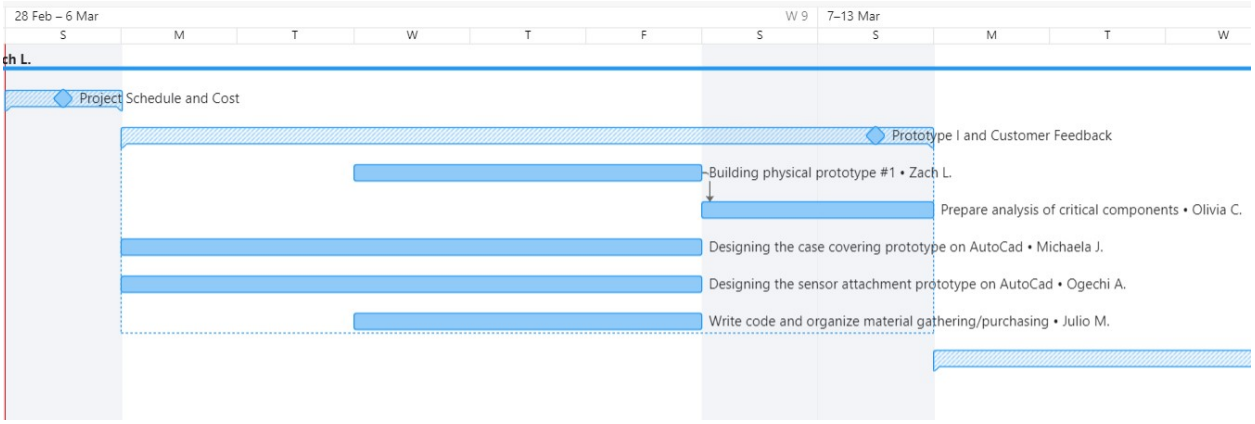
Project Deliverable E: Project Schedule & Cost

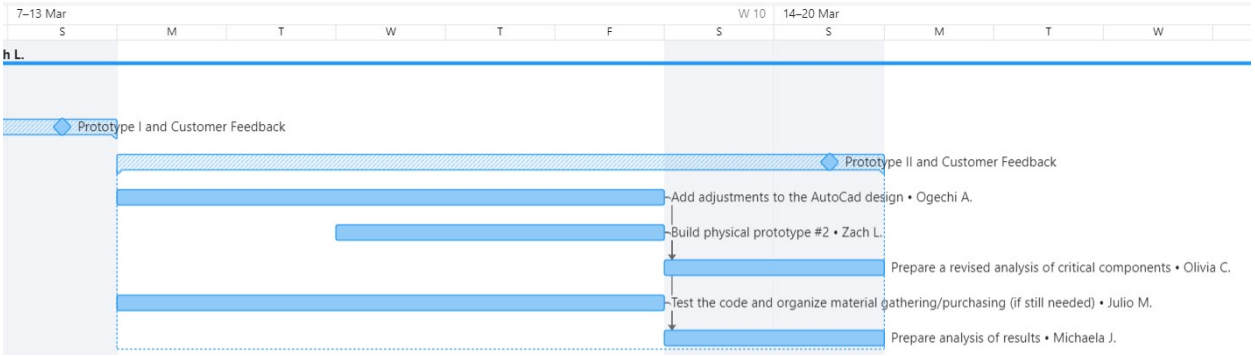
A list of all the tasks which need to be completed, an estimated duration for each task, as well as who is responsible for each task:

Deliverable F: Prototype #1 Task Plan



Description of plan: For the first prototype, the priority is to show proof of concept. So for the physical prototype, Zach will make it with random parts around his house. Once Zach is done with his task, he will send his work to Olivia so she can prepare her analysis of the critical components (functionality, feasibility, etc). Michaela and Ogechi will contribute to the AutoCad design of our prototype by each designing different parts. Michaela will work on the case covering and Ogechi will work on the sensor attachment. Finally, Julio will write the code for our sensor and will also be responsible for the purchasing and gathering of the materials needed to make the upcoming prototypes later on in the semester.

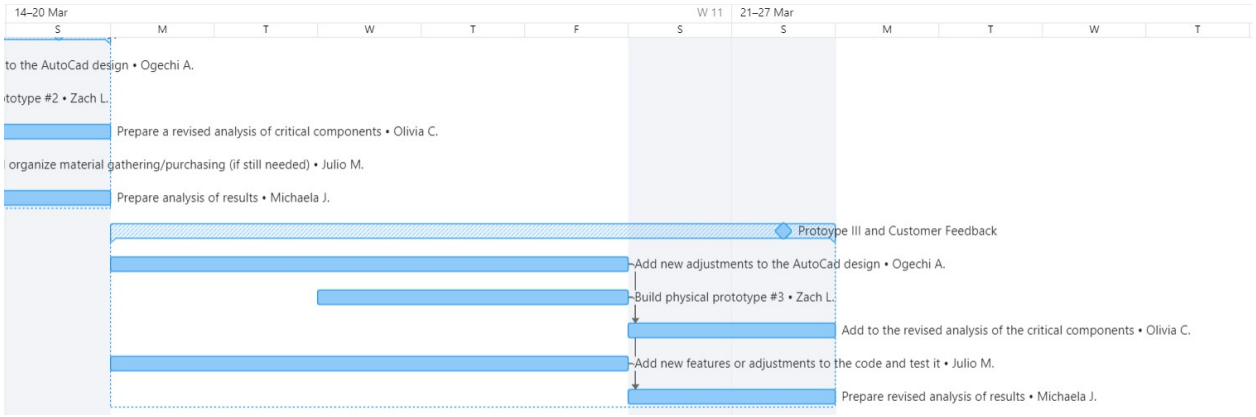
Deliverable G: Prototype #2 Task Plan



Description of plan: For the second prototype, the priority is to make more of a functional prototype that can be tested. Based on the customer feedback, Zach and Ogechi will make adjustments to their physical and computer designs respectively. Once they are done, they will send their work over to Olivia so she can prepare the revised analysis of critical components. Julio will start to test the code to see if everything works and he will gather the data he collects.

