Remote CO_2 Laser Engraver/Cutter

May 8, 2020

Jonathan Abernathy, Jason Dick, and Nicholas Lewis

ENT 498 Senior Design II

Mert Bal

Statement of Purpose (Executive Summary):

The goal of our project was to develop and manufacture a CO2 laser engraver capable of being remotely controlled via the internet using a custom-built interface. The purpose of our project was to provide access to individuals who may be interested in creating custom laser engraved works but who didn't necessarily have access to a CO2 laser engraver. Our product would allow users to design and monitor their own custom works from the comfort and security of their own homes. Our basic designs were inspired from multiple DIY examples that we found online, but nothing we found had remote access. To add this functionality, we used Microsoft Visual Studio and Client – Server based communication protocols to provide real time information about the status of the laser. We believe that our project is relevant, especially today amongst the COVID-19 outbreak, when remote access and control have become the new normal.

Table of Contents:

Scope and Methodology:

The scope of the Remote CO2 Laser Cutter/Engraver project was to create a laser cutter system with the ability to monitor its status via an internet connection. The laser should be able to cut/engrave common types of projects with the inclusion of remote monitoring technology. To achieve this, the laser is monitored by an Arduino that is also used to control the motion of the laser device. The Arduino then sends the status of the laser machine to a Visual Studio program on a computer. This Visual Studio program takes this information and projects it to a viewer of the computer by way of a simple graphical user interface (GUI). A separate program in Visual Studio sets up a client - server communication with a remote computer to project screenshots of the first computer at 1ms intervals. This effectively allows anyone with proper credentials to connect to the laser device and view the laser's status.

After doing much research online for DIY laser cutter/engraver, we decided to go with a medium size cutting area (1000mm X 900mm). We also decided that using the Arduino would be the best to use with all the experience that we had already gained using them in multiple classes. This made understanding the coding process a little easier.

The code (GRBL) was written by Simon Svale Skogsrud in 2009 and released as on open-source (github.com). This was his idea for this code from the beginning. He wanted to make the code available to everyone and this was the biggest reason for using the Arduino IDE. Most DIY enthusiasts prefer this code because it is open-source and constantly updated with fixes to problems that they may have. Many people use it to keep from having to pay the high prices of

g-code programs. Most of the code was already done, just needing a few lines of the code deleted (making it a comment, not actually deleting it entirely), as well as adding some lines of code.

In using the Arduino Mega, this gave the CO2 laser more than enough digital and analog ports, memory, and processor power. The Arduino IDE is one of most widely used for most DIYers for many different applications other than just CO2 laser. Many people are using the Arduino in their 3-D printing machines as well. The GRBL code is used to interpret the g-code that most manufacturing facilities use. The biggest problem with Arduino right now is that it is only capable of operating in 3-axis (X. Y, and Z). Arduino is not capable as of right now for rotational axis. A quick search found that many people are working modifying the code to make this a possibility.

The majority of the CO2 laser is built using extruded aluminum. The reason for this was to save on weight of the entire project. We wanted to make the CO2 laser light for portability. The plan was also to try and build a rolling system for the laser as well. This was the reason for wanting to keep the weight down. Once the main frame was built, we were able to see what the size our work area was going to look like. This is also were we started to lay out how and where the electronics for laser were going to housed. The CO2 laser is attached to the top of the main frame to make laser alignment easier.

The cooling of the laser is done from a completely independent system. The main unit also houses all the water that is used for cooling of the laser, as well cooling the water that is coming from the laser housing unit. This type of system makes things much easier because it is all one unit instead of having a water holding tank, cooling unit, and many more water lines than just to and from the laser. This also saved weight due to fact that the cooling system is not mounted to the laser housing. We did realize that this would make one more thing that would have to be

carried along with the laser housing. Also, in doing this, this helps to keep the laser unit from becoming heavier on one side of the housing due to the mounting of the cooling unit.

The decision was made to go with a 60-Watt CO2 laser. This would give us the capability to engrave many different types of material (wood to thin metal). To help control the position of the head of the laser (X-axis and Y-axis), we used Nema 23 stepper motors. The reason for this was the ability to add height control of the head of the laser and knowing that this was going to add some weight to the X and Y axis, the Nema 23 would not have a problem in moving that extra weight due to extra torque that they would provide over the Nema 17 stepper motor. We decided to go with a ball screw type system to allow for more accurate control of the laser head during operation. Most other DIY CO2 lasers use the belt type system. We wanted something with more control and precision.

The hardware that was used to build the laser was purchased locally at hardware stores and online form amazon. The hardware was one of the last things purchased in bulk due to knowing for sure how and where things were going to go. So, instead of buying things up front and not knowing if we were going to use them, we decided to buy them as the laser was being put together. We tried to buy things with hardware included or buy some hardware that we knew that we going to need.

Findings:

Due to the COVID-19 outbreak the project was unable to be fully integrated; however, much progress was made toward the completion of this project and a proper proof of concept was able to be completed. We found that it was possible to complete the remote portion of the project successfully by sending physical inputs from the real world to a Visual Studio program using the Arduino. From there the GUI was sent virtually across a LAN network to another computer for viewing. As of now the functionality of this system is limited to being within a single building. For many instances where this technology would be used that would be acceptable because it allows the status of an Arduino controlled device to be monitored anywhere within a single building/workplace. To expand the range of the system to anywhere in the world, a static IP would be required. This would allow a device from anywhere to be able to connect to the server computer and view the projected screenshots. One way to work around this safely is to have a designated internet connection for the device being remotely monitored. This way the safety of the files for the rest of the company would not be compromised by allowing outside sources to connect to a businesses network. Another limitation was the inability to test the remote monitoring portion with the laser itself. Upon the completion of the laser, the GUI program would have incorporated a camera positioned at the laser to provide better information about the status of the laser project.

Conclusion and Recommendations for Further Study:

The restrictions placed on our group as a result of the COVID-19 pandemic prevented us from fully realizing our project. However, we do believe that we've provided proof of concept with remote functionality while the assembly of the laser itself is the only remaining open item. If we had completed the assembly process, we planned to further refine our online interface to be more pleasing. Currently the interface is a very simple form that gives users very basic options but we would have liked for it to also display live video of the laser at work. We also wanted to create a progress bar that would display the designs percent completion in real-time so that users could easily monitor their designs progress.

While we are a bit disappointed that we never produced a functioning laser engraver, we believe that we have everything that we need to do so, including the required knowledge and understanding. We also believe that the pandemic itself has actually strengthened our opinion that our project is more relevant today than ever before. Remote access is the way of the future and not just in manufacturing applications, but in just about every industry. COVID-19 has shown all of us what work is still possible due to networking and communication technology. More and more jobs, schools, and even recreational events will be conducted remotely going forward, and we believe that this project has made us more prepared for that eventuality.

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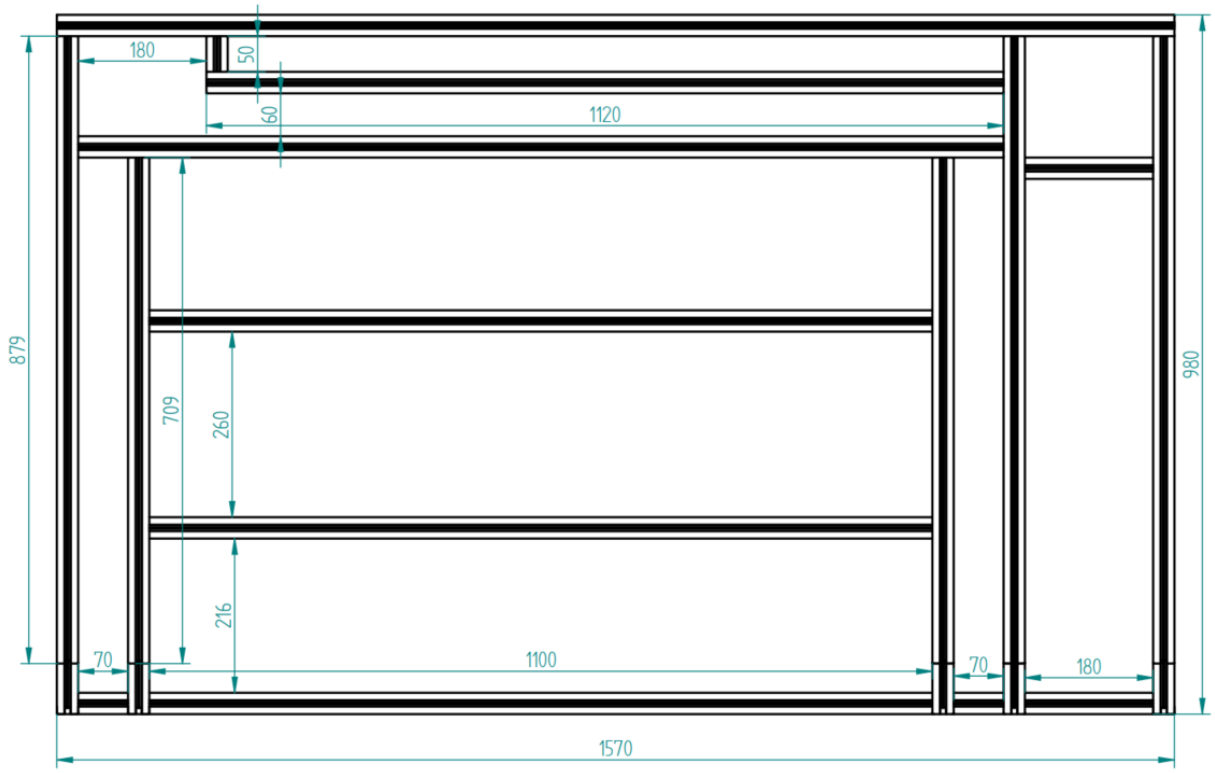
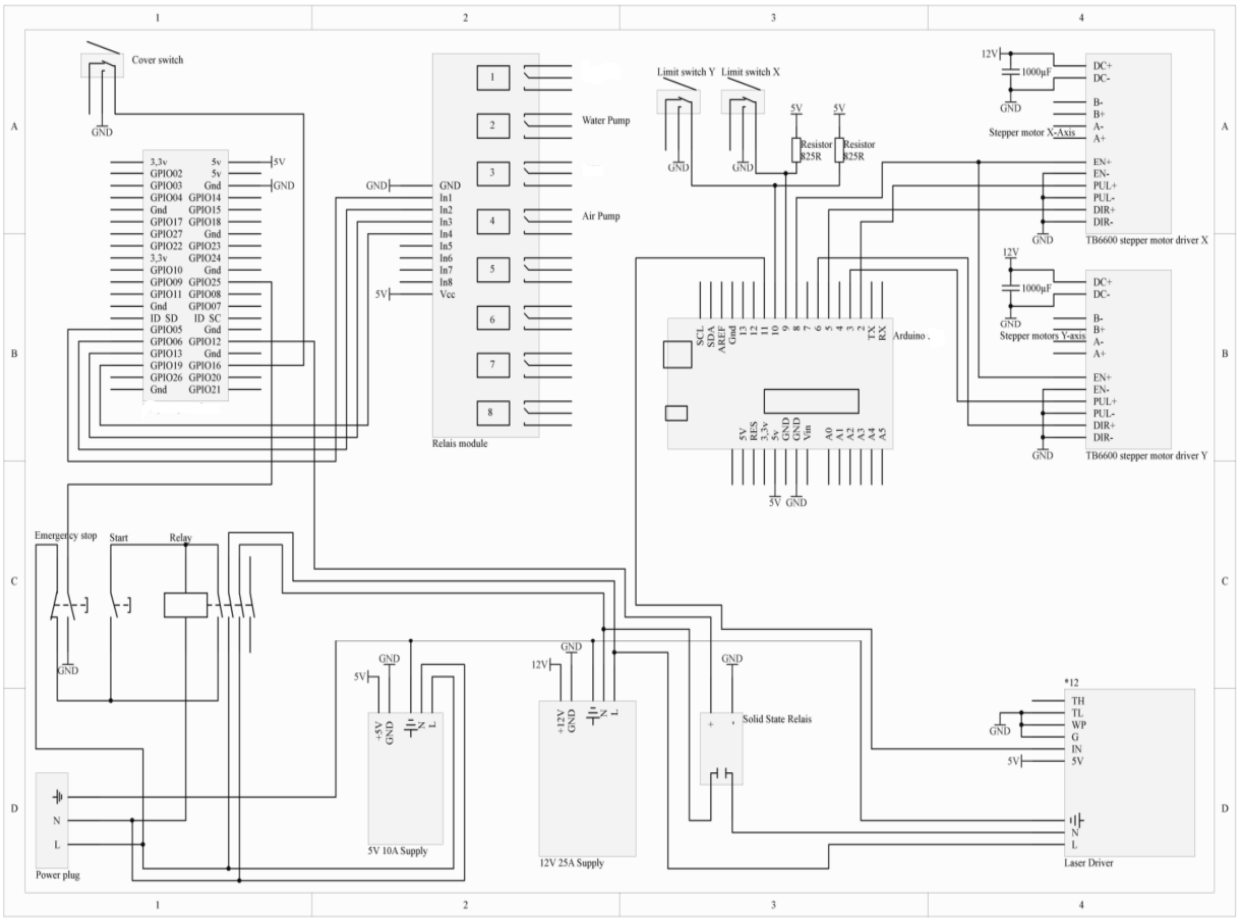
Appendices:

