

EE486C Introductory Presentation

Heart Bytes

9/9/22

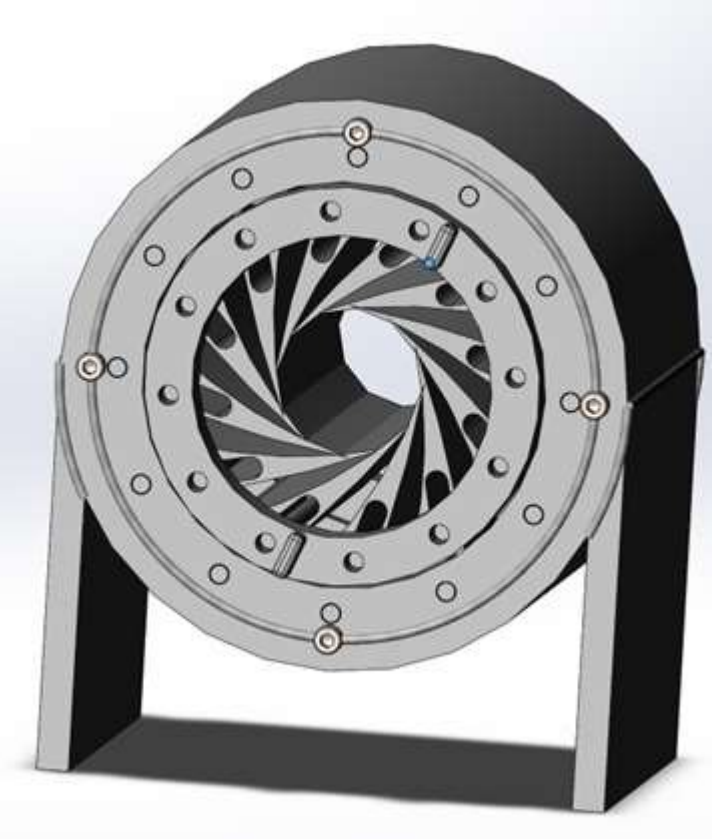
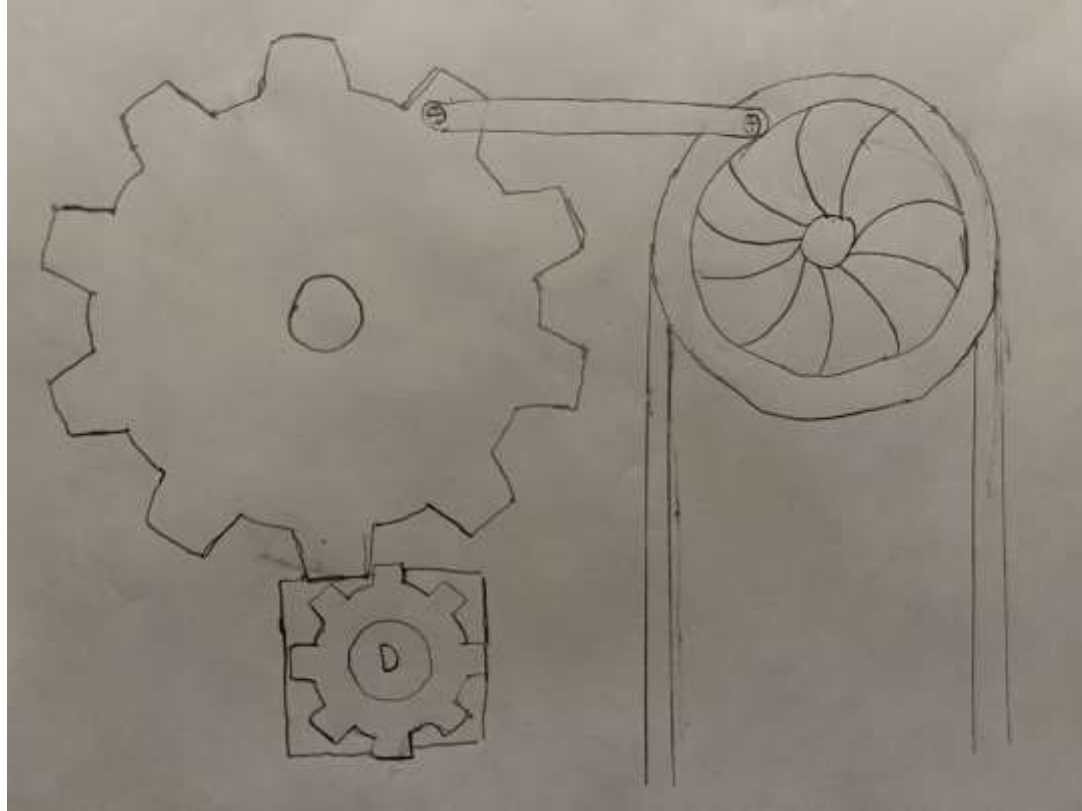
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Overview