If not all the materials for the prototypes have come in, he will continue to track and organize that. Once he is done testing his code, he will send his results to Michaela (Zach and Ogechi will send their results too) so she can start her analysis of our results.

Deliverable H: Prototype #3 Task Plan



Description of plan: For the third prototype, the priority is to fix anything wrong with the second prototype so it will be fully functional. The task plan for prototype #3 will run just like the task plan for prototype #2. The differences will be that the adjustments will be different.

Final remarks

Our team is aware that the more prototypes we make the bigger our chances of success will be. However, with our schedules, our team can't predict if we'll be able to produce more than three prototypes before Design Day. If our team finds the time to make additional prototypes, we will plan for it and update our Wrike task plan accordingly. Any updates to our task plan can be found on our team Wrike page under **Semester Activities**.

A list of the significant project risks and your associated contingency plans to mitigate the critical risks that are *reasonably* likely (Julio & Michaela):

List of Potential Project Problems:

- Spend more money than available
- Materials and/or tools required are not available
- Materials and/or tools are damaged during the creation of the prototype
- Materials and/or tools do not deliver on time

List of Potential Sensor Problems:

- Sensor Damage:
    - Accidental physical damage
    - Water damage
    - Drastic temperatures* and/or weather conditions
- Sensor Errors:
    - Sensor gets covered

    - Sensor gets completely (or partially) pulled out from arduino

Backup Plan:

- For best results, the temperature and humidity sensor(s) needs to be isolated from the outside world.
- The sensor's function is to read the temperature and humidity from the air inside the container
- In order to prevent any external interference, the holes created for the wires to pass through will have to be sealed once the wires are connected
- The biggest potential problem is the sampling rate of the temperature and humidity sensor(s)
- If data is demanded to be collected too fast, the sensor will start outputting unreliable data
- The raspberry pi mounted on the drone is currently operating at 2Hz
- The DHT22 has a processing rate of 0.5Hz. The code provided in Deliverable D will output accurate and reliable data at a rate of 0.5Hz or at most 1Hz
- Multiple sensors can be connected in order to get an accurate average of the temperature and humidity values. The code can be modified to rule out any anomalies in the values given by the sensor.

Summary of Backup Plan:

- The sensor needs to be isolated from outside interference in order to output accurate readings
- If the sampling rate for the sensor is too demanding, the backup code can be used in order to output reliable data at a slower rate
- Multiple sensors can be used to rule out any radical results given by one of them

An estimate of the cost for all components and materials which you will need for the different prototyping deliverables described above (Ogechi & Olivia):

Material	Approximate Cost
Plastic for 3D printing of sensor	$28/kg
Wire Wrapping	$5
Nuts and Bolts	$4
Temperature and Humidity Sensor (Grove - AHT20)	$4.90 USD $6.24 CAD
Arduino Uno	$0 (included with course) or $29
Gorilla Glue Adhesive (Backup)	$8.48

Wires (Backup)	$13.99
TOTAL (including backups)	$64.71
TOTAL (without backups)	$43.24

Plastic for 3D printing of sensor

- Acrylonitrile Butadiene Styrene (ABS)
    - High resistance to heat (up to 105ºC)
    - Widely used, found in pretty much everything
    - Relatively low in cost
    - Bonds well with adhesives
    - Very resistant to corrosion
    - Link to material

- High-Density Polyethylene (HDPE)
    - Widely used, found in pretty much everything
    - High impact resistance
    - Corrosion and abrasion resistant
    - Low moisture absorption
    - Light-weight
    - Withstands temperatures up to 120ºC
    - Can be tricky to print with
    - Food safe and FDA approved
    - Link to material
    - Not the best option for the price

- Polycarbonate (PC)
    - Durable and has exceptional strength
    - High impact resistance
    - Weather resistance
    - Usually used in high quantities
    - Good for use up to 155ºC
    - Link to material

Wire Wrapping Materials

- Nylon Braided Cable Sleeving
    - Temperature range of -45ºC to 150ºC
    - Expandable
    - Durable
    - Long-lasting
    - Link to material
    - Link to material

- Split wire loom tubing
    - Temperature range of -40ºC to 93ºC
    - Durable
    - Link to material

Temperature and Humidity Sensor

- Collects data as frequently as one wants, will be able to meet the requirements of client (readings per second / 2 Hertz)
- Compatible with Arduino UNO
- Link to material

Arduino UNO

- Already have one
- Easy to use

Wires

- Just in case we need longer wires
- Link to material

Attachments

- Gorilla Glue Adhesive
    - Just in case we need to further secure things
    - Link to material
- Nuts and bolts
    - Link to materials

Sketch of system with approximate dimensions