Qty.	Part # & Description	Unit Cost	Amount
3	Aluminum Extrusion 48" (1220 mm) Clear Anodize Misumi Series 5 (20mm x 40mm) - 4 pack	129.99	389.97
2	Boeray 2020 Series M5 T Slot Aluminum Profile	10.99	21.98
2	iExcell 100 pcs M5 x 10 mm 10.9 grade alloy steel	7.98	15.96
3	PZRT 2020 Series Aluminum Profile Connector Set, 20 Pcs (Silver)	24.59	73.77
2	Boeray 3-Way End Corner Bracket Connector (Silver)	11.59	23.18
4	Befenybay 4PCS/Set Corner Bracket Plate with 20PCS	13.99	55.96
2	uxcell Straight Line Connector	8.73	17.46
1	Vinmax Industrial Water Chiller	189.98	189.98
2	Uxcell a16031400ux0193 8 mm x 10 mm Silicone Translucent Tube	10.62	21.24
1	SenTECH 60W CO2 Glass Laser Tube	249	249
1	Garosa Laser Engraving Machine Red Oxide Film Aluminum CO2 Laser Head Set	89.99	89.99
1	Cloudray 60W Co2 Laser Power Supply 110V for CO2 Laser Tubes MYJG-60W	119.99	119.99
	Cloudray Co2 Laser Tube Holders Flexible Dia.50-80mm	43.99	43.99
1	Rattmmotor 3 Axis CNC Kit Nema 23 Stepper Motor	285	285
1	4pcs Nema 23 Stepper Motor Steel Mounting Bracket with Mounting Screws	11.99	11.99
1	3Pcs 6.35x10mm CNC Stepper Motor Jaw Shaft Coupler	15	15
1	Emergency Stop Button 660V 10A Red Sign	8.99	8.99
1	URBEST Plastic Drag Chain Cable Carrier	10.99	10.99
1	8 Channel DC 5V Relay Module with Optocoupler	8.78	8.78
1	TinaWood 2PCS SSR-40DA 40A Solid State Relay Load	13.68	13.68
1	Baomain Delay Timer Relay	11.29	11.29
1	Arduino Mega 2560	38.5	38.5
1	22GA Hook up Wire Kit	17.95	17.95
1	18awg Electronic Wire Kit IN STOCK 17 FEB 2020	15.99	15.99
2	Befenybay Small V-Wheel with Plate for 2020V	15.99	31.98
1	CNCCANEN Ball Screw SFU1605-1050mm	56	56
1	Happybuy Linear Rail 3 Ballscrew RM1605 kit	278.96	278.96
3	DSG16H Ball Screw Nut Housing Seat Mount Bracket	11.99	35.97
	Bolts and washers		250
	Total		2403.54

