Initial Project and Group Identification Document

February 3, 2015

EEL 4914 - Senior Design I

CCLES

**Computer Controlled
Laser Engraving System**

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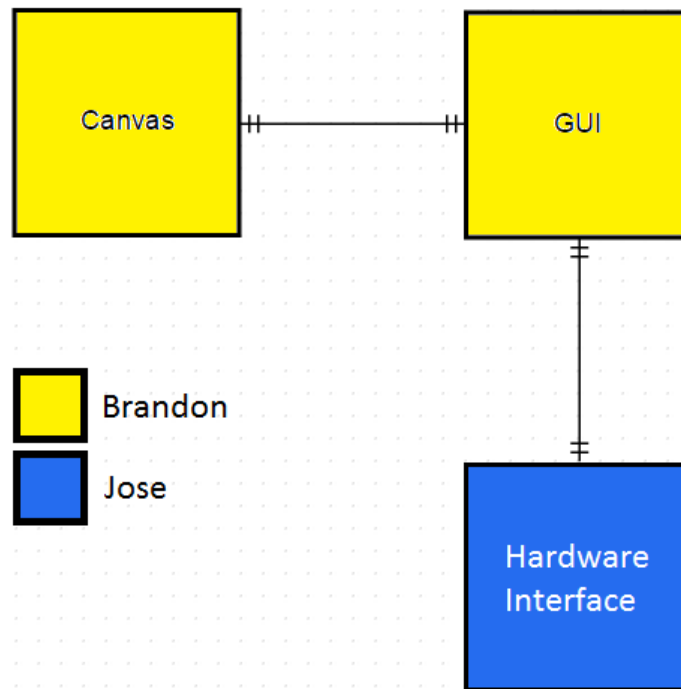
Project Description:

The project in mind would be similar to a two dimensional Computer Numerical Controlled (CNC) cutting system, such as what would commonly be present in machining and fabrication settings. Instead of cutting material this project would function as a 2D drawing machine.

