Progress Report for the

SmartChef Automated Cooking System

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1. Introduction

This document elicits the progress of the SmartChef system that has been made thus far in terms of the scheduling, budget, and implementation.

2. Schedule

Figure 1 shows the Gantt chart that was proposed as our original schedule. As seen, we aimed to finish the implementation by November 22, 2015. Thus far, we are approximately one week behind schedule. The separate subsystems have been built, however they have yet to be integrated together as an entire system. Pseudocode for servo-motor control has been written, and is ready to be translated to C++ for the Arduino. Although we are behind schedule according to what we originally proposed, we believe that we can finish our project in time for our demonstration date (December 15, 2015).

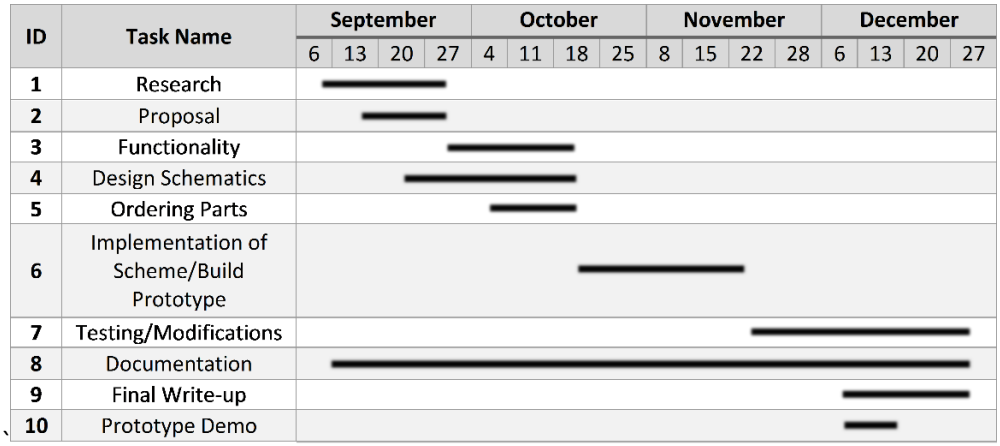

Figure 1: Gantt Chart of Original Schedule

3. Financial

Our group has been allotted $250 from the Engineering Science Student Endowment Fund (ESSEF). elicits our budget to date.

Table 1: SmartChef Budget

Expenditure	Amount
High-torque servo motors x 6	$192.00
DC motor	$10
Lumber	$40
Circuit components (Buttons, perfboard, connectors)	$55.96
Kitchen appliances (Pan, cooling racks)	$5.00
Miscellaneous (Glue, sandpaper, screws)	$30
Total	**$332.96**

The majority of our budget has been allocated to the high-torque servo-motors. We have salvaged some kitchen appliances from various sources for free, and purchased others at a low cost to minimize our expenditure. We are $82.96 over budget, which will be split between the team.

4. Progress

One solid ingredient dispenser has been built and tested. Currently it is able to store and dispense dry ingredients without jamming or spilling. Another dispenser of the same design will be constructed and tested. The resulting 2-dispenser system needs to be attached and fitted to the main chassis, and tested with various ingredients. It could also be modified to better handle wet ingredients by applying a waterproof and food-safe finish to the wood.

The liquid dispenser mechanism for the dispensing unit has been constructed after various iterations of implementation methods. It has been built as a mini water pump that can pump the liquid from a container in a controlled fashion to achieve a safe/fail consequence in case the motor fails. It has been implemented with a 9V DC motor with a potentiometer circuit that receives PWM input commands from the Arduino. This subsystem has been tested and proved to be working efficiently conforming to the functional specification. The final integration of this system into the entire framework still needs to be implemented.

The hardware for the stirring mechanism has been constructed, however it requires some alterations. The original mechanism to lift the stirring unit up/down utilized a screw, which was directly attached to the motor. Upon rotating the motor, the stirring mechanism was lowered/lifted. However, after testing this design, we found that it took too long (~40 s) to fully adjust the height of the unit. Thus, we have decided to alter this feature of the stirring unit in order to decrease the time it takes to move up and down. This subsystem is %70 complete to date, and will be ready for our demonstration date.

The pan-control unit has been built using two high-torque servo motors – one used for moving the pan between the heating and dispensing areas, the other used to rotate the pan to serve the ingredients onto a dish. The support for the two motors has been built using lumber. This subsystem is complete, tested, and ready to be integrated into the entire system.

The AC heating element has been constructed, secured and tested. All high-power electronics are enclosed in an electrical box keeping the user away from the risk of shock. The relay to the heating element is controlled by an active low relay. The heating system has been tested and functions well as a heat delivery mechanism. A feedback mechanism for regulating heat will not be implemented. The system is considered complete aside from integration with the rest of the system.

The original idea of the system was to have a proof-of-concept test system consisting of a mechanical button for each motor mechanism. We removed this idea because all IOs on the board were occupied by motor/relay outputs, and couldn't be used for button inputs. The new plan is to implement a single pushbutton that performs the appropriate sequence of actions to prepare a meal. The circuit will be built using a perfboard or solderless breadboard that is enclosed and isolated from the system.

Conclusion

To date, we have successfully constructed the majority of our subsystems. We have yet to integrate them together as an entire system, and time the controlling of each subunit to form a well synchronized system. We are approximately one week behind schedule, however we feel confident that our system will be completed in time for our demonstration date.