Design Report 4 Presentation

Heart Bytes

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Professor: Dr Venkata
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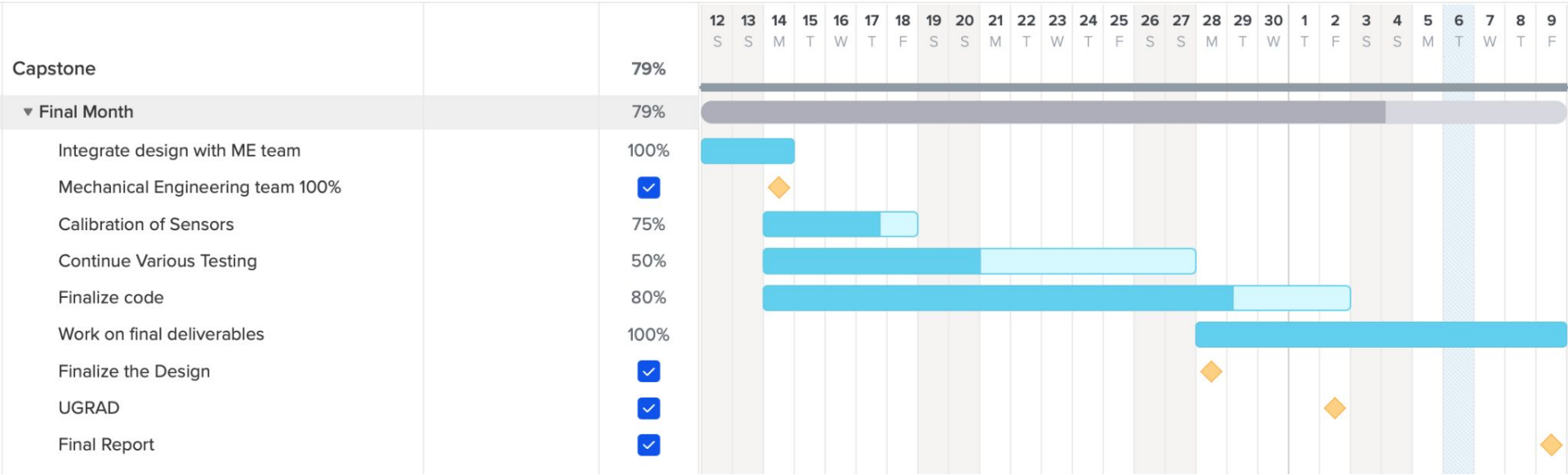
Gantt Chart

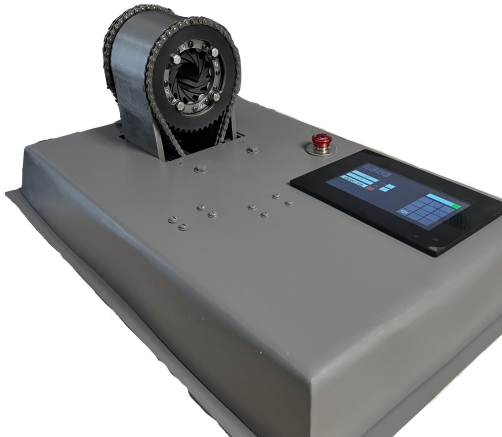

12 S
13 S
14 M
15 T
16 W
17 T
18 F
19 S
20 S
21 M
22 T
23 W
24 T
25 F
26 S
27 S
28 M
29 T
30 W
1 T
2 F
3 S
4 S
5 M
6 T
7 W
8 T
9 F
Capstone
79%
Final Month
79%
Integrate design with ME team
100%
Mechanical Engineering team 100%
Calibration of Sensors
75%
Continue Various Testing
50%
Finalize code
80%
Work on final deliverables
100%
Finalize the Design
UGRAD
Final Report

Project Description

The goal for the project was to create a low-force stent crimping machine for W.L. Gore & Associates given the following list of customer requirements

1. The stent crimper must utilize an iris-shaped crushing mechanism
2. Radial force and diameter readouts after crimping
3. User inputs to control the diameter and radial force of the stent
4. The machine must meet relevant OSHA and ANSI standards
5. A working model of an stent crimper
6. A reliable and precise design