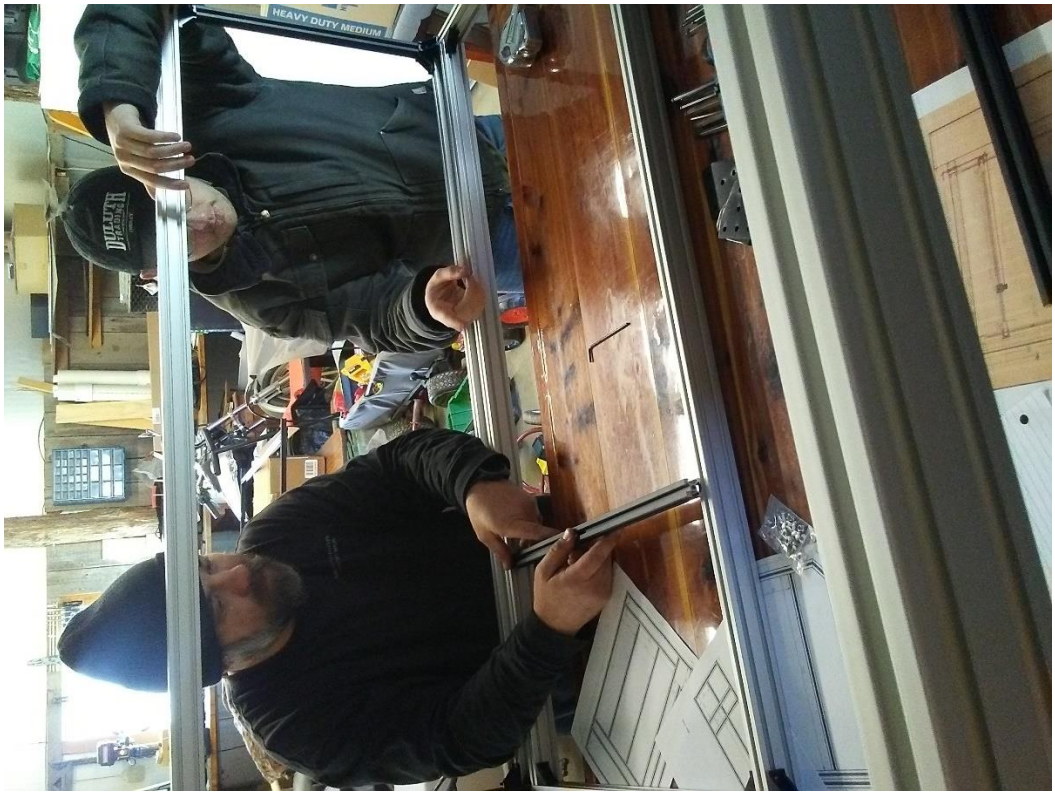
Final Cost Breakdown

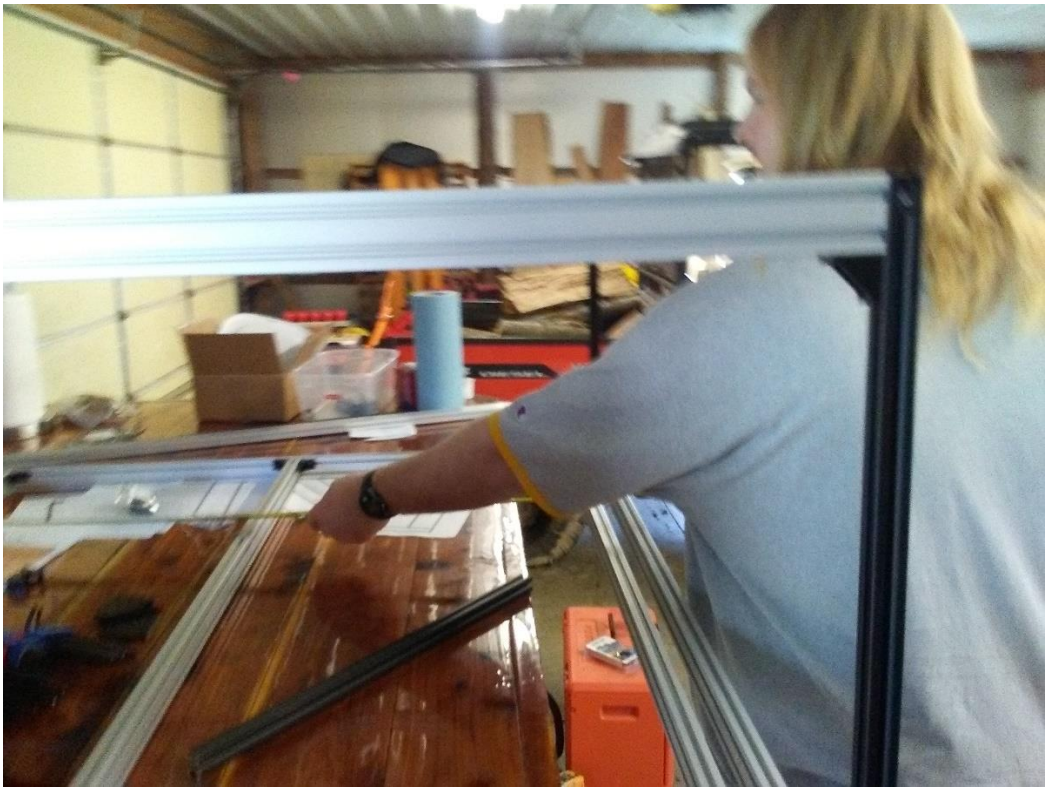


DIY Frame Schematic Baseline



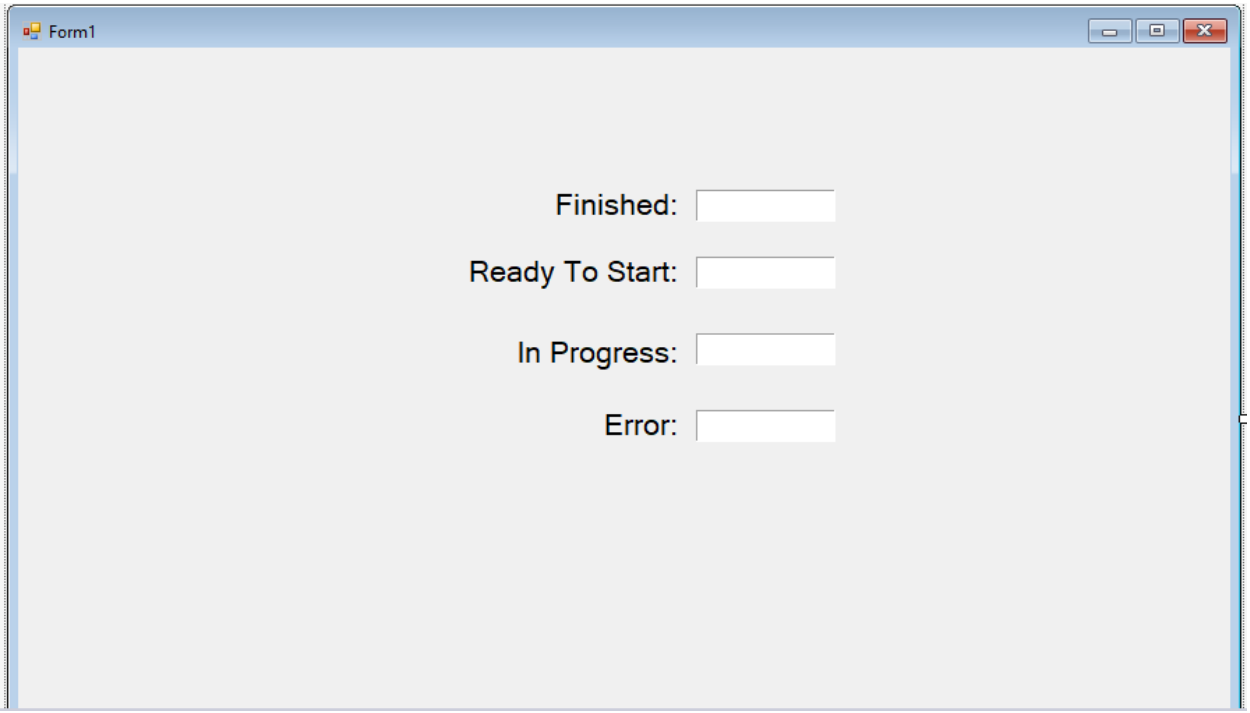
Wiring Layout based on DIY





Team Photos

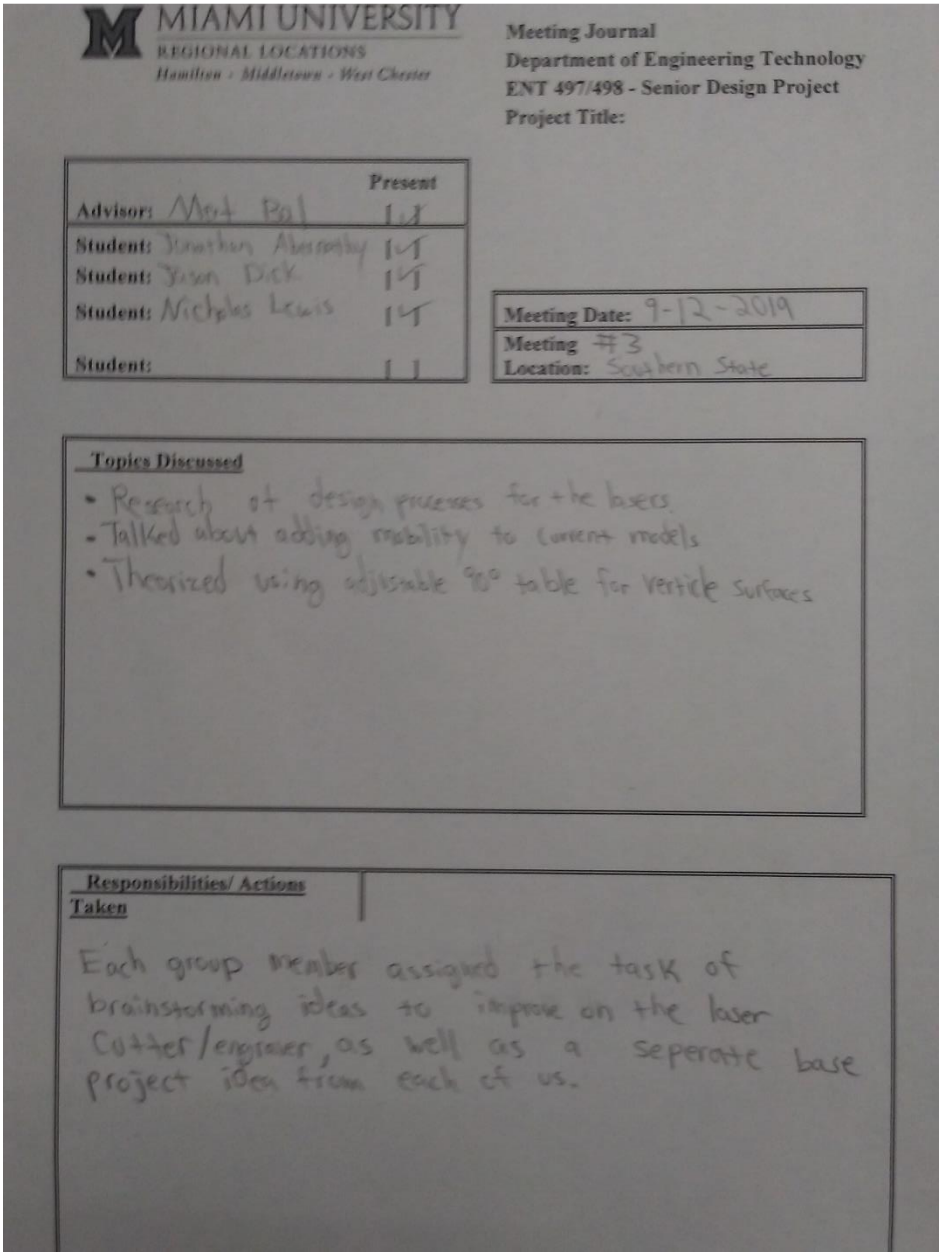
Current State of Laser Unit



GUI Prototype

Visual Studio Code Included Separately

Meeting Journals



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Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mark Bal	1/3
Student: Jonathan Abernathy	1/3
Student: Jason Dick	1/3
Student: Nicholas Lewis	1/3
Student:	1/3

Meeting Date: 9-12-2019
Meeting # ~~#~~3
Location: Southern State

Topics Discussed

- Research of design processes for the lasers
- Talked about adding mobility to current models
- Theorized using adjustable 90° table for vertical surfaces

Responsibilities/ Actions Taken

Each group member assigned the task of brainstorming ideas to improve on the laser cutter/engraver, as well as a seperate base project idea from each of us.

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Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mert Bal	[V]
Student: Jonathan Abernathy	[V]
Student: Jason Dick	[V]
Student: Nicholas Lewis	[V]
Student:	[ ]

Meeting Date:	9-19-2019
Meeting Location:	#4 Southern State

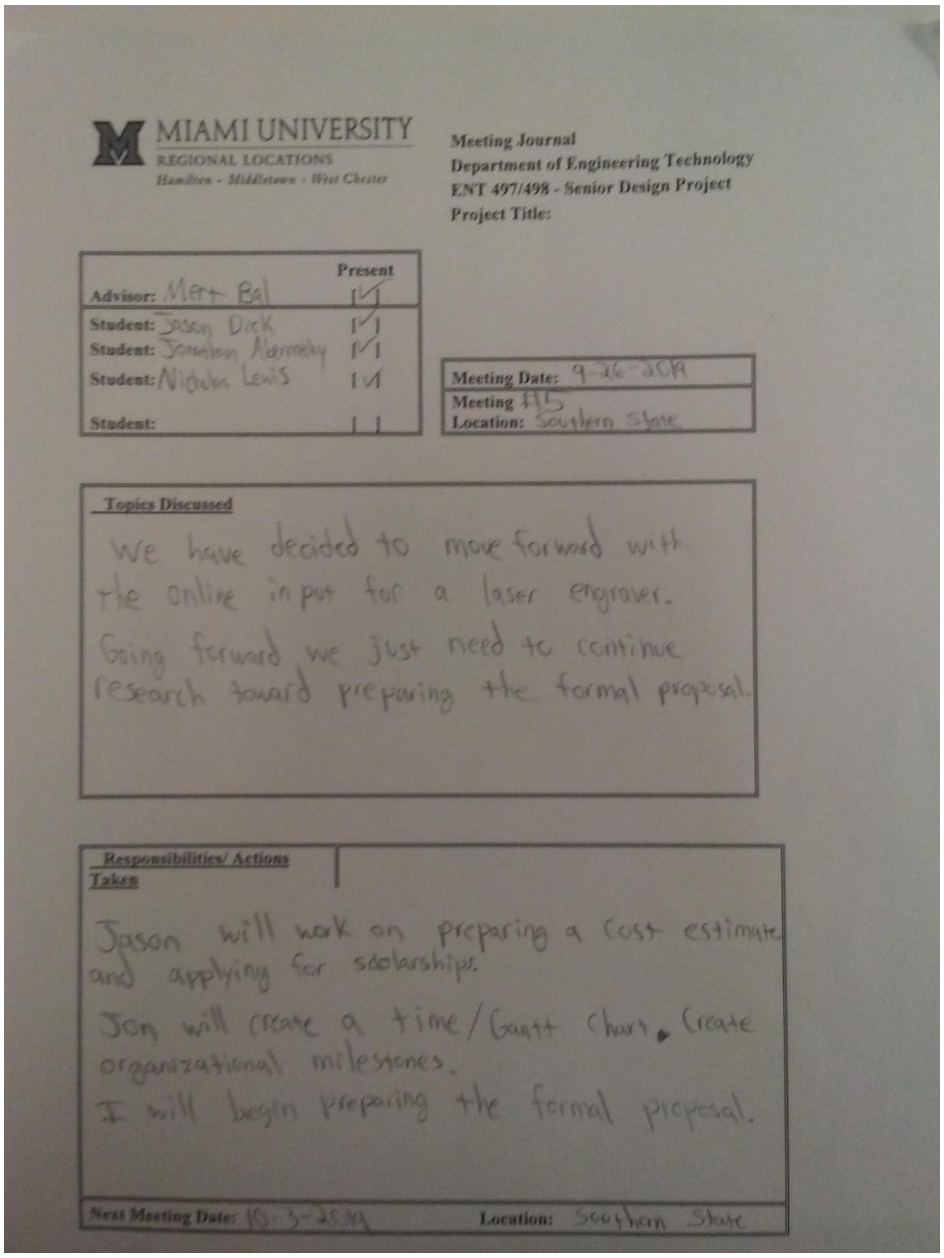
Topics Discussed

- Self-Charging eBike idea debated
- Automatic ignition Started Key-fob proximity idea
- Automatic Laser Cutter/Engraver system online input by clients w/ queued projects + delivery

Responsibilities/ Actions Taken

We are fairly confident we are going with the laser/cutter engraver idea. Each group member has been assigned to start preparing the proposal, Jason is in charge of cost analysis. Jon is in charge of the Gantt chart, and Nick is in charge of technical writing.

