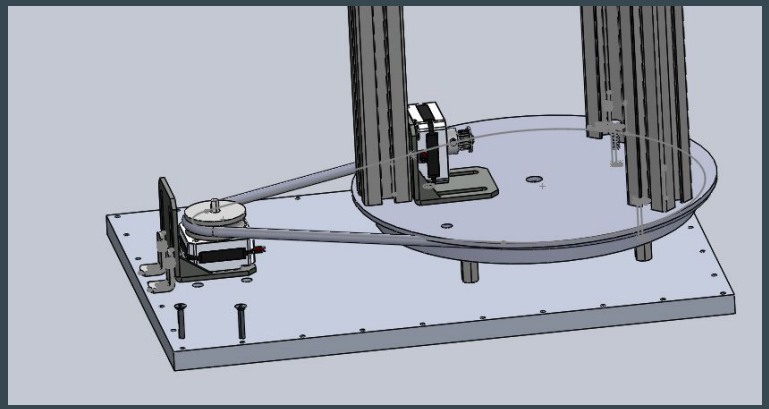
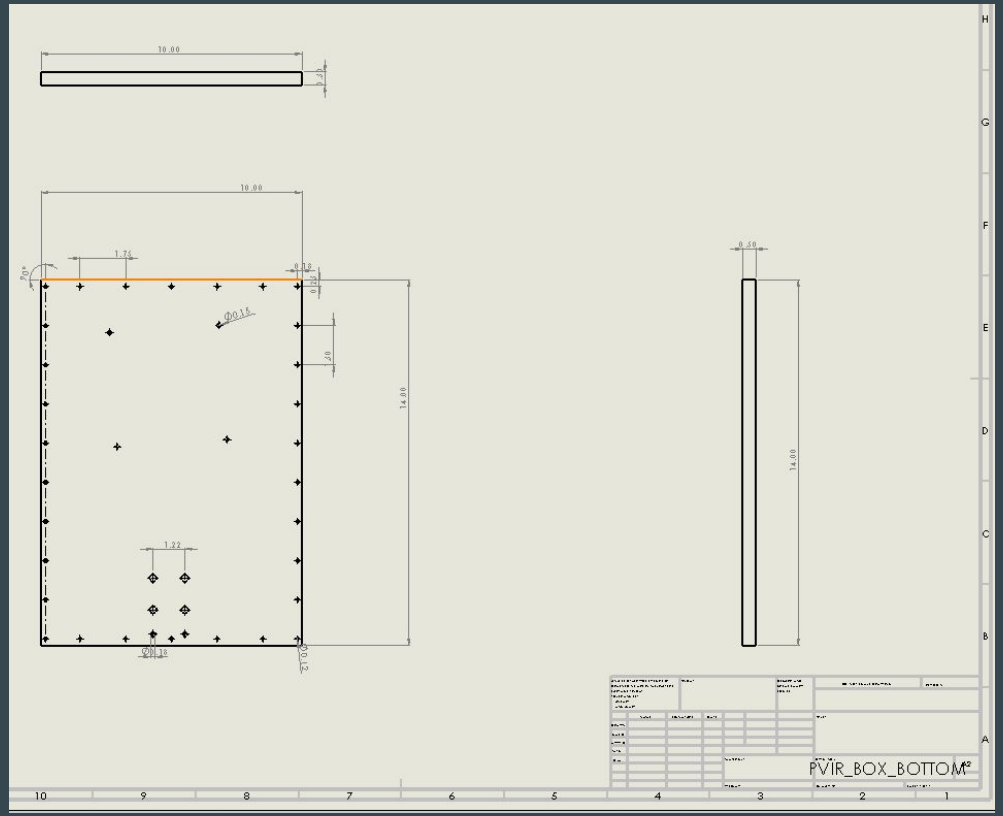
Weekly Updates - 3/12/19

Team P.V.I.R
Advisor: Lukas Graber
Team Members: Stephanie Chan, Elizabeth Fuller, Adrian Munoz
Nelson Raphael, and Lemek Robinson

