Design Presentation 3

Heart Bytes

11/4/22

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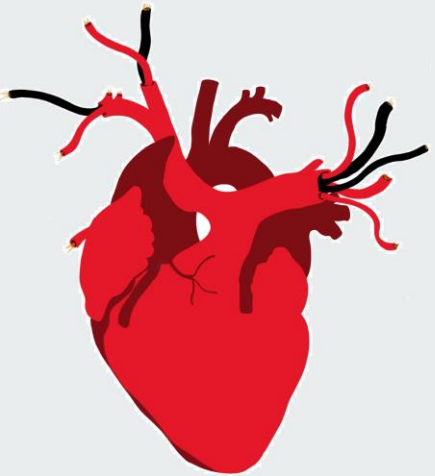
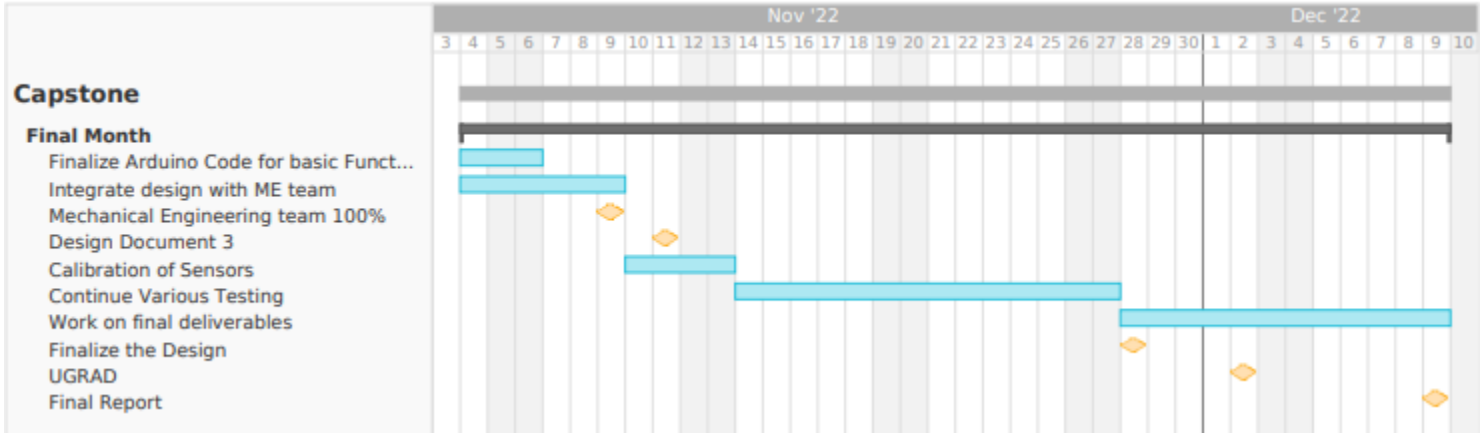
GTA: Alex Dahlmann