Next Meeting Date: 9-26-2019 **Location:** Southern State



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Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Matt Bal	✓
Student: Jason Dick	✓
Student: Jonathon Abernathy	✓
Student: Nicholas Lewis	✓
Student:	

Meeting Date: 9-26-2014
Meeting #: 5
Location: Southern State

Topics Discussed

We have decided to move forward with the online input for a laser engraver.
Going forward we just need to continue research toward preparing the formal proposal.

Responsibilities/ Actions Taken

Jason will work on preparing a cost estimate and applying for scholarships.
Jon will create a time/Gantt chart. Create organizational milestones.
I will begin preparing the formal proposal.

Next Meeting Date: 10-3-2014 **Location:** Southern State

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Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mert Bal	[✓]
Student: Jason Dick	[✓]
Student: Jonathan Abernathy	[✓]
Student: Nicholas Lewis	[✓]
Student:	[ ]

Meeting Date: 10-3-2019
Meeting # 6
Location: Southern State

Topics Discussed

Trouble has arisen with the funding. The VA will only cover 1/3rd the cost of the project. We are now looking at the Armin Fleck scholarship. We are otherwise still working on preparing the remainder of the formal proposal.

Responsibilities/ Actions Taken

Complete the Armin Fleck Scholarship

Hope to have rough drafts next class of the formal proposal.

Next Meeting Date: 10-15-2019 **Location:** Southern State

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Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mert Bal	[✓]
Student: Jason Dick	[✓]
Student: Jonathan Abernathy	[✓]
Student: Nicholas Lewis	[✓]
Student:	[ ]

Meeting Date: 10-10-2019
Meeting # 7
Location: Southern State

Topics Discussed

* Milestones and how they will fit on our timeline
* Looked at Alternative Components, need to decide specifically to build BOM + Budget.
* We talked about the work break down and who's responsible for what.

Responsibilities/ Actions Taken

* Finalizing responsibilities project proposal due next week.

Next Meeting Date: 10-17-2019 **Location:** Southern State

Project Title:

	Present
Advisor: Mert Bal	[✓]
Student: Jason Dick	[✓]
Student: Jonathan Abernathy	[✓]
Student: Nicholas Lewis	[✓]
Student:	[ ]

Meeting Date: 10-17-2019
Meeting # 8
Location: Southern State

Topics Discussed

Specific step by step plan for the project.
Using two arduinos, each with dedicated purposes.
One to communicate between Visual Studio and the laser and the other to control the laser.

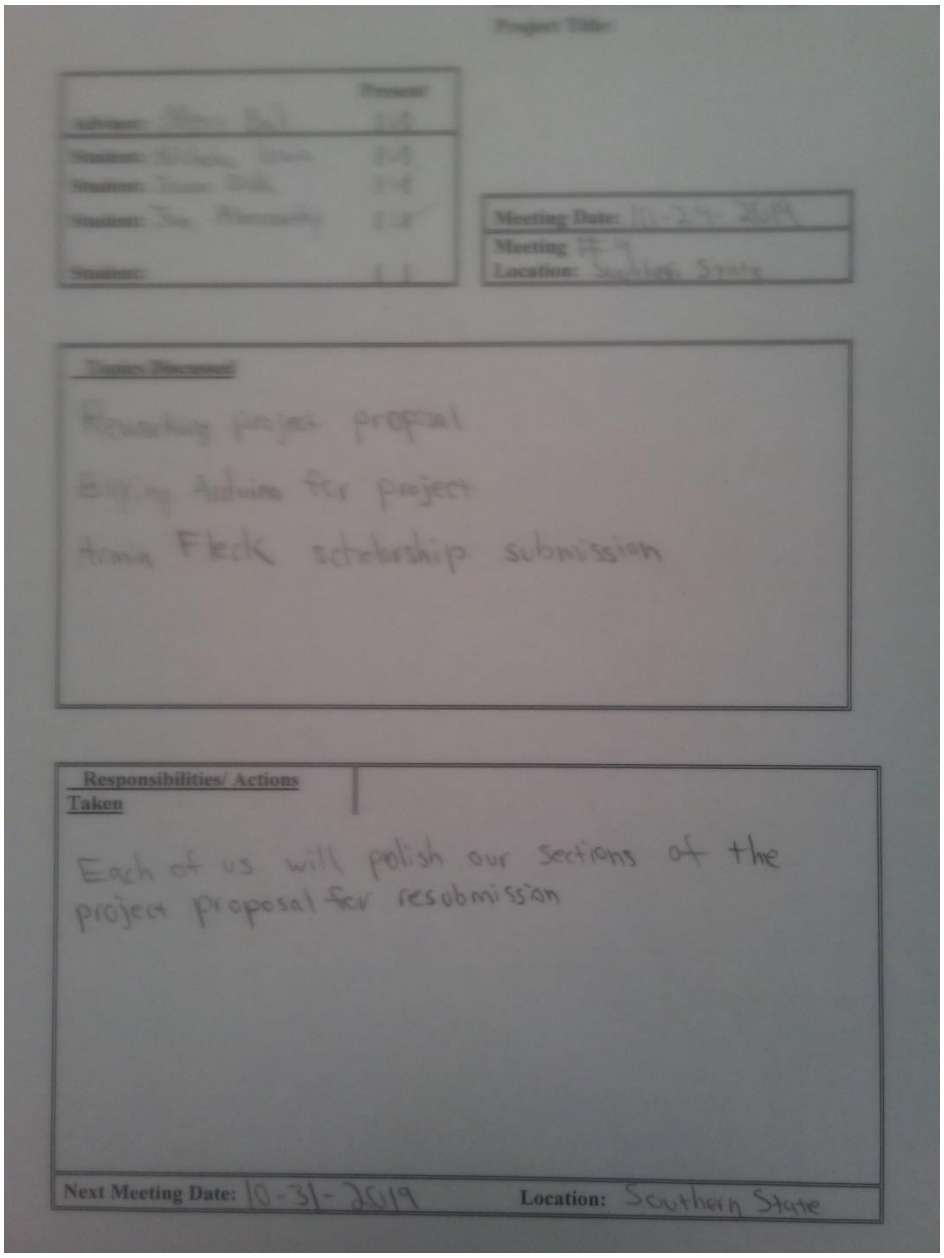
Responsibilities/ Actions Taken

Jason is putting the finishing touches on the Cost analysis.

Jon is finishing the gantt chart.

Nick will begin reaserch and creation of the internet communication program.

Next Meeting Date: 10-24-2019 **Location:** Southern State



Project Title:

	Present
Advisor:	
Student:	
Student:	
Student:	
Student:	

Meeting Date:

Meeting #

Location:

Topics Discussed

Reviewing project proposal

Editing Advice for project

Annie Fleck scholarship submission

Responsibilities/ Actions Taken

Each of us will polish our sections of the project proposal for resubmission

Next Meeting Date: 10-31-2019 Location: Southern State

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Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mary Bal	M
Student: Nicholas Lewis	M
Student: Jonathan Abernathy	M
Student: Jason Dick	M
Student:	

Meeting Date: 10-31-2019
Meeting Location: Southern State

Topics Discussed

Project proposal resubmission
Scholarship plans and requirements.

Responsibilities/ Actions Taken

- Prepare for and submit Armin J Fleck Scholarship

Next Meeting Date: 11-7-2019 **Location:** Southern State

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Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mary Bal	[✓]
Student: Jason Pick	[✓]
Student: Jonathan Abernathy	[✓]
Student: Nicholas Lewis	[✓]
Student:	[ ]

Meeting Date:	11-07-2019
Meeting Location:	Southern State

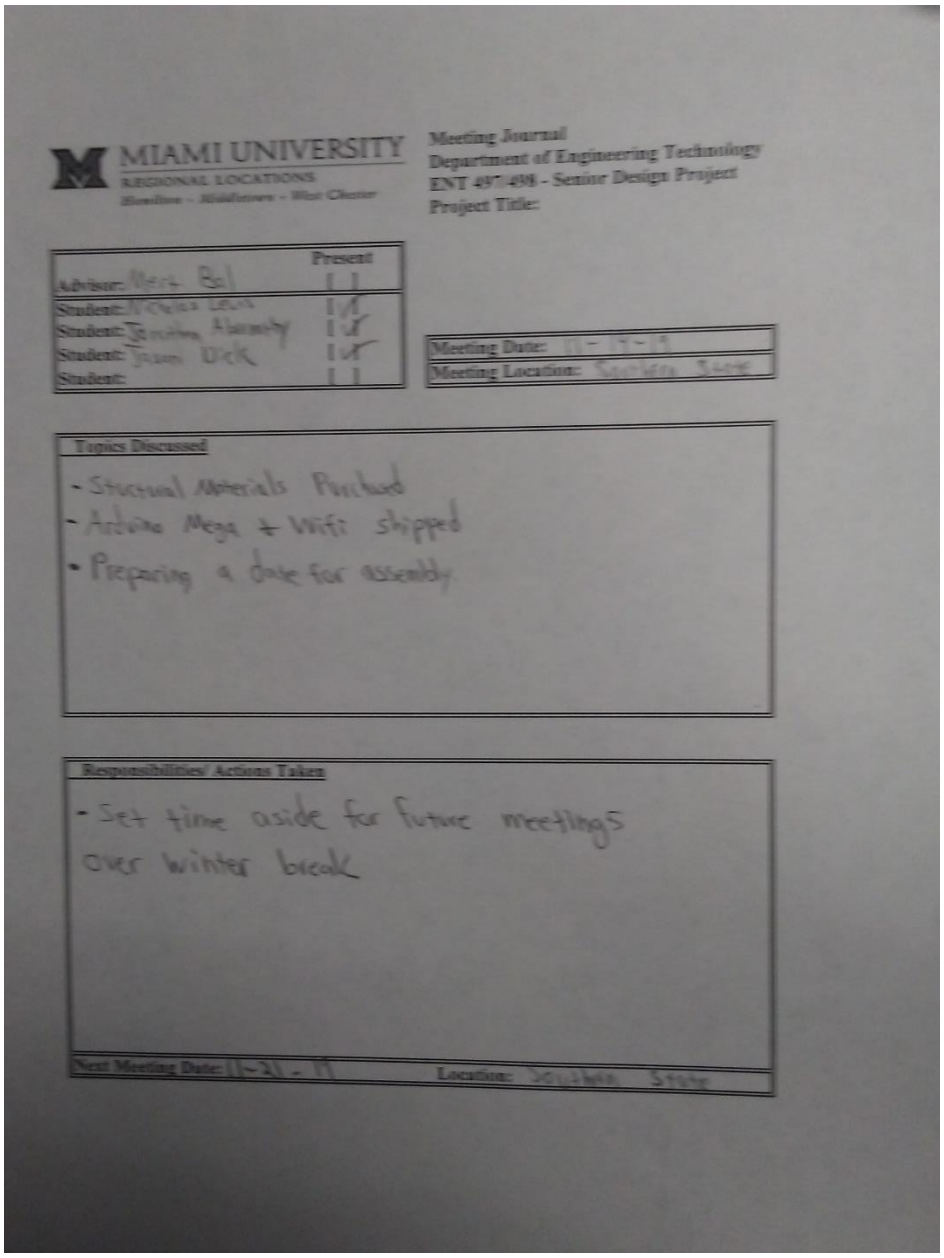
Topics Discussed

+ Scholarship - funds needed for project materials.
* Budget
* Ordering Arduino's today.