Mechanical Arm Design Updates

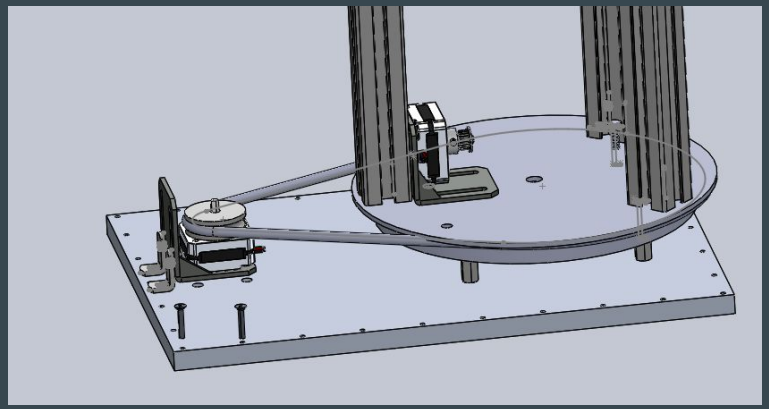
https://drive.google.com/open?id=12kyc1t7l-Hxcr3GuNBSXRet5F27PB_2H




10.00
10.00
1.75
70°
Ø0.15
2.0
14.00
1.22
Ø0.18
0.50
14.00
PVIR_BOX_BOTTOM
10
9
8
7
6
5
4
3
2
1
H
G
F
E
D
C
B
A

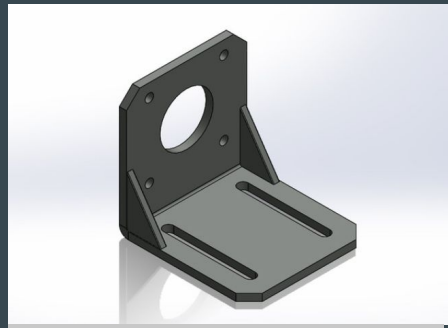
Mechanical Arm Design Updates

https://drive.google.com/open?id=12kyc1t7l-Hxcr3GuNBSXRet5F27PB_2H



Mechanical Arm Design Updates

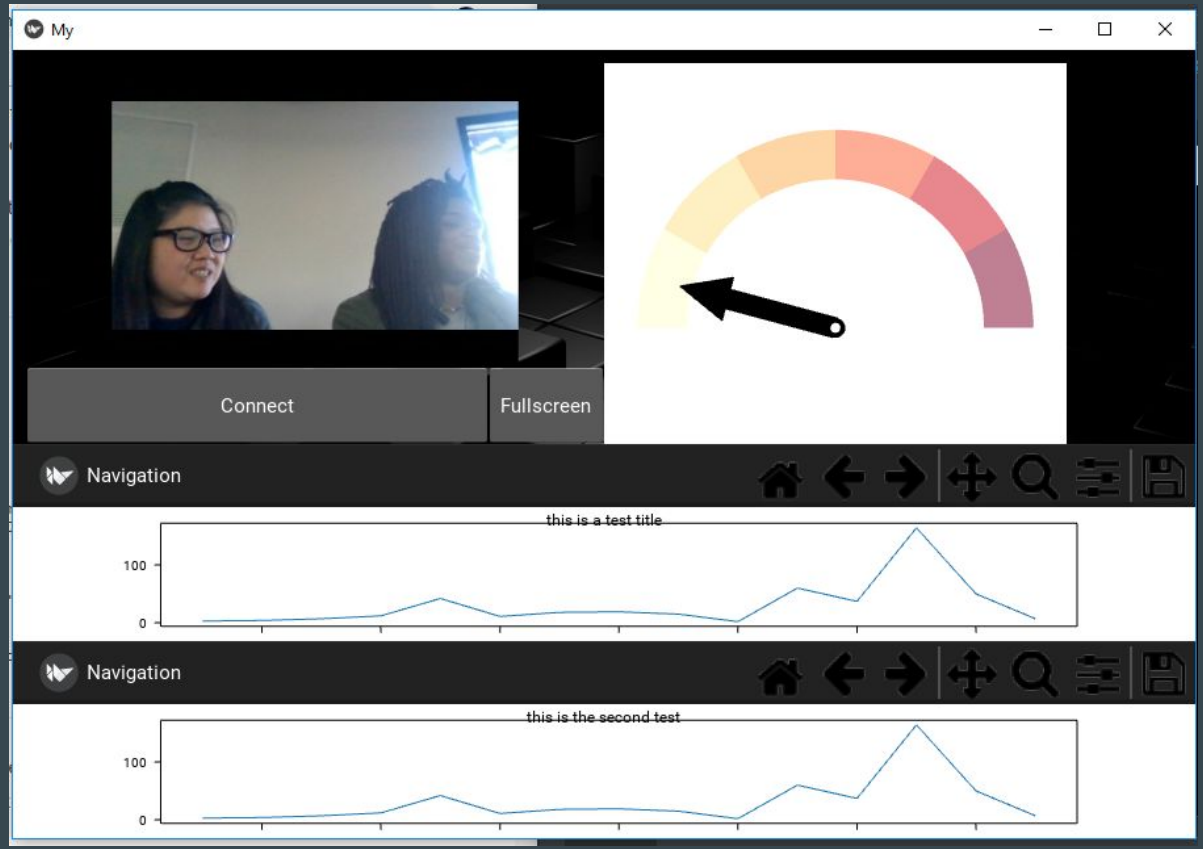
- DXF files are complete and ready for aluminum plates
  - Once plates are here, holes with slightly smaller holes than actual diameter of screws will be made to plates for accurate placement of screws
  - Holes will be threaded using tap screws from either the invention studio or the HIVE.
- Nema motor mounts were 3D printed for both motors, as well as, a case for the raspberry pi
-



