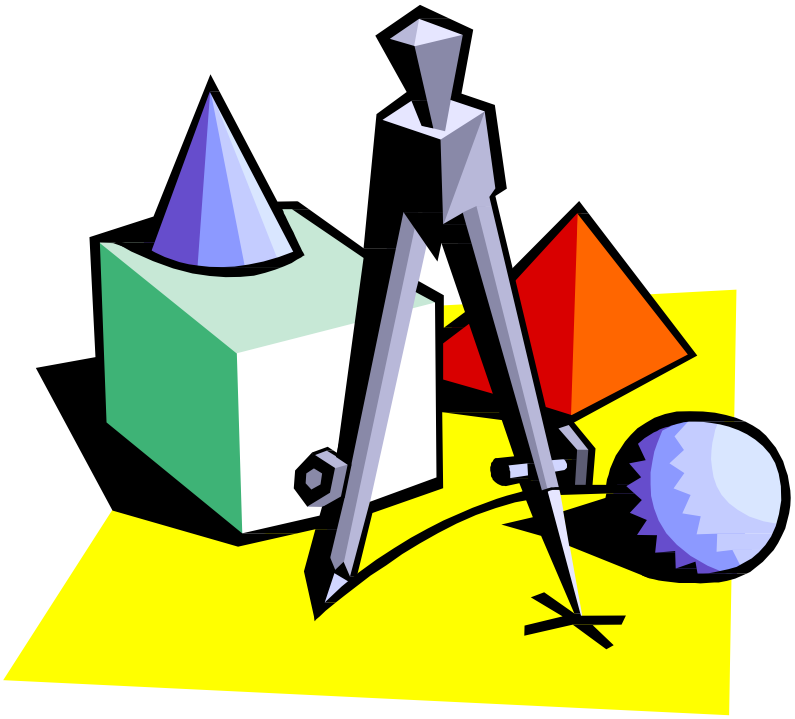
Engineering Design Notebook



Name: Philippe Laban

Project Title: Automated Spice Mixer

Contact Info.: plaban3@gatech.edu - 678.665.8019

Table of Contents

Title of Activity Draft Project Summary Outline

Title Of Project Automated Spice Mixer

Tuesday, 3rd November 2015 (7:30 pm, Klaus Atrium 3rd Floor)

In this meeting, the work for the project summary was divided up among the group members. The work was divided in the following way:

- Michael Kuchnik - Significant tradeoffs within the design of Automated Spice Mixer. Also consider different option and which solution is the best. 11/08/2015 ☑
- Sunny Patel - Realistic design constraints that applied to Automated Spice Mixer
- Me - Research the computing aspect of Automated Spice Mixer and identity the hardware and software interactions. 11/08/2015 ☑ 11/08/2015 ☑
- Philippe Laban - Research between Pro and Cons of having a touch screen vs. normal LCD screen. Also research about Internet of Things applications. 11/08/2015 ☑

In addition, every person should also read each example on T-Square

- PSF Example 1 – Multi-Robot Mapping 11/08/2015 ☑
- PSF Example 2 – Wireless Entertainment 11/08/2015 ☑

and write down important points and take note of the correct format to adhere to. Also each person must research a list of code and standards about their own topics by next meeting.

Philippe Laban

Winessed and Understood by _____Michael_Kuchnik____ Date ___11/03/3015_____

Recorded by _____Philippe Laban_____ Date ___11/03/2015_____

Title of Activity Draft Project Summary Form

Title Of Project Automated Spice Mixer

Sunday, 8th November 2015 (2:00 pm, Klaus Atrium 2nd Floor)

We met to start working on the draft of project summary form by using Google Document. Each team member continued working on their section and recorded documents visited online.

- Michael Kuchnik - Wrote significant tradeoffs Mixer.

  "Wifi vs. Ethernet vs. Bluetooth - The device must connect to a network, whether it is through Wifi, Ethernet or Bluetooth. Each has different costs and advantages. Wifi was chosen because it allows the mixer to connect to the internet directly. Kitchens usually do not have ethernet ports and therefore a wireless option is best.

  Material and size of the containers - Glass vs. Plastic vs. Metal, Small containers to reduce size of machine vs. larger containers to handle more volume. Plastic was chosen because it is easy to manufacture with 3D printers and is widely used in food delivery."

  http://www.diffen.com/difference/Bluetooth_vs_Wifi

  http://www.streetdirectory.com/travel_guide/117214/technology/bluetooth_and_wifi_

  http://www.androidauthority.com/build-materials-metal-vs-glass-vs-plastic-617553/

- Sunny Patel - Wrote realistic design constraints.

  "Manufacturing cost and testing - Must minimize the quantity and cost of the different component purchased. This is done to reduce the potential sale price of the final product.

  Accuracy of weight measurements - The weight measurements must match the desired quantity with a minimal error.

  Speed of service - The machine speed is a constraint as the user expects rapid delivery, and factors such as the architecture of the machine, the design of the software, and the choice of programming language all impact the end performance.