Responsibilities/ Actions Taken

* Jason to submit scholarship request. by 11/8/19.

Next Meeting Date: 11-14-2019 **Location:** Southern State



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Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mark Bol	✓
Student: Nicholas Lewis	✓
Student: Jennifer Abernathy	✓
Student: Jason Dick	✓
Student:	

Meeting Date: 11-17-14
Meeting Location: Student Union

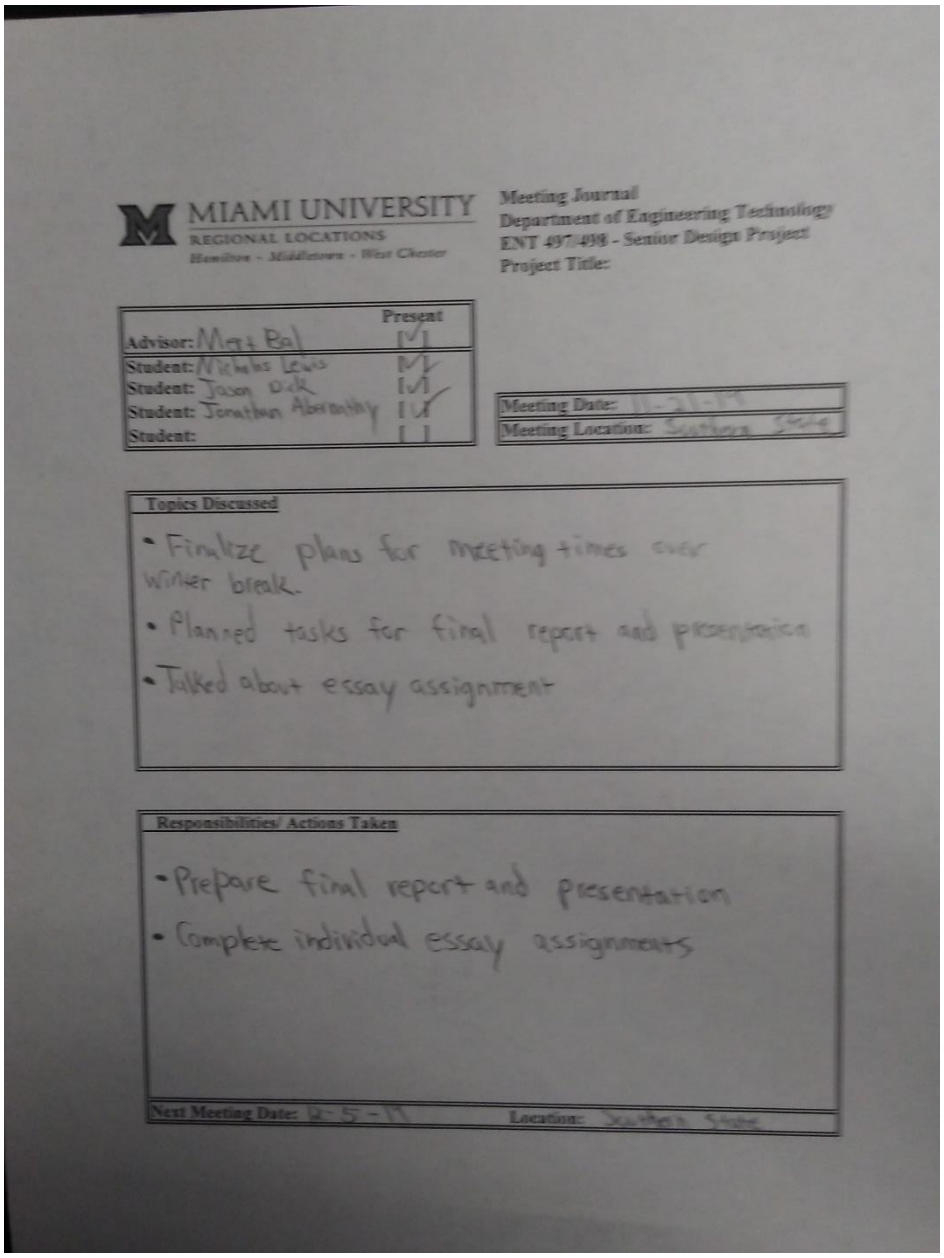
Topics Discussed

- Structural Materials Purchased
- Arduino Mega + Wifi shipped
- Preparing a date for assembly

Responsibilities/ Actions Taken

- Set time aside for future meetings over winter break

Next Meeting Date: 1-21-15 Location: Johnston Study



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Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mary Bal	[M]
Student: Nicholas Lewis	[M]
Student: Jason Dick	[M]
Student: Jonathan Abernathy	[M]
Student:	[ ]

Meeting Date: 11-21-19
Meeting Location: Southern Step

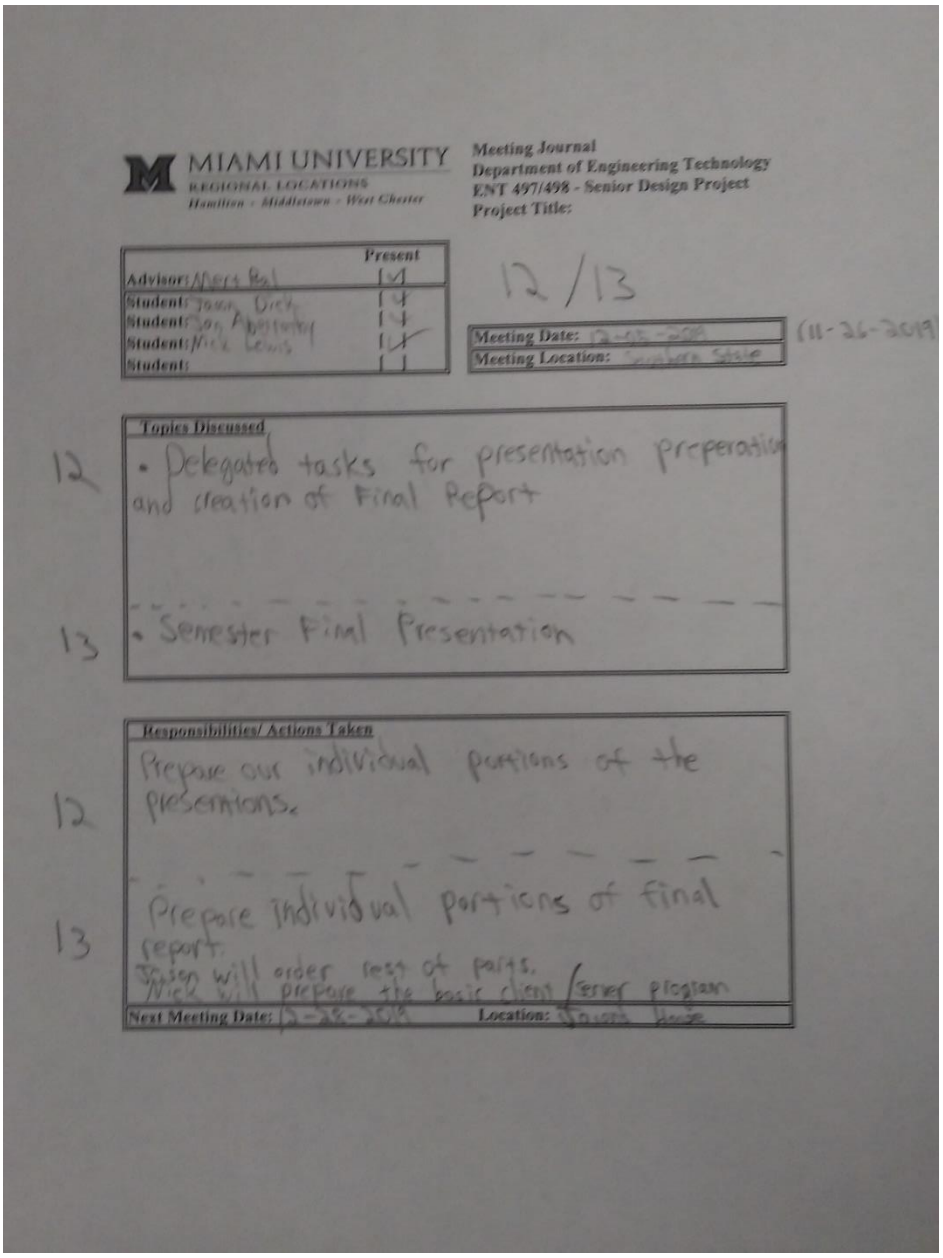
Topics Discussed

- Finalize plans for meeting times over winter break.
- Planned tasks for final report and presentation
- Talked about essay assignment

Responsibilities/ Actions Taken

- Prepare final report and presentation
- Complete individual essay assignments

Next Meeting Date: 12-5-19 Location: Southern Step



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Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mark Rol	✓
Student: Jason Dick	✓
Student: Ian Abernathy	✓
Student: Nick Lewis	✓
Student:	