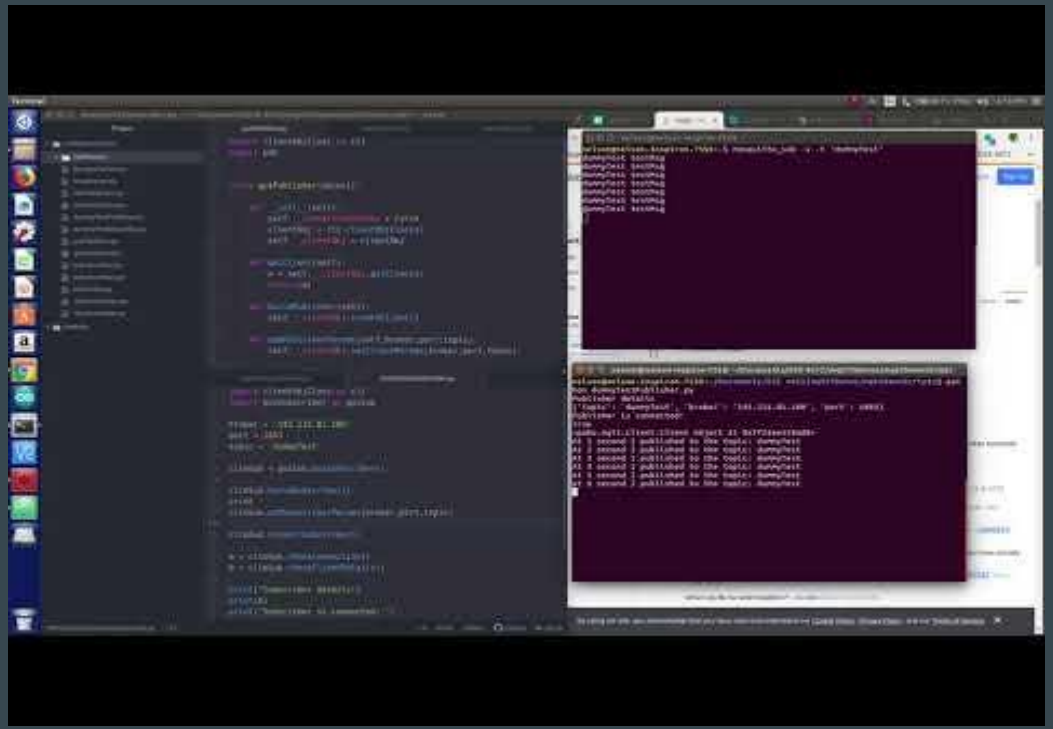
GUI Update

Working Aspects:

- Live Streaming
- Log-in window functions
  - Error messages
  - Allows Log-in
- Live Line Plot working
- Fullscreen camera
- Gauge Graphic



MQTT Communication



- Created 3 classes
  - One creates the publisher
  - One creates the subscriber
  - One handles the client directly
- 75% done
  - Successfully publishes to the subscribed topic
  - Subscriber class does not print
- Software Diagram
  - 50% done
  - Overhaul after change in design