  The product must be as small as possible to fit on a kitchen counter. It must still be large enough to have a large number of containers to fit all kitchen spices."

  http://www.ni.com/white-paper/2908/en/

Continued on Page 3

Winessed and Understood by_Ratchapong Tangkijvorakul Date ___11/08/2015_____

Recorded by _____Philippe Laban_____ Date ___11/08/2015_____

Title of Activity Draft Project Summary Form (continued)

Title Of Project Automated Spice Mixer

Sunday, 8th November 2015 (2:00 pm, Klaus Atrium 2nd Floor), continued

3. Ratchapong Tangkijvorakul - Wrote the computing aspect and wrote the hardware and software interactions.

   Hardware and software tradeoffs will be made so that benefit for engineering effort is maximized. This implies using software over hardware when computation is feasible. In certain cases, a mix of both will be needed. For example, real time computer vision will be difficult to be achieve on a traditional CPU, but a dedicated DSP such as a GPU would be able to handle the task. Decisions will be made on how motors are controlled; device drivers are easily reprogrammable, but dedicated hardware may provide better performance.

   https://dev.windows.com/en-us/iot
   http://www.adafruit.com/category/105?gclid=COXVhbTO4MgCFdgUgQod5EwDbg
   http://beagleboard.org/BLACK
   https://www.96boards.org/products/ce/dragonboard410c/

4. Philippe Laban - Research between Pro and Cons of having a touch screen vs normal LCD screen. Also research about Internet of Things applications.

   LCD Interface - Several interfaces exist to connect monitors to embedded device including the prominent LVDS, and VGA connectors. Additionally, touch screen sensors require a controller which typically interfaces with the embedded device through a Serial/COM or USB port. Even though different controllers are required for the different touch sensors, the computer connections are standardized.

   https://www.sparkfun.com/products/13733
   http://pinouts.ru/SerialPorts/
   https://www.raspberrypi.org/forums/viewtopic.php?f=44&t=7453

   We also started considered formats of example documents that were given and to see if the team was missing any essential part of the proposal. From looking at other examples, each member was in charge of finding specific codes and standards relevant to the project to add to the proposal.

Winessed and Understood by_Ratchapong Tangkijvorakul Date ___11/08/2015_____

Recorded by _____Philippe Laban_____ Date ___11/08/2015_____

Title of Activity **Preliminary Project Proposal (Researching Individual Sections)**

Title Of Project Automated Spice Mixer

Tuesday, November 17 (6:00 pm, Klaus Atrium 2nd Floor)

Met to work together on our individual parts and talk through the design.

Michael Kuchnik - The computing platform for the spice mixer will need enough computing resources to manage network connectivity, robotics control, and any analytics. Chose to use a Raspberry Pi with Linux.

https://www.raspberrypi.org/documentation/installation/installing-images/linux.md
http://ms-iot.github.io/content/en-US/win10/SupportedInterfaces.htm
https://www.raspberrypi.org/documentation/usage/gpio/
https://www.raspberrypi.org/blog/introducing-raspberry-pi-model-b-plus/

Sunny Patel - Began to research about different weighing mechanisms
Domestic Scales, Commercial Scales, Industrial Scales, Precision Scales
Scales used for weighing come in many forms and an equally large number of applications. The right scale can make the difference in certain weighing functions.

http://www.ehow.com/list_6146929_types-weighing-scales-function.html
http://www.nanomotion.com/piezo-ceramic-motor-technology/piezoelectric-effect/

Ratchapong Tangkijvorakul - Began to research about data visualization, commercially available solutions and current practices. Research about database MongoDB vs SQL and have to make decision on what database to use by next meeting 12 November 2015.

http://fellinlovewithdata.com/research/the-role-of-algorithms-in-data-visualization
http://mobihealthnews.com/40600/survey-diabetes-patients-who-use-digital-tools-self-report-better-health/

Philippe Laban - Emailed Dr. Collins with our proposal form. Researched about how 3D printing works. Also researched about motors to be used with Automated Spice Mixer. Also sketched the size and shape of the container and evaluated its cost.

http://www.sciencedirect.com/science/article/pii/0925527395000752
http://www.robotshop.com/media/files/pdf/hs805.pdf

Continued on Page _____

Winessed and Understood by _____Sunny Patel_____ Date ___11/17/2015_____

Recorded by _____Philippe Laban_____ Date ___11/17/2015_____

Title of Activity **Preliminary Project Proposal (Outline for Thanksgiving)**

Title Of Project Automated Spice Mixer

Tuesday, November 24 (6:00 pm, Klaus Atrium 3rd Floor)

Decided on the best approach to work on the project: each person is in charge of a piece of the design, and we review it together. Therefore, tasks 3 to 7 will be done during Thanksgiving and ready to be discussed for the next meeting. The outline for the paper is below:

Before thanksgiving make sure to finish 3-7

Executive Summary (Finish last) - Everyone

1. Introduction- Everyone

Objective, Motivation, Background

2. Project Description and Goals- Everyone
3. Technical Specification

a. Punch - Data visualization
b. General Layout/ Physical Design of Containers
c. Computation / OS/ devices - Michael
d. Weighing/Dispensers of material