12/13

Meeting Date: 12-13-2019 (11-26-2019)
Meeting Location: Cincinnati State

Topics Discussed

12 • Delegated tasks for presentation preperation and creation of Final Report

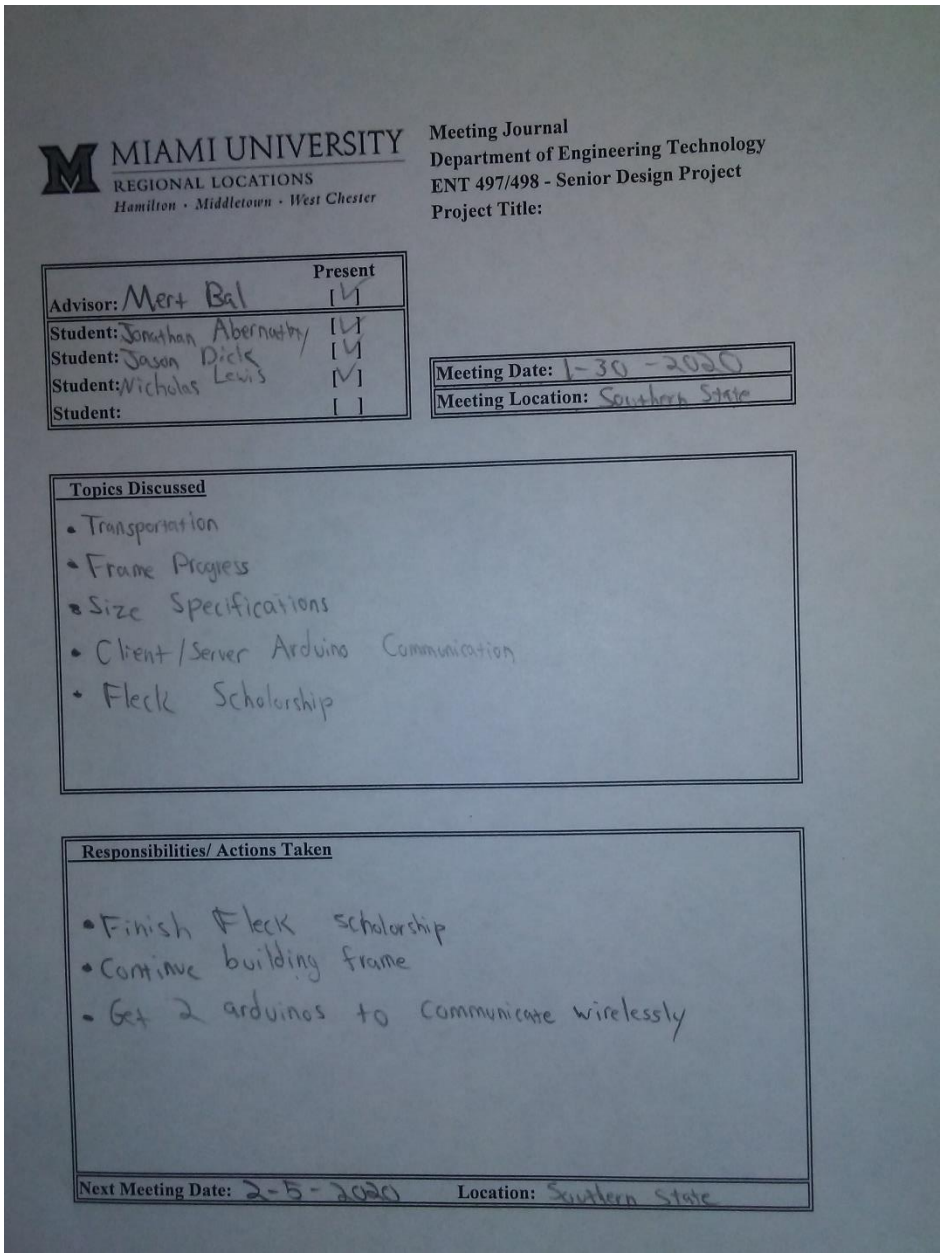
13 • Semester Final Presentation

Responsibilities/ Actions Taken

12 Prepare our individual portions of the presentions.

13 Prepare individual portions of final report.
Jason will order rest of parts.
Nick will prepare the basic client/server program

Next Meeting Date: 1-25-2020 Location: Jason's house



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Meeting Journal
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ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mert Bal	[✓]
Student: Jonathan Abernathy	[✓]
Student: Jason Dicle	[✓]
Student: Nicholas Lewis	[✓]
Student:	[ ]

Meeting Date: 1-30-2020
Meeting Location: Southern State

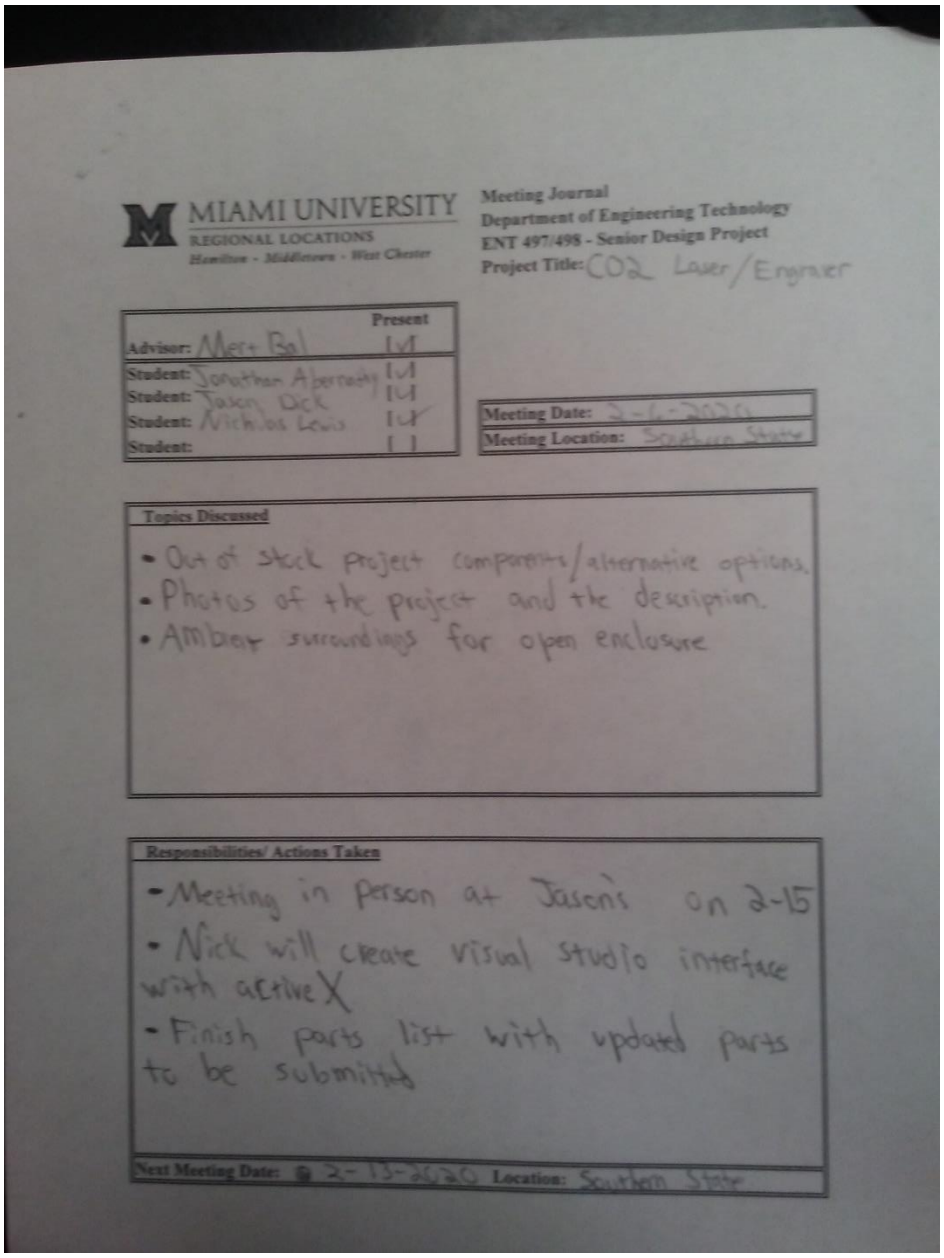
Topics Discussed

- Transportation
- Frame Progress
- Size Specifications
- Client/Server Arduino Communication
- Fleck Scholarship

Responsibilities/ Actions Taken

- Finish Fleck scholarship
- Continue building frame
- Get 2 arduinos to communicate wirelessly

Next Meeting Date: 2-5-2020 **Location:** Southern State



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Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title: CO2 Laser/Engraver

	Present
Advisor: Mert Bal	
Student: Jonathan Abernathy	
Student: Jason Dick	
Student: Nicholas Lewis	
Student:	

Meeting Date: 2-6-2020
Meeting Location: Southern State

Topics Discussed

- Out of stock project components/alternative options.
- Photos of the project and the description.
- Ambient surroundings for open enclosure

Responsibilities/ Actions Taken

- Meeting in person at Jason's on 2-15
- Nick will create visual studio interface with active X
- Finish parts list with updated parts to be submitted

Next Meeting Date: @ 2-13-2020 **Location:** Southern State

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ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mert Bal	[✓]
Student: Nicholas Lewis	[✓]
Student: Jason Dick	[✓]
Student: Jonathan Abernathy	[✓]
Student:	[ ]

Meeting Date: 2-13-20
Meeting Location: Southern State

Topics Discussed

- Out of stock parts from order list
- Shipping must come to Miami first
  - ★ Pick up from Miami or Ship to us?

Responsibilities/ Actions Taken

- Meeting Saturday
- Progress Pictures

Next Meeting Date: 2-20-20 **Location:** Southern State

MIAMI UNIVERSITY
REGIONAL LOCATIONS
Hamilton · Middletown · West Chester

Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title: CO2 Laser Cutter/Engrave

	Present
Advisor: Mert Bal	[✓]
Student: Jonathan Abernathy	[✓]
Student: Jason Dick	[✓]
Student: Nicholas Lewis	[✓]
Student:	[ ]

