Final Project Proposal

Year: 2019 Semester: Fall Team: 8 Project: Condiment Express

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Team Members (#1 is Team Leader):

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1.0 Project Description:

As college students with little free time on our hands, cooking is a “leisure” that we don’t often have the time. As we all know, eating at restaurants or consuming fast food every day is neither practical nor healthy. What if there is a way to somehow automate this process a bit more so we can do the same cooking in less time? After a careful look at some typical western and eastern cooking processes, we find out that for those people who are new to cooking, most of the time is wasted on measuring the correct amount of ingredients and looking through the recipe book. This becomes a problem as most people are willing to save time on cooking and it has an impact on not only the new cooks but also many middle-class households. By 2020, half of the world’s population is expected to fall in the global middle class, thus at least half of the world could benefit from our design. [1]

We are trying to create an IoT enabled condiment distribution device which is in sync with recipes that sit on the countertop. This device can distribute condiments in order with precise measurements. Users can fill in condiments in the included bottle which has a thread on the bottom and attached to the machine. The top cap is to be opened by the user to refill the condiments and the bottom thread is used by the machine for dispensing. By using our application via BlueTooth, users can communicate send information to the machine of which condiments are needed. The machine will also alert users if any condiments are running low and need a refill. To operate, it first calibrates its x-y axis and then calibrates its weight sensor. The condiment dispensing routine will happen after the calibrations are done. Since the condiments are dispensed in sequence based on the recipe, users will take the condiment directly and mix then with the rest of the food. Users need to wash the condiment collector and return it to the machine, and the machine will continue to the next sequence of the condiment dispensing.

2.0 Roles and Responsibilities:

Yuanqiu Tan - Team leader: Yuanqiu has research experience from more than two years in various projects. Yuanqiu has leadership experience in conducting events with more than 100 students and guiding members in professional measurement. With a wide range of experience in ECE topics, she will be responsible for maintaining the teamwork and assisting fellow team members.

Minghao Sun - System engineer: Minghao has experience in both hardware and software development from several courses. Minghao will be in charge of the overall system including but not limiting to the improvement of the design, cooperation between each part and the function of each mechanism.

Chengming Zhang - Electrical Engineer: Experienced Software, Machine Learning and Embedded System Engineer with a demonstrated history of working in the electrical and electronic manufacturing industry. Fluent in C, C#, Java, Python, Swift, MATLAB, SQL, Verilog, Objective C and C++. Skilled in AutoCAD, Tableau, Inventor, Solid Work, EAGLE, Keil. Strong engineering professional with a Bachelor of Science, focused in Software Engineering from Purdue University. Chengming will be responsible for overall design, verification and assembly of the electrical system. Chengming will also help develop part of the embedded software as well as mechanical parts.

Binhan Xu - Software Engineer: Binhan has experience in STM32 development from ECE 362. Binhan will be responsible for developing the software system that control the condiment expense system, including motor control and integrate with sensor inputs. The software will be responsible for integrating hardware systems together.

2.1 Homework Assignment Responsibilities

|  |  |  |  |
| --- | --- | --- | --- |
| *Design Component Homework* | | *Professional Component Homework* | |
| 3-Software Overview | BX | 9-Legal Analysis | BX |
| 5-Electrical Overview | CZ | 10-Reliability and Safety Analysis | CZ |
| 7-Mechanical Overview | MS | 11-Ethical/Environmental Analysis | MS |
| 8-Software Formalization | YT | 12-User Manual | YT |

Figure 1: Assigned Homework Responsibilities

3.0 Estimated Budget

Below is the estimated budget for the project

|  |  |
| --- | --- |
| *Item* | *Estimated price* |
| Mechanical |  |
| 3D printing materials | 50 |
| Containers | 30 |
| Peristaltic pump | 40 |
|  |  |
| Electrical |  |
| Sensors | 50 |
| PCB printing and Assembly | 100 |
| LCD | 30 |
| X-Y linear railing | 100 |
| Stepper Motor | 50 |
|  |  |
| Total | 450 |

Figure2. Estimated component prices

The main portion of the cost comes from the X-Y linear railing system and the PCB cost. We currently estimate the total cost to be around $450, which is approximately equal to the allowed budget. In case of an additional item that goes beyond the budget, the extra money will be evenly split among the team members.

4.0 Project Specific Success Criteria

Below are the criteria necessary for the success of our project.

1. An ability to position the receiving component correctly using an x-y table.
2. An ability to measure the weight of condiments precisely with acceptable tolerance using a weight sensor.
3. An ability to control the perlitic pump to dispense liquid condiment.
4. An ability to receive commands via BlueTooth protocol
5. An ability to display information back to users via an LCD display.

5.0 Sources Cited:

[1] L. Shapiro and H. Long, “Analysis | Where do you fit in the global income spectrum?”, The Washington Post. [Online]. Available:<https://www.washingtonpost.com/graphics/2018/business/global-income-calculator/?noredirect=on&utm_term=.88f9b673071e>[Accessed: 06-Apr-2019]