Website Update

- Expanded on the documents page
  - Will hold the following:
    - Design notebooks
    - Finished proposal
    - Weekly slides
    - Software tutorials
    - Video testing
- Populating the website with more experiment images and milestones

Control System Design - TO DO : Testing to fill in details

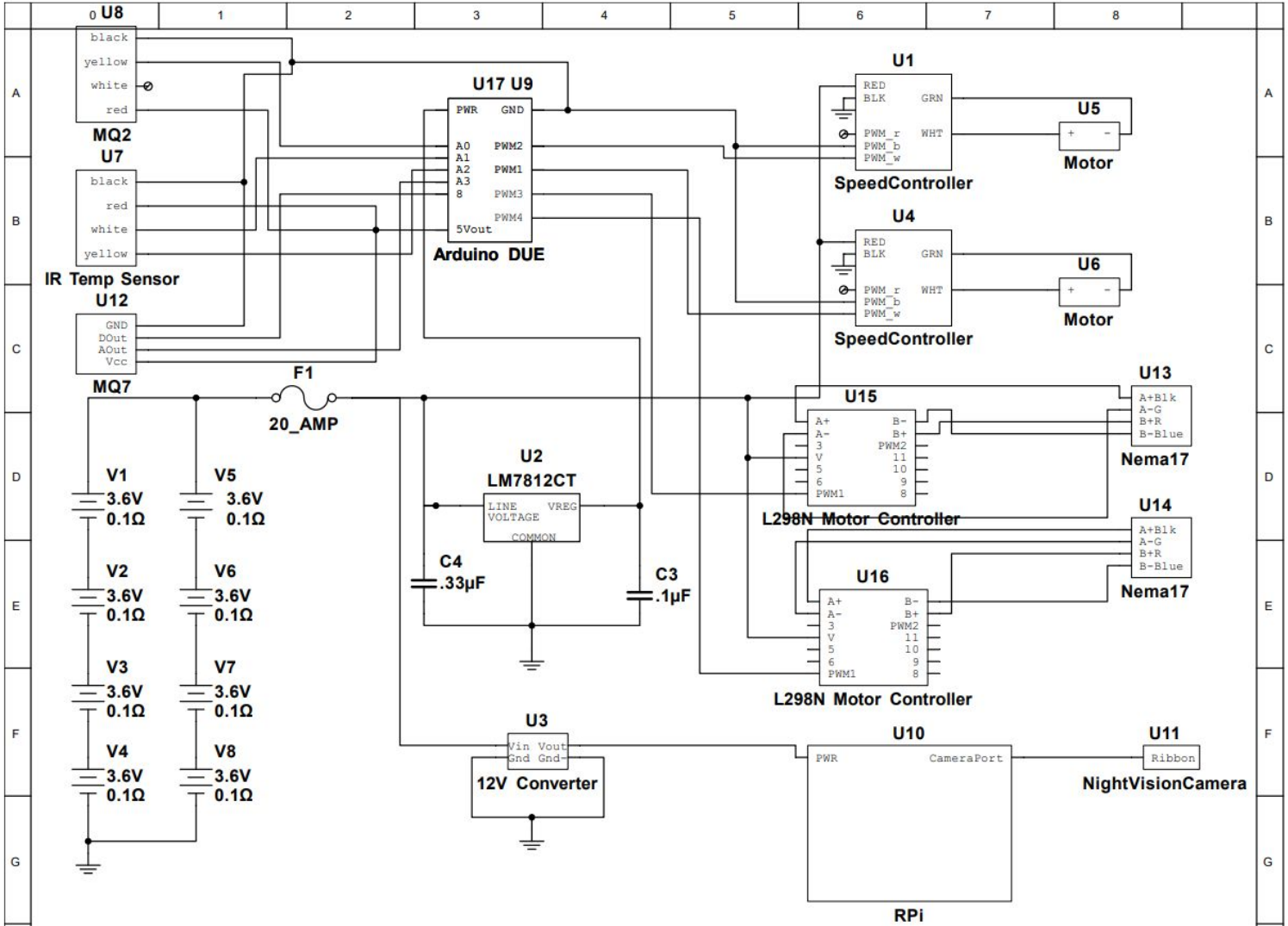
	Control Feature	Implementation	Details
Motor Control	Right Motor Forward	PWM Signal Value: 195	Motors are controlled individually; 185 is the neutral value for PWM;
	Right Motor Reverse	PWM Signal Value: 175	
	Left Motor Forward	PWM Signal Value: 195	
	Left Motor Reverse	PWM Signal Value: 175	
Speed Control Mode	Crawling Mode	PWM signals will not exceed 5%	need to calculate max speed robot can handle without exceeding 20 Amps
	Speed Mode	PWM signals can exceed 5%	
Stepper Motors	Stepper Motor Turn		
	Stepper Motor Lift		
Default Position	Resets All Controls	setting values to start up values	motors stop; crawling mode; Stepper motors: front facing and lowered