Meeting Date: 2-20-20
Meeting Location: Southern State

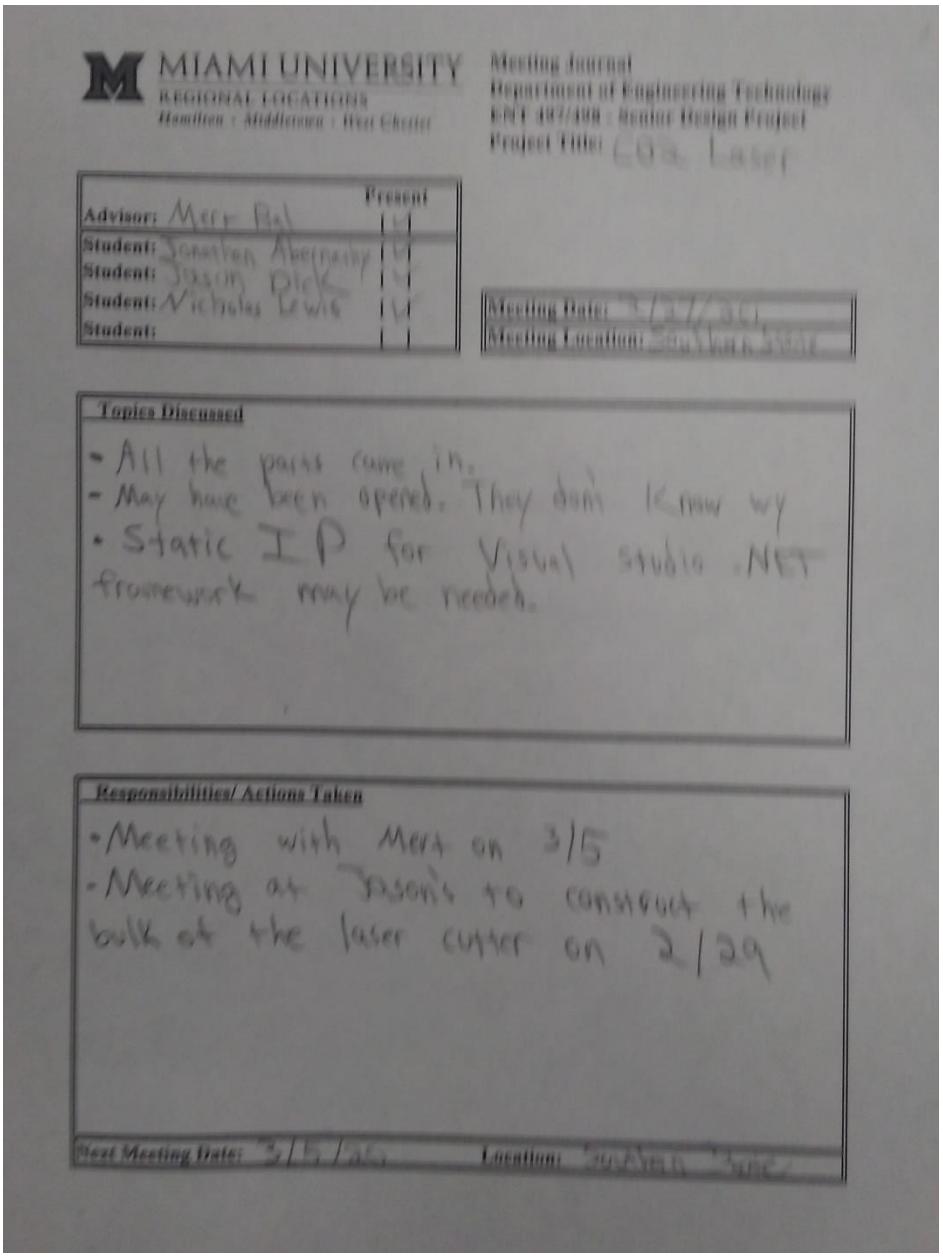
Topics Discussed

* Continuing the assembly process.
* Discussed an alternate component to one that would arrive too late.

Responsibilities/ Actions Taken

Coordinated with Mert to pick up components that arrived to Miami. Jason + Nick to pick up by noon 2/21/20. Assembly process to resume once we have components in-hand.

Next Meeting Date: 2-27-20 **Location:** Southern State



MIAMI UNIVERSITY
REGIONAL LOCATIONS
Hamilton : Middletown : West Chester

Meeting Journal
Department of Engineering Technology
EET 487/488 : Senior Design Project
Project Title: CO2 Laser

	Present
Advisor: Mert Bal	
Student: Jonathan Abernathy	
Student: Jason Dick	
Student: Nicholas Lewis	
Student:	

Meeting Date: 3/27/2015
Meeting Location: Southwest Suite

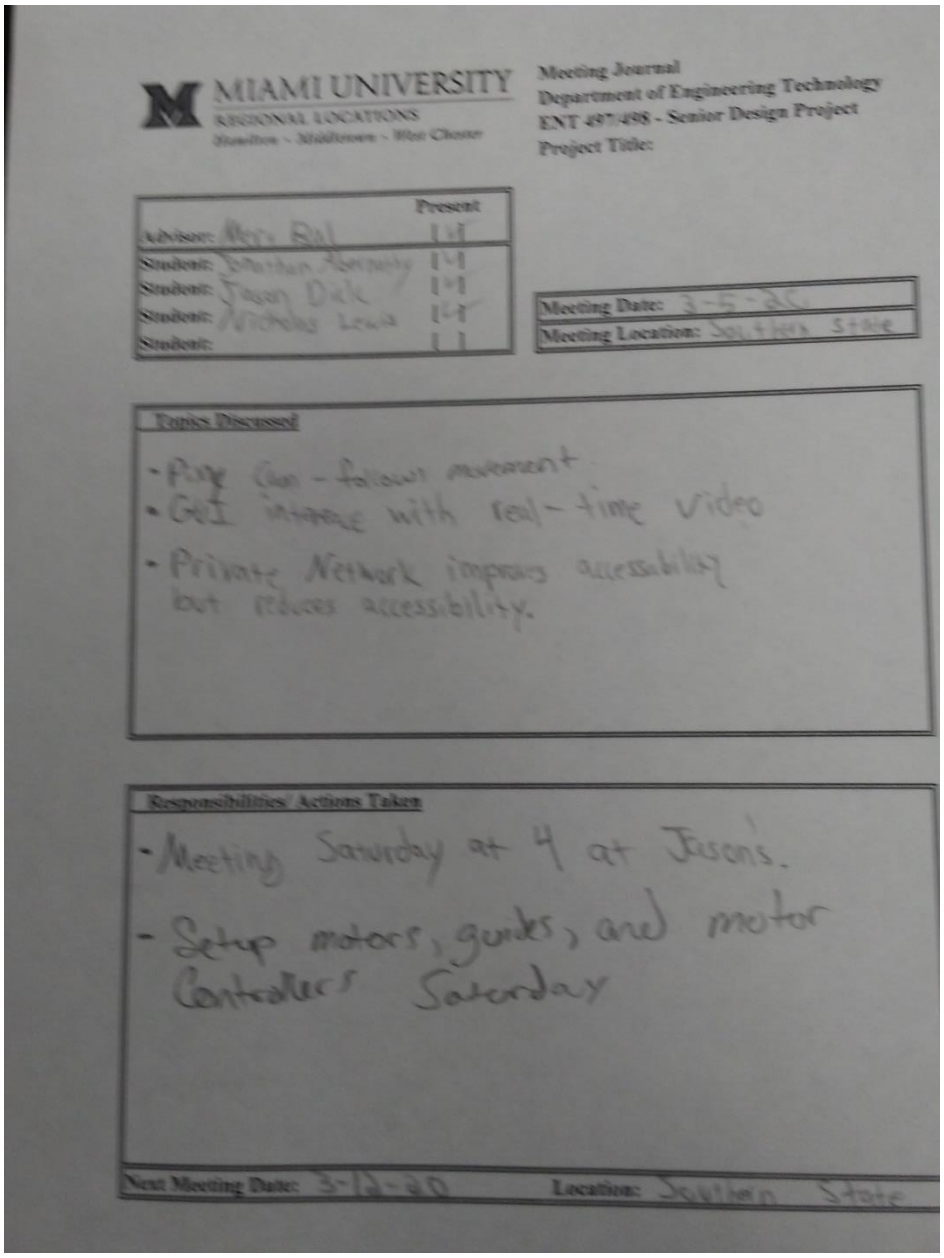
Topics Discussed

- All the parts came in.
- May have been opened. They don't know why
- Static IP for Visual Studio .NET framework may be needed.

Responsibilities/ Actions Taken

- Meeting with Mert on 3/5
- Meeting at Jason's to construct the bulk of the laser cutter on 2/29

Next Meeting Date: 3/15/2015 Location: Southwest Suite



MIAMI UNIVERSITY
REGIONAL LOCATIONS
Hamilton · Middletown · West Chester

Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mary Bal	LM
Student: Jonathan Abernathy	LM
Student: Jason Dick	LM
Student: Nicholas Lewis	LM
Student:	

Meeting Date: 3-5-20
Meeting Location: Southern State

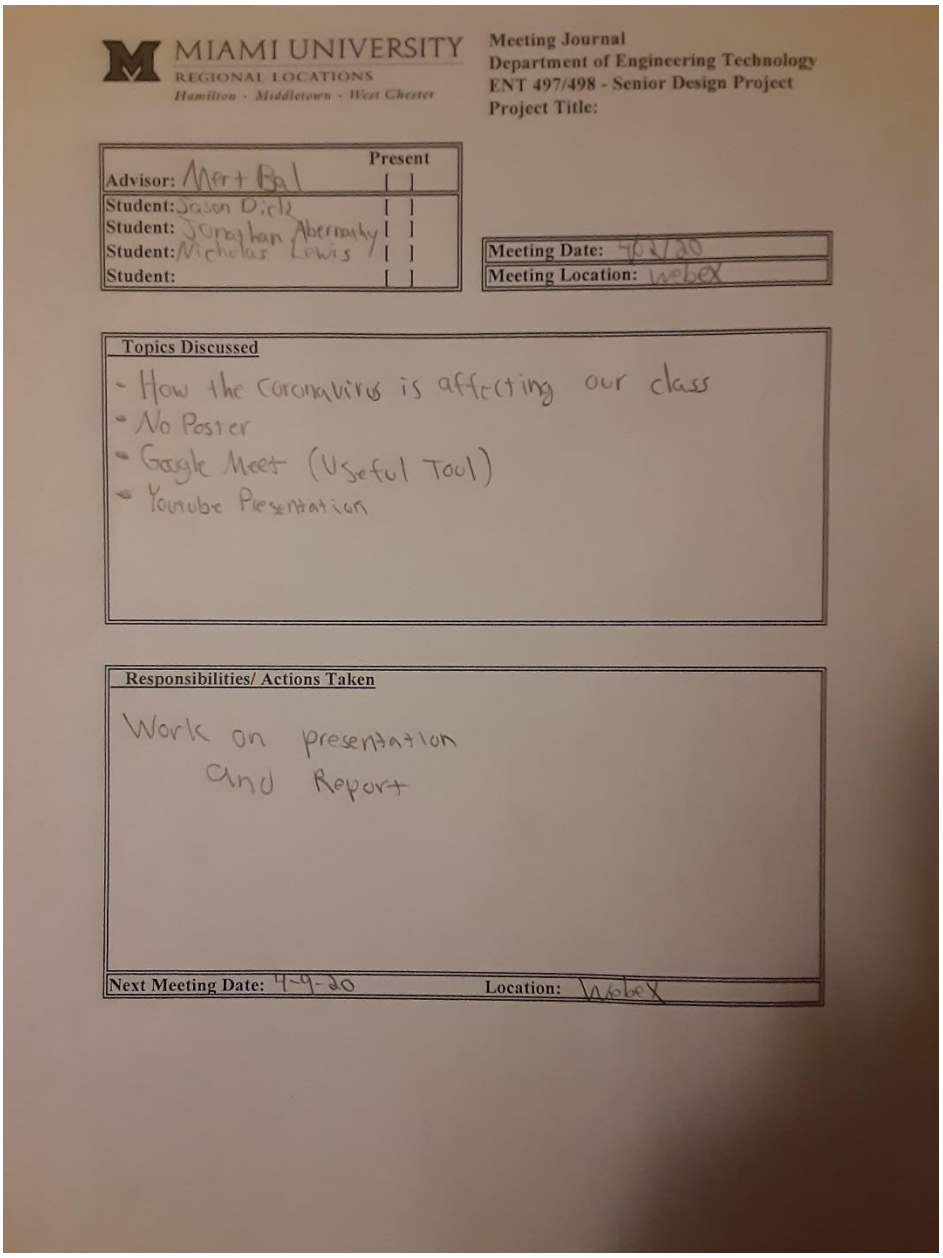
Topics Discussed

- Ping Gun - follow movement
- GUI interface with real-time video
- Private Network improves accessibility but reduces accessibility.