- The Heart Bytes team is currently working alongside a mechanical engineering capstone group to create a stent crimping machine for W.L. Gore & Associates
- Stent crimping machines are devices used in the medical field that contract stents to become the correct diameter prior to a surgery
 - Stents are a medical tool made of metal that is inserted inside blood vessels to ensure blood flow
- Our team is responsible for designing the electrical hardware and software necessary for the machine to function
- Alex is responsible for coding a microcontroller as well as ensuring all connections to and from the board work as intended
- Aziz is responsible for the sensor selection and figuring out how to integrate it in the design
- Eisa is responsible for the motor selection and figuring out how to integrate it in the design

Complete Design

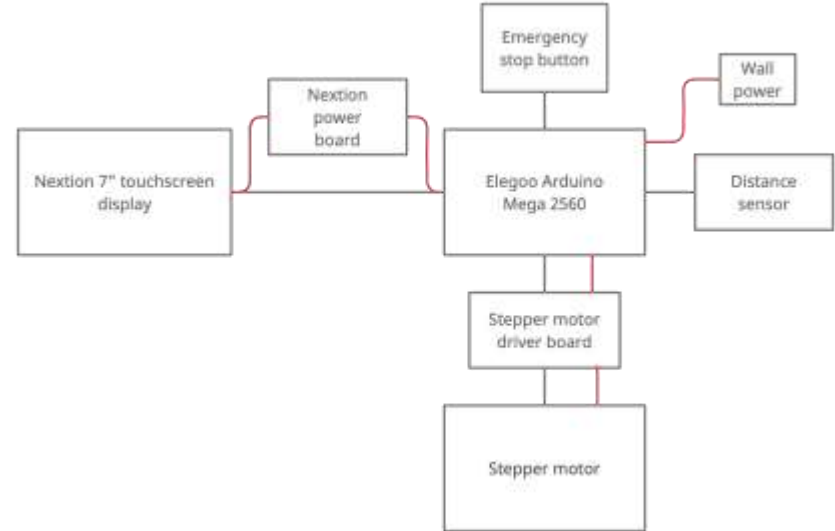


Hardware Overview

- An Elegoo Arduino Mega 2560 is the primary microcontroller that will be used for the project
- A Nextion touchscreen display will be used to display data to the user and receive user inputs
 - The Nextion screen is itself a microcontroller board with a display that can transmit data to the Arduino board
- A powerful stepper motor that will be used to turn the gears
 - Several motors have been discussed, we are unsure of the exact motor
- A distance sensor will be used to detect the diameter of the stent