Arduino Sensor Code Links

- Sensor Data (from analog inputs)
  - IR Temp Sensor - (http://wiki.seeedstudio.com/Grove-Infrared_Temperature_Sensor/)
  - MQ2 Gas Sensor - (https://www.hackster.io/karimmufte/arduino-and-mq2-gas-sensor-57f98c)
  - CO Sensor - (http://www.learningaboutelectronics.com/Articles/MQ-7-carbon-monoxide-sensor-circuit-with-arduino.php)
    - To test functionality of CO sensor need to place near an exhaust pipe

Schematic Updates

- Added Stepper Motor Controllers, Nema17 and MQ7 CO sensor
- Looking to convert schematic over to Simulink in Matlab



Order Status

The following parts have been ordered:

- 2 Grove MQ2 Gas Sensor ($7.53)
- 2 Grove Infrared Temperature Sensor ($9.90)
- 1 30pcs Protoboard set ($10.85)
- 1 130pcs Jumper Wire Kit ($7.89)
- 1 3pcs Solderless Breadboard ($7.99)
- 1 Arduino DUE board ($37.40)
- 1 Waveshare RPi Camera F Module ($25.99)
- 1 Sandisk 32gb micro SD card ($8.90)
- 2 Parallax Carbon Monoxide Sensor ($5.99)

Order 1 Total: $145.86

- 8 Samsung 30T 21700 Battery ($7.99)
- 2 EFAN 4 Channel Battery Charger ($9.97)
- 4 21700 Battery Tray ($5.25)
- 1 10ft Ethernet Cable ($5.99)
- 1 8” Aluminum Lazy Susan ($17.00)
- 1 USB Breakaway cable for Xbox 360 ($3.99)
- 1 6061 Aluminum plate 12” x 12” , ¼” thick ($47.11)
- 1 6061 Aluminum plate 12” x 24”, ⅛” thick ($43.12)

Order 2 Total: $220.07

- 1 Test Pressure Gauge (2-½”)($1.61)
- 1 General Purpose Pressure Gauge (2-½”) ($3.59)
- 1 Liquid Filled Pressure Gauge (2-½”) ($4.85)
- 1 Xbox 360 Controller, Wired USB controller ($16.99)
- 4 T-slot sliders ($5.50)
- 3 30mm x 30mm T-slotted profile 6ft ($19.23)
- Timing Belt Kit (Includes timing belt, pulleys, tension spring, clamp mount) ($12.99)
- 5 Zinc-plated steel corner bracket 2” x 2” ($0.92) (Note: Steinberg also ordered the item from the additional link which costs $9.99 for 16 L-brackets)
- 1 6061 Aluminum plate 12” x 12”, ¼” thick ($43.12)

Order 3 Total: $167.44 (Note: The additional $9.99 was NOT included in this calculation)

