RAHS TECH INC.
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Progress Report

Introduction

At RAHS Tech the goal is to create a simple solution to a very common problem. RAHS is designed to defrost and heat the interior of a vehicle before the user enters it. This device is a car accessory that is easily implemented into any car and heats the vehicle without starting the engine. The user can activate the system with either the timing system or the remote control device. This report will show the progress of the RAHS with respect to the initial schedule and budget. This document will also address remediation for this project and a plan to complete this project by the deadline.

Schedule/Progress

The original schedule was to have all the systems integrated by March 27th. We have also allocated time for prototype modification until April 6th. The following shows the milestones and the progress of our project.

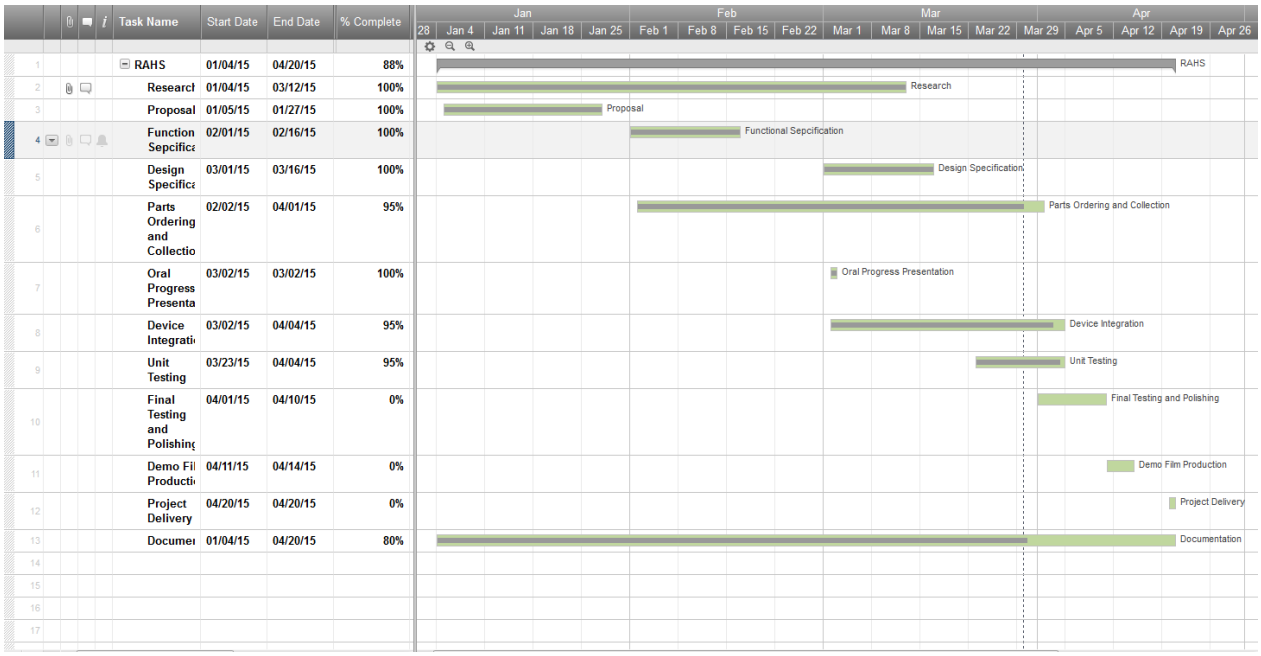

Figure 1: Project Timeline for RAHS

Given our somewhat drastic changes to the system design (seen below in remediation) we have not been able to implement our design fully as per our original schedule. This is mainly due to the fact that the chosen heater for our design is currently being manufactured in California. All other hardware components have been fully assembled and integrated together.

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The Battery, relay switch, and microcontroller, and sensors have been tested and are functioning as per our design. We have tested the system with a resistor to mimic the function of the heater unit. Once we have received the heater unit, we will implement the heater with our control mechanism to test the overall efficiency and functionality of the device. We are hoping to polish the device by packaging all the components into a black box and leaving the interface for user to prevent any damages towards the device.
Our controller unit software is currently in the debugging stage where we are sorting out the remaining bugs for smooth user controllability. All software bugs should be eliminated and the controller fully operational by the prototype demo date April 20th.

Finances

All necessary components for implementation have been acquired and the project is currently within the proposed budget. ESSEF has been RAHS Tech's main source of funding and have provided $400 for this project. So far we have spent $390 on components such as the microcontroller, RF transmitter, relay switch, temperature sensor, and the heater. We also have access to the engineering lab which provides us with wire, solder, and tools saving us costs of having to purchase these items. We have managed to reduce our product costs by changing our overall system design which is described below under remediation.

Item	Actual Price	Estimated Price
Heater	$190	$100
Microcontroller/Arduino	$80	$110 (Battery substituted)
RF Transmitter	$10	$30
Relay Switch	$60	$95 (Inverter substituted)
Phi-2 Shield	$50	$30
Total Cost	$390	$400

Table 1: Project Budget for RAHS

Remediation

Our original plan and design concept included utilizing a DC to AC power inverter as well as a standard 120V AC heater unit. Furthermore this was to be connected to the vehicle battery. After careful consideration, as well as extensive research and testing our team concluded that the power losses of this design were too great and would cause battery life failure. Instead of using a 1200W AC heater we have chosen an energy efficient 600W 12V DC heater unit manufactured explicitly to be used with standard 12V car batteries.
This has allowed us to bypass the unnecessary conversions of DC to AC power via the inverter which contributed overall system power losses. This subsequent design has cut

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power losses by half. The new system design also has reduced the cost of project by $150 allowing us to implement a secondary battery which will be responsible only for heating while leaving the vehicles existing battery alone. Now both batteries will be connected to the alternator allowing both batteries to be charged simultaneously, and each battery safe from draining to unsafe levels. Furthermore our timing system design is now being run with an Arduino microcontroller which has allowed us to implement additional functionality such as temperature and tilt sensors. The microcontroller operates a solid state relay which allows us to have complete control over the circuit from the battery to the heater.

Currently the chosen heater is being manufactured in California and so we have not been able to implement our design fully as per our original schedule. If the heater does not arrive by the 20th of March we will need to resort to a backup 12V heater unit which unfortunately does not produce as much heat as we had hoped.

Conclusion

RAHS Tech has put a lot of time into designing and implementing the systems included in RAHS. The modification of the timing system changes the classic alarm clock into an Arduino microcontroller which can be more easily integrated into our system. In addition, these changes will not influence the net cost of project. Although remediation is needed for our project, the project is still on schedule and will be completed by April 20th.