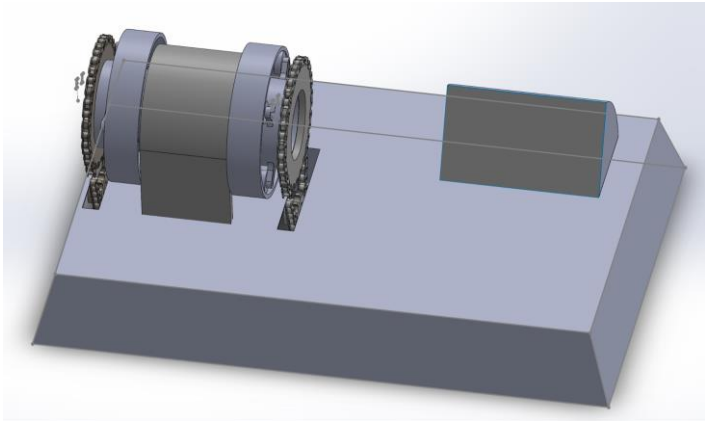


Gantt Chart

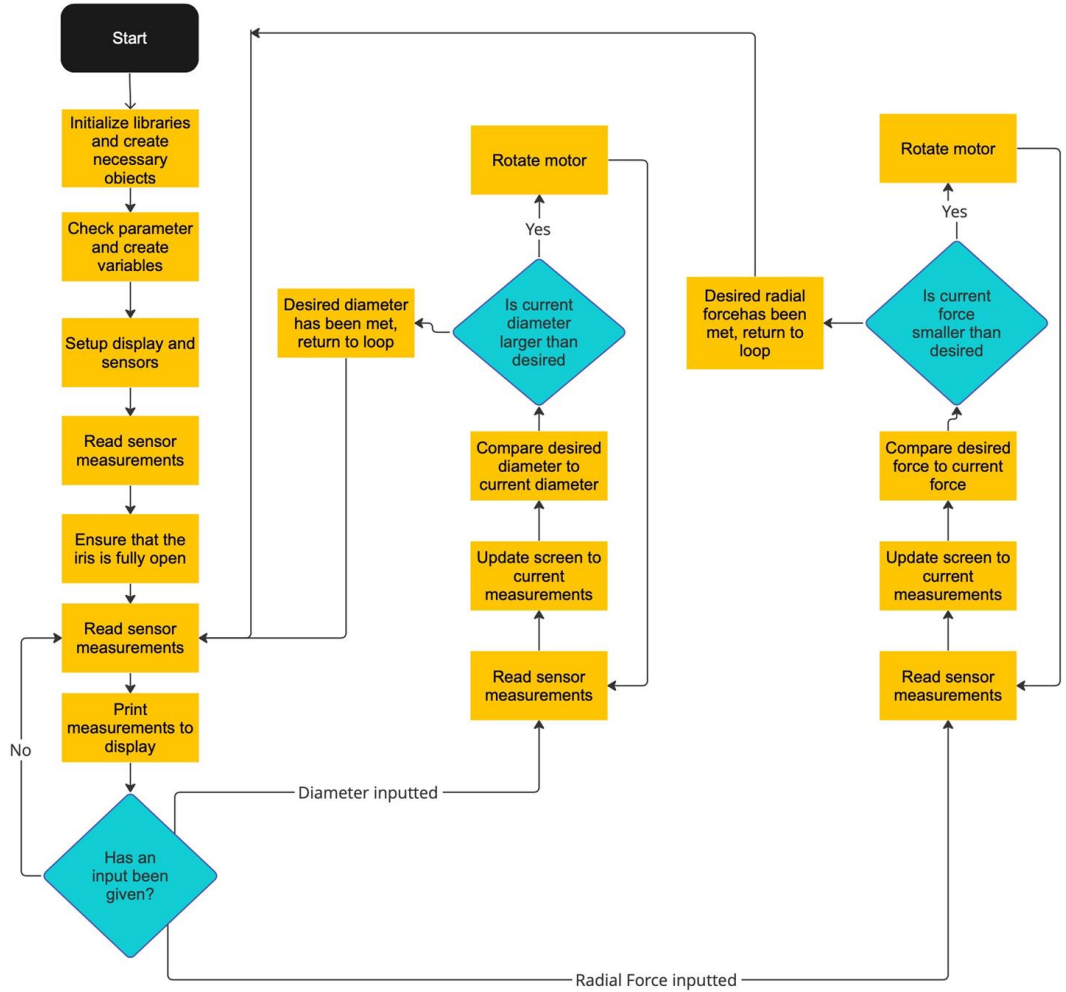

Nov '22
Dec '22
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 1 2 3 4 5 6 7 8 9 10
Capstone
Final Month
Finalize Arduino Code for basic Funct...
Integrate design with ME team
Mechanical Engineering team 100%
Design Document 3
Calibration of Sensors
Continue Various Testing
Work on final deliverables
Finalize the Design
UGRAD
Final Report

Project overview

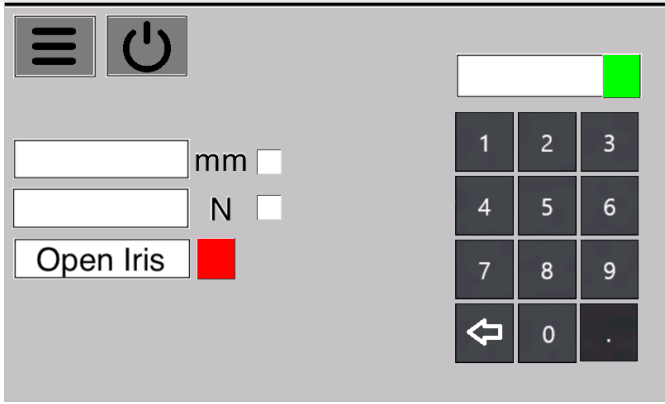
- The stent crimping machine is nearing completion
  - We will be combining our teams work and the mechanical engineering teams work by next wednesday
- Inside the case of the device, there will be a motor connected to a shaft with gears on it
  - The gears will rotate gears that are attached to the crimping mechanism
  - A rotary encoder is attached to the opposite side of the shaft from the motor
  - A force sensitive resistor is attached to the fins in the crimping mechanism
- The team is still working on the emergency stop button



