspi software functionality	Will need to be debugged quickly; outside help may be used to check software errors such as people with experience and the internet.	High	High
Budget surpassed due to the addition of a new component	We will need to determine the items to be removed or replaced to save on cost. Asking other teams for certain components which they may have in excess is another option.	Moderate	Low

Team member is unable to finish his task:

- A team member might be overwhelmed by other courses or even personal problems which could set our team back and involve the rest of the team doing more work. This could cause stress on the entire team and cause tension.

A part of the project is not feasible:

- A part of the project simply is unachievable according to acquired experimental data, for example due to material limitations, such as dimensions .

Issues with software functionality:

- There is a high chance of a software and compatibility issue while creating our device. This can be due to many sources of errors like coding errors or even errors during the creation process.

Budget surpassed due to the addition of a new component:

- In the event we need to add a component unaccounted for in the current BOM, for example due to newly discovered client needs, the total cost for the project exceeds the allowed budget of $50.

5. Bill of Materials

With a budget of $50, pricing each component of our system is essential to meet all the requirements of our device. With a restricted budget, we need to make sure that it is well and that our priorities are fulfilled.

Table 2: Bill of Possible Materials

Part	Description	Cost ($)
PIR Motion Sensor [1]	Motion sensing hardware which will alert the system to detect motion.	7.41
DHT11 Temperature-Humidity Sensor [2]	Sensor that detects temperature and humidity as a digital signal. (0 to 50°C) Provides data once every 2 seconds; a resistor is included.	5.00
MQ-7 CO Sensor [3]	CO sensor which will alert the system when there is a dangerous amount of carbon monoxide	4.95
Top & Bottom Casing	Casing will protect the components of the system	0.00
Fasteners	Nuts and bolts	2.00
Teflon tape	Tape made from teflon	2.50
AA rechargeable battery	Will provide power to the system and all its components	0.00
USB Powerbank charger [6]	Will recharge the battery, ensuring the system is powered for long durations.	6.18

USB-C to USB 3.0 cable	Connects the device to the vehicle	0.00
Electrical wires	Used to connect the battery and sensors to the Raspberry Pi	0.00
2-meter USB 3.0 cable extension [4]	A 2-meter USB cord used to connect the central unit to the car's USB port.	7.74
6" Velcro Straps X 2	Long rectangular velcro straps are used to secure items.	4.49
Total		40.27

6. List of Equipment

Table 3: Needed Equipment for the Product's Development

Hardware	**Description**
Raspberry Pi 3 Model B	Powerful processor that has the capability of a wireless LAN & bluetooth connectivity.
Breadboard	Wiring block used for simplifying circuits
Screwdrivers	Many different sizes and types for attaching fasteners
Multimeter	Multimeter used for measuring different electric properties
Software	Python will be used to code the raspi. Python is a general coding language that emphasizes readability.
Raspberry Pi OS	Raspi uses its own OS similar to linux.
DHT lib	Library for DHT11 sensor
PIR lib	Library for PIR motion sensor
MQ-7 lib	Library for MQ-7 sensor

7. Conclusion

This deliverable allowed us to get a clear image of our final design concept, and to better define our task plan, considerably improving our perception of what needs to be done for our design to succeed. This deliverable also enabled us to anticipate potential project delays linked to issues

among the team, errors while coding in the Raspberry Pi OS or unavoidably exceeding the budget, and to prepare solutions to minimize these delays. Subsequently, we created a preliminary bill of materials, summing up the total cost for this design to $40.27, approximately two dollars under our $50 budget. This stage was crucial to determine the best components available for our design without spending more than allowed by our budget. Through this deliverable, we managed to globally outline our goals for this project and important details to complete it, allowing us to launch the prototyping process.