Items on Final Order

- 2 Nema Stepper Motors
- 1 ¼” diameter round belt
- 1 pulley for round belt
- 1 6061 Aluminum Sheet 1/8" Thick, 12" x 12"
- 4 Zinc-Plated Steel Corner Bracket, 5/8" x 1" x 1/2"
- 1 Foamular board (For testing environment) 4’ x 8’
- Waterproof DC/DC 12V Step Down to 5V 3A 15W Voltage Buck Converter
- Zinc-Galvanized Low-Carbon Steel Rod (3ft)
- AutoEC 20A Inline ATC ATO Waterproof Fuse Holder (1 Set)
- GiBot Cable Glands - 25 Pack Plastic Waterproof 3.5-13mm Cable Glands Joints Wire Protectors
- 304 Stainless Steel Screw and Nut 515pcs, M3 M4 M5 Metric Socket Head Bolt and Nut
- Male-Female Threaded Hex Standoff
- 10-32 x 1-1/2" Hex Head Cap Screw Bolts, External Hex Drive, Stainless Steel 18-8, Full Thread, Bright Finish, Flat Point
- 6061 Aluminum ½” thick x 10 inch wide - 2ft
- Qunqi L298N Drive controller board DC stepper
- Spiral-coiled ethernet cable (2ft-9ft)
- #6-40 x ¾” flat head screw
- #6-40 Tap

Total: $311.34

Budget Update

Order 1 Total: $145.86
Order 2 Total: $222.07
Order 3 Total: $167.44
Order 4 Total: 311.34

Grand Total: $ $846.71
Remaining Budget: -$346.71
(Again, note: additional $9.99 was not included in this calculation)

Items to be Discussed

- Task Status: Arm CAD design, Sensor Package Schematic, Control System Design
- Action Items for the week
- Concern: RPi - Arduino Serial Connection: are there pins that can be used or will we need to strip a micro usb cord?
  - 4 connections in cord puts us over the 8 connection limit in an ethernet cord
    - Current 8 connections: 5 analog from the 3 sensors; RPi Power (off GPIO pin?) ; 5V sensor Power; GND
  - Possible to make our own “coiled wire” (https://www.instructables.com/id/Make-Coiled-Wire/)

Design Notebook Information

ECE4012 Tentative Deliverables

Assignment	Student Deliverables Due Dates
.	
Confirm Project Groups Identify Your Group Leader & Web Master	ASAP
Proposal & Presentation Planning: Meet with & Review Advisor Feedback	Week 1
Progress Report Emails	Initially ASAP then Weekly before Wednesday beginning Week 2
.	
Oral Proposal Presentation	Before the end of Week 2
Submit any Revised Proposal	Before the end of Week 2
Project Summary: Revised to Advisor	Before the end of Week 2
.	
Start Purchasing & Building...	After Advisor approves Proposal documents
.	
Initial Web Site Posting including ECE4011 TRPs, Written Proposal, Proposal Presentation, Project Summary, ...	One week after notification from lecture instructor of web ... availability
.	
Design Notebooks	Before March 15 Friday
.	
Spring Break	March 18-22
.	
Design Notebooks	Before April 25 Thursday
.	
Final Presentation	As specified by Advisor, often at Expo
Capstone Design Expo	Probably April 23 Tuesday ~4-8pm
Final Project Demonstration	Before May 2 Thursday, see your Advisor for details
Final Project Report: doc pdf	Before May 2 Thursday, on your web site
Final Project Summary	Before May 2 Thursday, on your web site
Completed Web Site	Before May 2 Thursday
.	
Teamwork & Professionalism	Always

Design Notebooks

ECE4012 Design Notebook Grading

There are two Design Notebook submissions for grading this semester.

Details for submitting online will be provided shortly prior to the assignment due dates..

Design Notebook discussion

Project Notebook Grading Rubric

Points		
3		Each page is numbered, dated and signed
1		The notebook does not have removable pages
1		All blank pages/areas are marked Intentionally Left Blank
4		Your name, projects name, contact info, and team members contact info are recorded on the cover or inside of the cover
1		All Notebook entries are in chronological order
1	11	All notebook entries are in ink, i.e., no pencil entries allowed
3		Record team meetings dates, those present, and meeting highlights
2		Detailed meeting notes (if project has software component this includes documenting coding progress and source code locations)
1		Document information resources accessed (websites, books, scientific papers, professors, industry professionals, etc...)
3		Record design ideas in the form of block diagrams, sketches, etc.
3	12	Documentation of Engineering Results and Data (test plans, raw data, analysis and discussion of results)
2		Generate to-do items and place a box in the left hand margin ahead of listed item
3		Include check boxes for your and your team's and list individual responsibilities and deadlines
1		Check off to-do items when they are completed and write in completion date
1	7	To-do items should run chronologically through the notebook as your design work progresses
3	3	Professionalism (general organization, neatness, professional language)
33		Total