The stent crimping machine has now been fully constructed



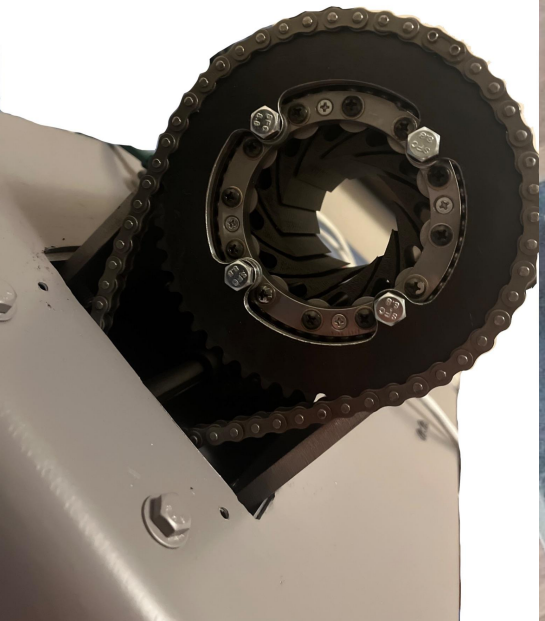
Requirements

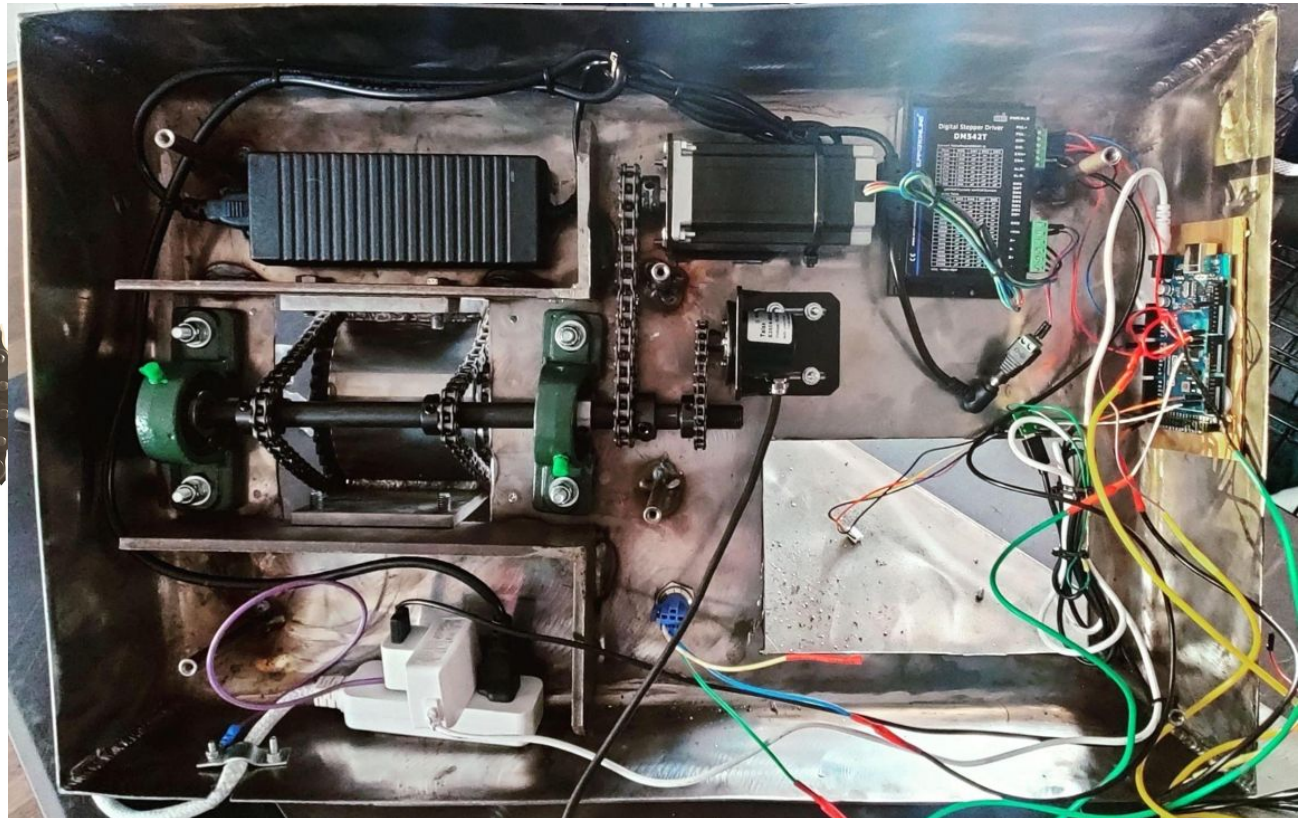
To meet the customer's requirements, the team created a corresponding list of engineering requirements:

1. The device will use an iris crusher designed by the ME team
2. The team will use a touchscreen display to show measurements
3. The touchscreen display will take user inputs for setting measurements
4. Include an emergency stop button, warning labels, and an iterative design process
5. Iris crimping range from 5mm to 50mm and exert a max force of 132.94N
6. Will use precise sensors to determine the measurements for diameter and radial force with up to 1% accuracy