Flowchart


Start
Initialize libraries and create necessary objects
Check parameter and create variables
Setup display and sensors
Read sensor measurements
Ensure that the iris is fully open
Read sensor measurements
Print measurements to display
Has an input been given?
No
Diameter inputted
Rotate motor
Yes
Is current diameter larger than desired
Desired diameter has been met, return to loop
Compare desired diameter to current diameter
Update screen to current measurements
Read sensor measurements
Desired radial forcehas been met, return to loop
Rotate motor
Yes
Is current force smaller than desired
Compare desired force to current force
Update screen to current measurements
Read sensor measurements
Radial Force inputted

Touchscreen Display



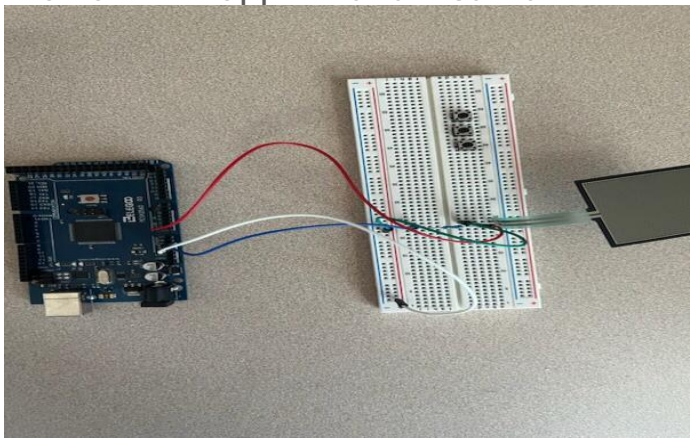
- The team chose a 7” Nextion Intelligent Series display
  - The Nextion screen is a touchscreen display connected to a basic microcontroller
  - The microcontroller on the screen handles the graphics processing and is connected to the Arduino via a UART connection
  - The power connections on the UART connection are plugged into a 5V 1A micro USB port
  - The TX and RX pins are plugged into the serial ports on the Arduino
  - The Arduino can write and read to the variables displayed on the screen
  - Within the code, there is a method that checks for UART connections to a serial port and deciphers what inputs were pressed to determine what needs to occur

Diameter Sensor

- To determine the diameter of the stent, we have chosen a Taiss rotary encoder with 600 pulses per revolution
  - The internal shaft of our device will only rotate 40 degrees which gives us 240 pulses to determine diameter
  - This is a digital sensor with two digital inputs into the arduino

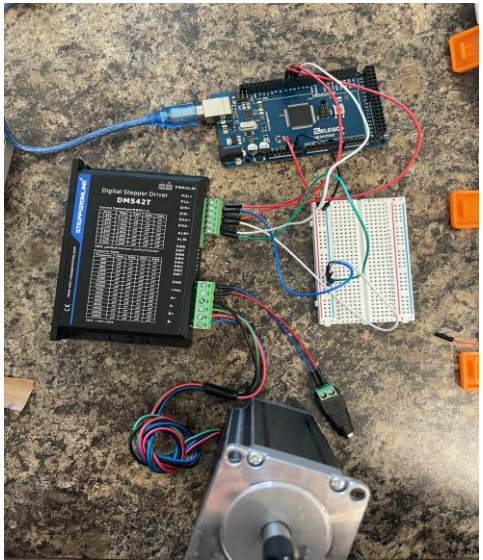
Radial Force Sensor

- To determine the radial force applied to the stent, we are using a force sensitive resistor
  - The resistor is an analog sensor that is connected to a pull down resistor of 10K Ohms
- The mechanical engineering team is still planning on purchasing a torque transducer or something similar to determine the best way to determine radial force applied to the stent



Stepper Motor

- NEMA 23 stepper motor that will be used along with a DM542T motor driver.
  - It’s extremely precise in rotation it has 1.8 deg step angle.
  - It has a rated of 4.2A. And resistance of 0.9 of ohms.
  - A power supply of 24 VDC will be used.



Thanks for listening!
Any Questions?