4. Design Approach and Details

. Design Approach

Each person writes about their own topic

- Punch - Data visualization
- General Layout/ Physical Design of Containers
- Computation / OS/ devices - Michael
- Weighing/Dispensers of material

Each person writes about their own topic

5. Schedule, Tasks, and Milestones

Each person writes about their own topic

- **Manager** - Sunny

6. Project Demonstration

Each person writes about their own topic

- **Manager** - Philippe

7. Marketing and Cost Analysis

a. Marketing Analysis
b. Cost Analysis

8. Summary

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Winessed and Understood by ___Sunny Patel_____ Date __11/24/2015_____

Recorded by _____Philippe Laban_____ Date __11/24/2015_____

Title of Activity **Preliminary Project Proposal (**Cost Analysis and Market Analysis)

Title Of Project Automated Spice Mixer

Monday, November 30 (6:00 pm, Klaus Atrium 2nd Floor)

Face to face meeting to agree on the cost and marketing analysis of the project and do it together.

We agreed to set different pricings such as labor cost, the price the device would be sold at, and realized the overall cost to develop the project is about $35,000 when accounting for human labor.

Below is the list of parts we need to purchase for the development phase:

Product Description	Quantity	Unit Price (USD)	Total Price (USD)
Raspberry Pi B+	1	35.00	35.00
LCD - 7" Touch Screen	1	62.95	62.95
Giant Scale Servo Motor	1	39.95	39.95
Power Supply	2	9.95	19.90
3D Printed Containers	10	2.00	20.00
Load Sensor Combinator	1	1.95	1.95
Load Sensor	1	9.95	9.95
Total Cost			189.70 USD

Winessed and Understood by _____Sunny Patel_____ Date __12/30/2015_____

Recorded by _____Philippe Laban_____ Date __12/30/2015_____

Title of Activity **Preliminary Project Proposal (Final Writeup)**

Title Of Project Automated Spice Mixer

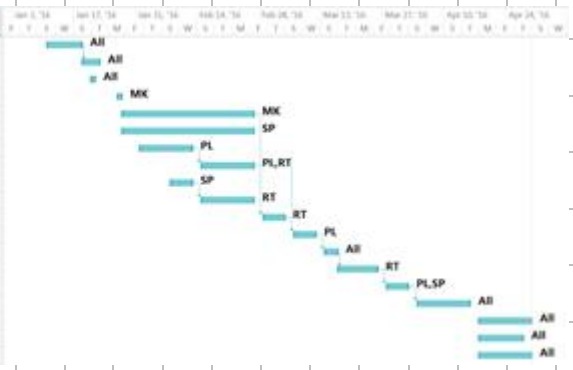
Tuesday, December 1 (7:00 pm, Klaus Atrium 2nd Floor)

Finalizing the paper for submission, writing introduction, summary, executive summary

Also finalized some of the minor design choices such as power supply.

Finalized the milestonesand built the Gantt Chart

	Task Name	Resource Names	Start	Finish	Duration	Predecessors
1	Technical Review Paper	All	M 1/11/16	M 1/18/16	6 days	
2	Project Proposal	All	T 1/19/16	F 1/22/16	4 days	1
3	Parts Ordering	All	T 1/21/16	T 1/21/16	1 day	
4	Install Linux	MK	W 1/27/16	W 1/27/16	1 day	
5	Make Driver For Motors And Sensors	MK	T 1/28/16	F 2/26/16	22 days	
6	Develop Server Program and Features	SP	T 1/28/16	F 2/26/16	22 days	
7	3D Print Components	PL	M 2/1/16	F 2/12/16	10 days	
8	Test and Debug Layout	PL,RT	M 2/15/16	F 2/26/16	10 days	7
9	Make Controller for Touchscreen	SP	M 2/8/16	F 2/12/16	5 days	
10	Make User Interface	RT	M 2/15/16	F 2/26/16	10 days	9
11	Calibrate and Test Motor System	RT	M 2/29/16	F 3/4/16	5 days	5
12	Test Motors Under Container Strain	PL	M 3/7/16	F 3/11/16	5 days	11,8
13	Connect Wire To Computers	All	M 3/14/16	W 3/16/16	3 days	12
14	Test Networking	RT	T 3/17/16	F 3/25/16	7 days	13
15	Test Dispensing From Containers	PL,SP	M 3/28/16	F 4/1/16	5 days	14
16	Test and Debug Overall System	All	M 4/4/16	F 4/15/16	10 days	15
17	Final Project Presentation	All	M 4/18/16	F 4/29/16	10 days	
18	Final Project Demonstration	All	M 4/18/16	W 4/27/16	8 days	
19	Final Project Report	All	M 4/18/16	F 4/29/16	10 days	



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Witnessed and Understood by _____Sunny Patel_____ Date __12/01/2015_____

Recorded by _____Philippe Laban_____ Date __12/01/2015_____