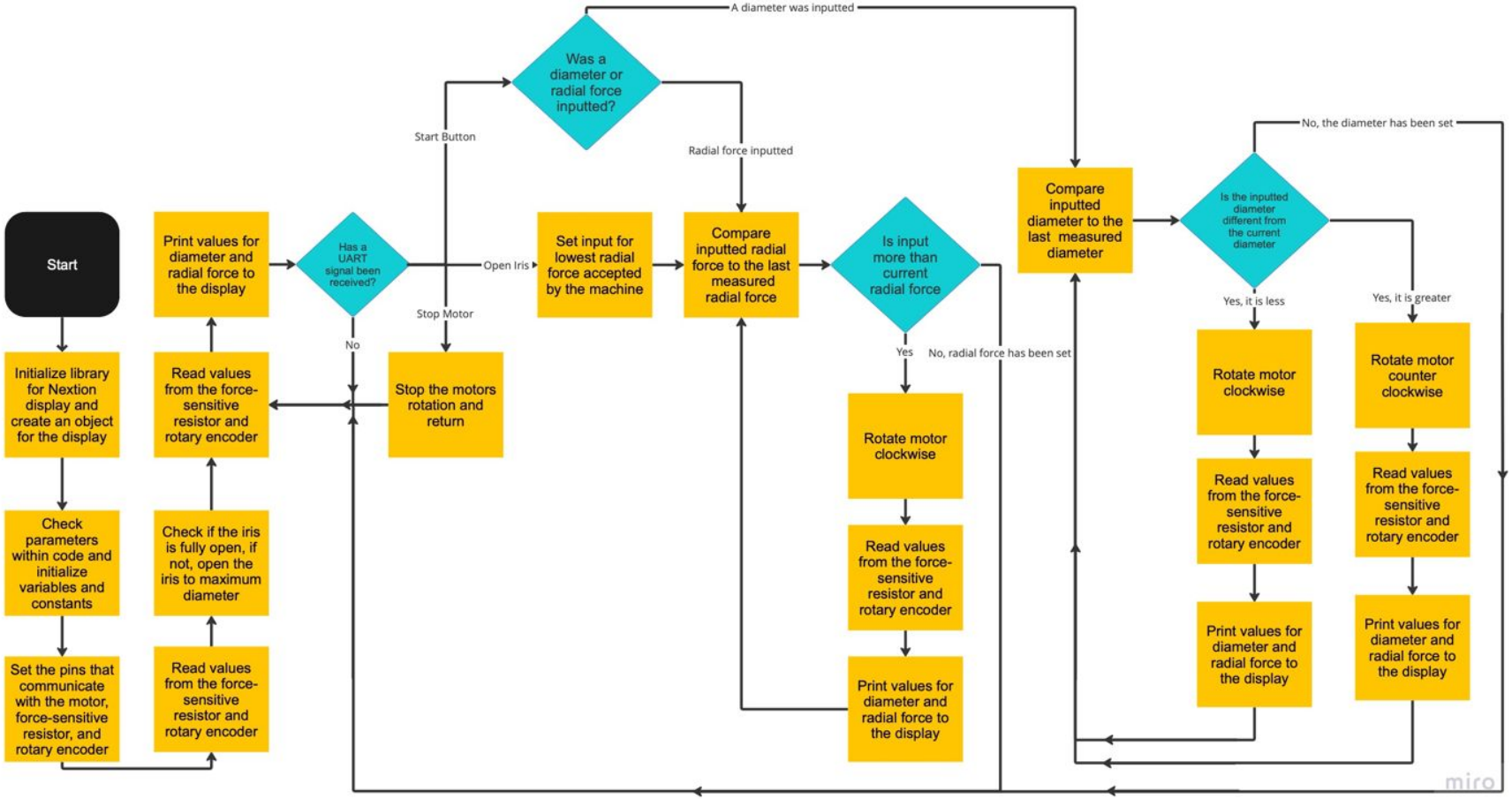
The team was able to meet the engineering requirements to varying levels of success. Requirements 1 - 4 were all fully met. The iris crimping range for the machine was from 2mm to 62mm but the max force was less than what was needed, so requirement 5 was half met. The sensors the team used were not accurate enough to meet requirement 6.

Design of the Machine





Flowchart for the Final Code



Test Results

During testing of the machine, the mechanical engineering team was able to procure a stent for more accurate testing

- When the stent was placed in the iris, the mechanism kept “binding”, the motor kept trying to rotate, but the iris mechanism would not close more, this was determined to be the motor not providing enough force
- Due to how the iris moves during crimping, there is not always a force being applied to the force-sensitive resistor
    - To solve this problem, the team created an equation to relate the diameter of the stent to radial force for the material of the stent

New Parts

The team decided to purchase two new components in the final weeks of the project

- A StepperOnline NEMA 34 Stepper motor that can provide up to 13 Nm of torque
  - The DM860T Stepper Motor driver board was purchased to drive the new stepper motor
  - The current motor only provides 3 Nm of torque, this new motor will increase the torque by 333.33%
- A new Jeanoko rotary encoder was selected that has 1024 pulses per rotation
  - The previous rotary encoder only had 600 pulses per rotation, this will increase the amount of pulses to determine the diameter by around 70%

The parts took longer to arrive than expected, so these parts were not put into the final design, but these parts would have addressed the issues with the stent crimping machine

Final Thoughts

- The team is confident that if there was enough time to implement the newly purchased parts, the team would have been able to meet all of the client requirements
- Regardless of the issues, the team was able to design a stent crimping machine that was mostly functional and both teams that worked on the project are satisfied with the outcome
- Despite the aforementioned issues, the contact at W.L. Gore & Associates has stated that he and the company are pleased with the outcome of the projec

Thank You For Listening
Any Questions?