Responsibilities/ Actions Taken

- Meeting Saturday at 4 at Jason's.
- Setup motors, guides, and motor Controllers Saturday

Next Meeting Date: 3-12-20 Location: Southern State



MIAMI UNIVERSITY
REGIONAL LOCATIONS
Hamilton · Middletown · West Chester

Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mert Bal	[ ]
Student: Jason Dirr	[ ]
Student: Jonathan Abernathy	[ ]
Student: Nicholas Lewis	[ ]
Student:	[ ]

Meeting Date: 4/2/20
Meeting Location: WebEx

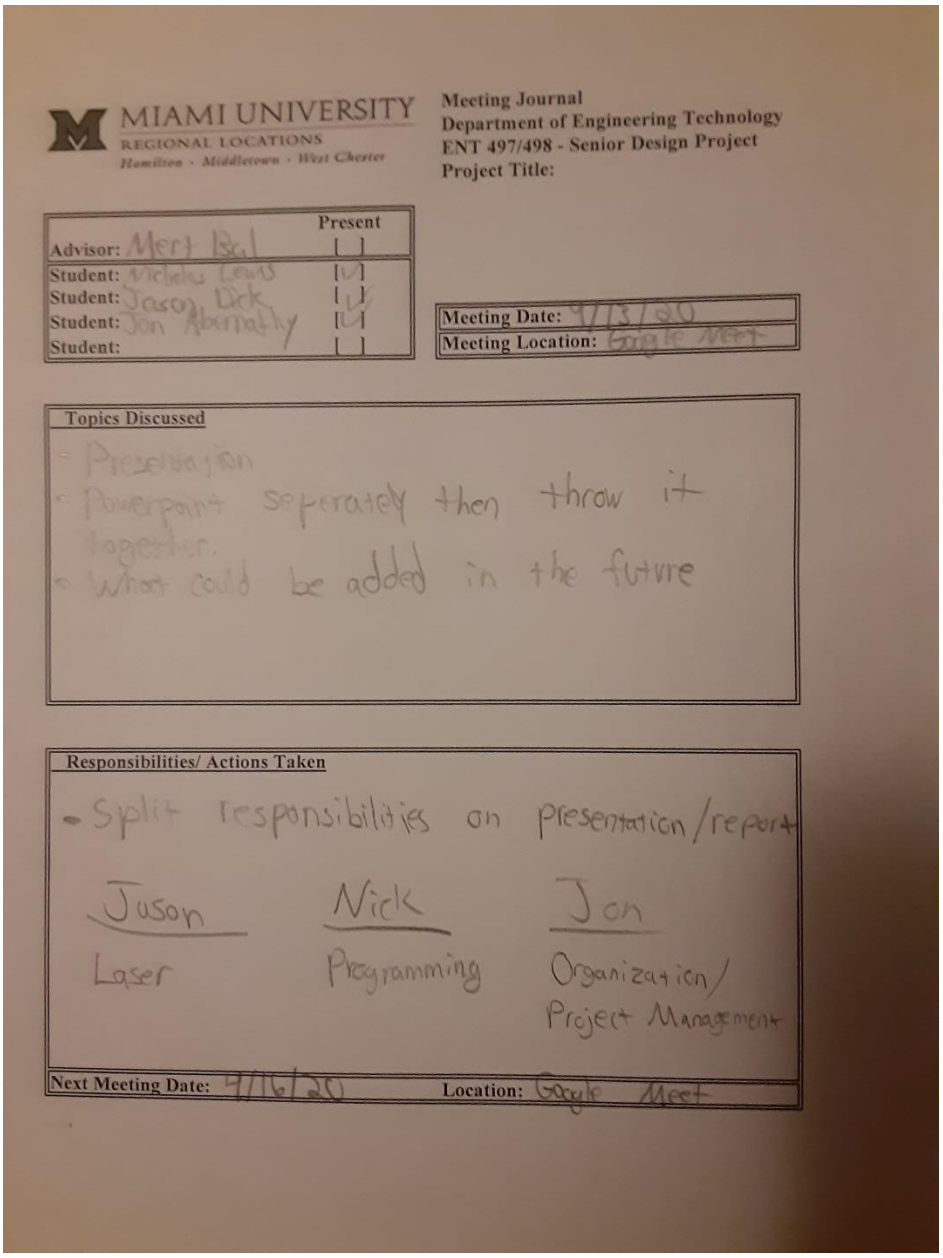
Topics Discussed

- How the Coronavirus is affecting our class
- No Poster
- Google Meet (Useful Tool)
- Youtube Presentation

Responsibilities/ Actions Taken

Work on presentation and Report

Next Meeting Date: 4-9-20 **Location:** WebEx



MIAMI UNIVERSITY
REGIONAL LOCATIONS
Hamilton · Middletown · West Chester

Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mert Bal	[ ]
Student: Nicholas Lewis	[V]
Student: Jason Dick	[V]
Student: Jon Abernathy	[V]
Student:	[ ]

Meeting Date: 9/13/20
Meeting Location: Google Meet

Topics Discussed

- Presentation
- Powerpoint seperately then throw it together.
- What could be added in the future

Responsibilities/ Actions Taken

- Split responsibilities on presentation/report

Jason	Nick	Jon
Laser	Programming	Organization/ Project Management

Next Meeting Date: 9/16/20 Location: Google Meet

MIAMI UNIVERSITY
REGIONAL LOCATIONS
Hamilton · Middletown · West Chester

Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

		Present
Advisor:	Mert Bal	[V]
Student:	Nicholas Lewis	[V]
Student:	Jonathan Abernathy	[V]
Student:	Jason Dick	[V]
Student:		[ ]

Meeting Date: Webex
Meeting Location: 4/16/20

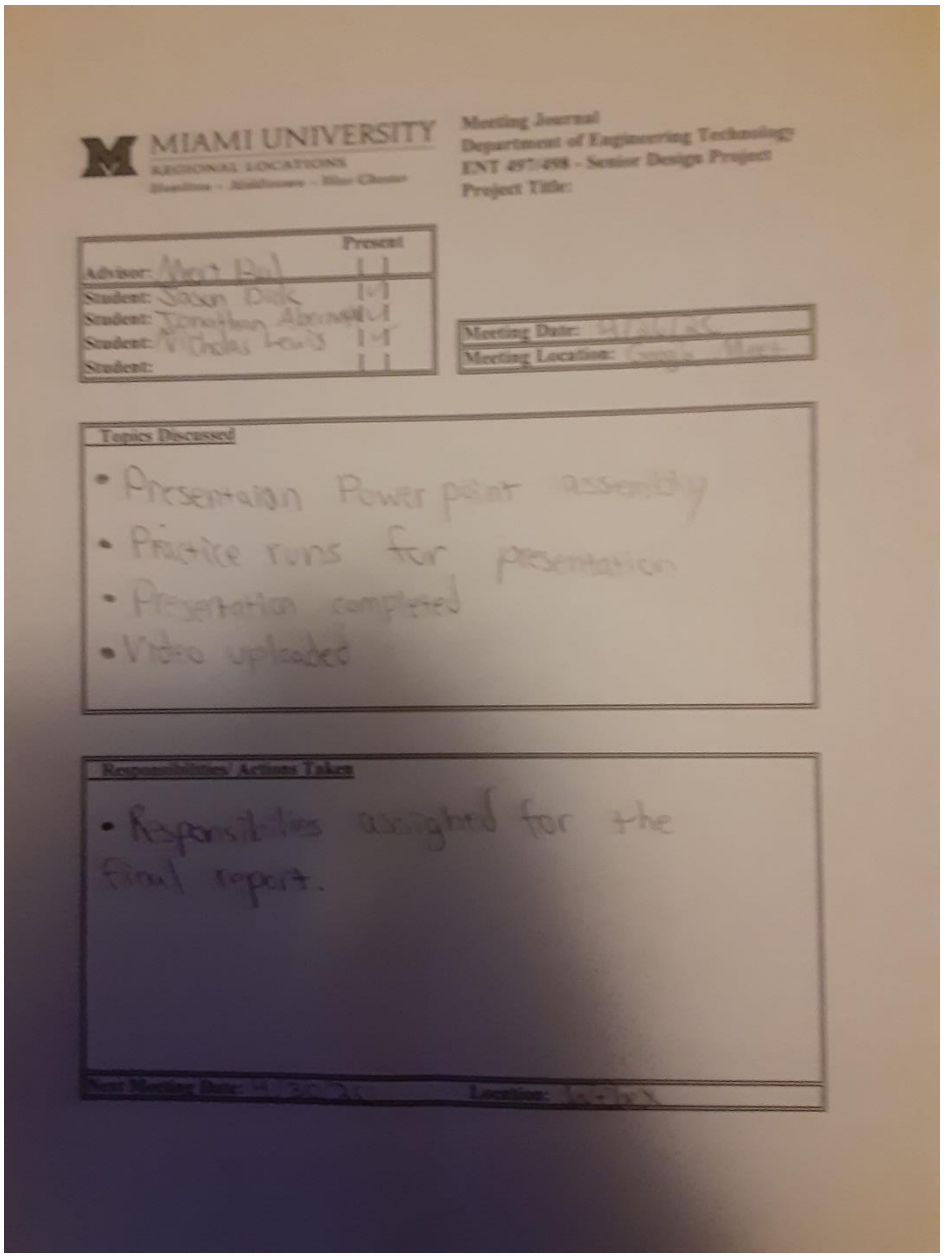
Topics Discussed

- Google meet for youtube upload of presentation
- Submit as unlisted
- Group Meeting with Mert for the whole presentation - instead of splitting it up.

Responsibilities/ Actions Taken

- Meeting on Sunday

Next Meeting Date: 4/23/20 **Location:** Webex



MIAMI UNIVERSITY
REGIONAL LOCATIONS
Hamilton - Middletown - Blue Chip

Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mark Bail	
Student: Jason Dick	
Student: Jonathan Abrams	
Student: Nicholas Lewis	
Student:	

Meeting Date:
Meeting Location:

Topics Discussed

- Presentation Powerpoint assembly
- Practice runs for presentation
- Presentation completed
- Video uploaded

Responsibilities/ Actions Taken

- Responsibilities assigned for the final report.

Next Meeting Date: Location:

MIAMI UNIVERSITY
REGIONAL LOCATIONS
Hamilton · Middletown · West Chester

Meeting Journal
Department of Engineering Technology
ENT 497/498 - Senior Design Project
Project Title:

	Present
Advisor: Mert Bal	[✓]
Student: Jason Dick	[✓]
Student: Jonathan Abernathy	[✓]
Student: Nicholas Lewis	[✓]
Student:	[ ]

Meeting Date: 4-30-20
Meeting Location: Webex

Topics Discussed

- Media release forms
- Report needs added to Miami library

Responsibilities/ Actions Taken

- Finish final report
- Reflective Essays

Next Meeting Date: N/A **Location:** N/A