This machine would function by imputing a simple image into a vector compatible program, and transferring the image into a vector point format. From this point the CNC component would recognize and generate a 'tool path', calculate values required for the operation of the machines X and Y axis, and retain a set height variable for Z. Once calculated, the machine will follow the previously generated path, moving to each designated point leaving a visible burn line. To avoid 'crashing' the tool, the machine will pause after each path before moving to the next location. The hope is that upon completion of the machine's paths, it will have perfectly transferred the image into the material. This machine would to etch images onto different materials. The program would adjust the laser's power based on the material and the image being etched.
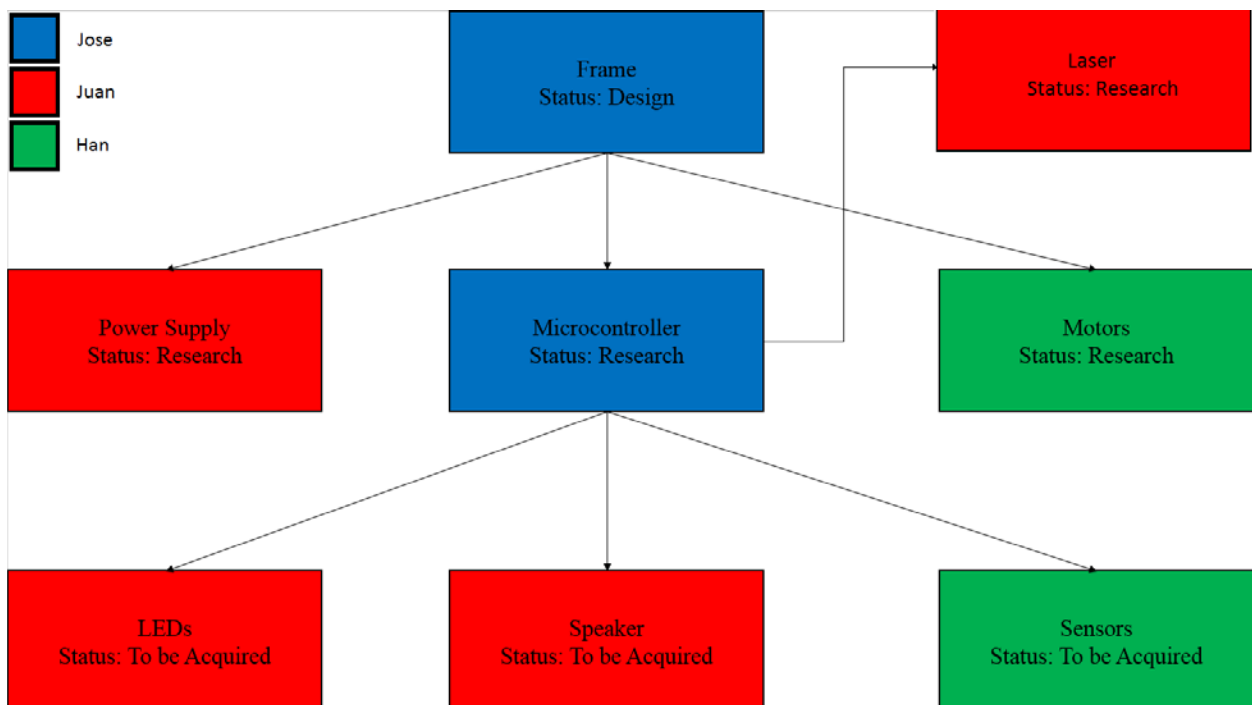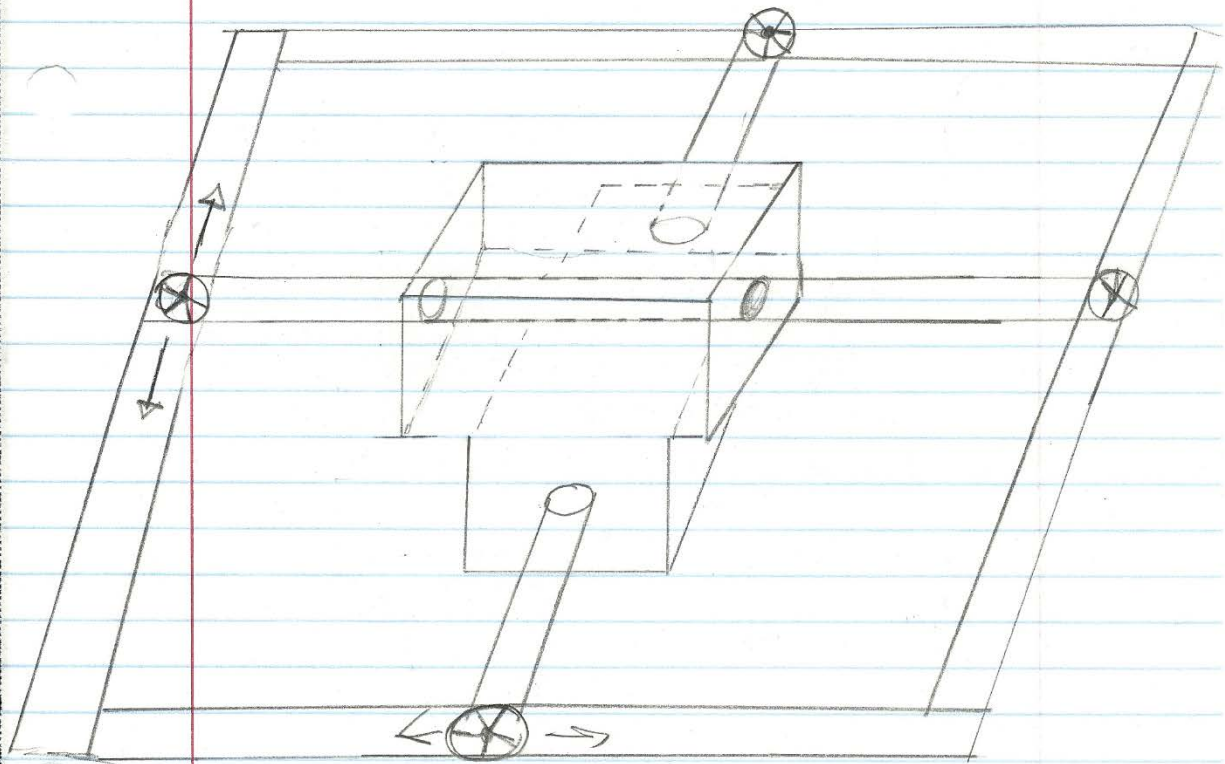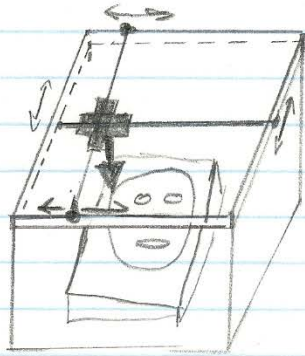
Specifications and Requirements:

- Armature must be able to hold the laser in a steady 'z' location during use.

- The armature control system must move reliably on the track maintaining a controlled movement.

- The armature control system must be able to self-calibrate itself prior to the drawing.

- The image to be drawn is going to be translated to a standard 8.5" x 11" paper.

- The physical dimension of the project is estimated to be at most 16" x 16" x 12 in.

- The frame will enclose the laser and material being cut while in use.

- The machine will have a security system in place so it will not operate when open.

- The program will keep track of the power of the laser.

- The program will build a list of positions from the canvas with an associated power level.

- The program will support a feature to allow the user to erase points from their image.

- The user will finish the drawing by hitting a finalize button which will send the data points to the microcontroller.

Software Class Diagram:

Legend:
- Yellow: Brandon
- Blue: Jose

Diagram elements:
- Canvas
- GUI
- Hardware Interface

Hardware Block Diagram:

Legend:
- Blue: Jose
- Red: Juan
- Green: Han

Diagram elements:
- Frame — Status: Design
- Laser — Status: Research
- Power Supply — Status: Research
- Microcontroller — Status: Research
- Motors — Status: Research
- LEDs — Status: To be Acquired
- Speaker — Status: To be Acquired
- Sensors — Status: To be Acquired

Project Budget:

Frame	$150
Power Supply	$60
Laser	$150
Microcontroller	$50
Motors	$120
LEDs	$10
Speaker	$25
Sensors	$200
Misc.	$50

Milestones

Spring 2015

- Finalize project definition and description.
- Research Software and Hardware designs.
- Design appropriate subsystems and perform small scale testing.
- Submit final design documentation.

Summer 2015

- Buy needed parts.
- Build each subsystem.
- Integrate subsystems together.
- Perform thorough testing with each integration.