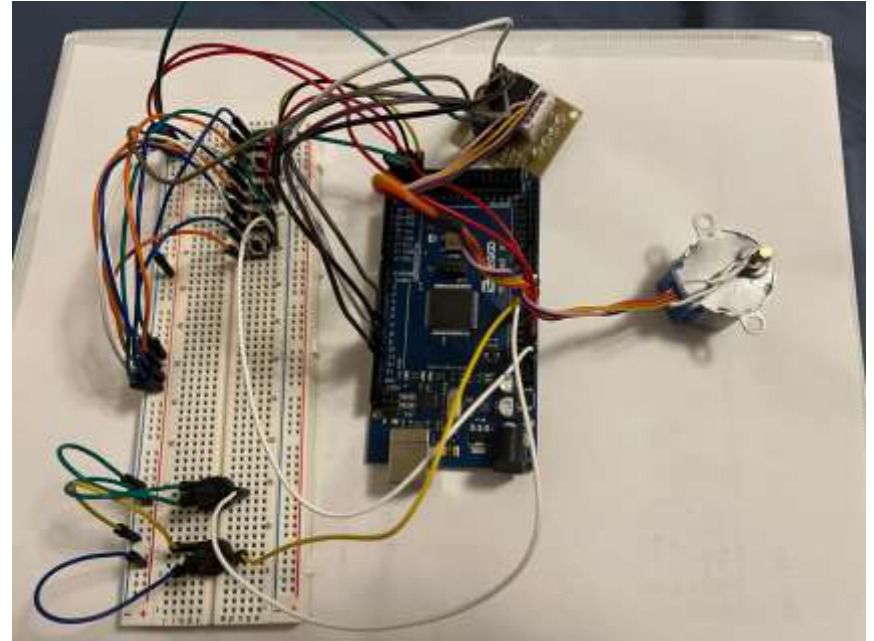
System Architecture and Connections

- The emergency stop is a push button connected to the Arduino RESET pin
- The Nextion display will transfer data to the Arduino board using a four pin connector
- The exact stepper motor and sensor are still undecided, so these are assumed connections

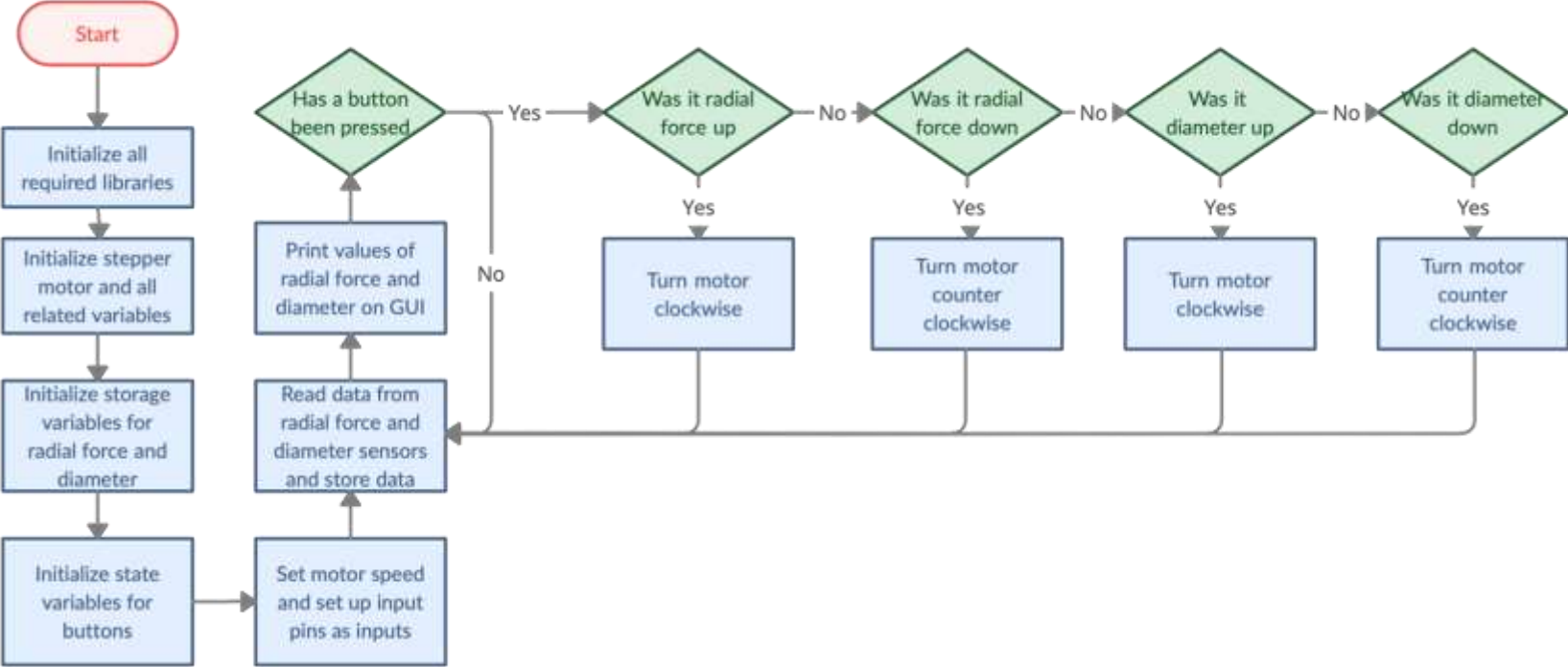


Current Prototype

- Since the final sensor has not been chosen, we are using potentiometers to simulate analog sensors
- Currently there are push buttons for the controls that will be on the touchscreen display
- Sensor data is printed to Arduino IDE
- The motor used is just a basic stepper motor that came with a kit

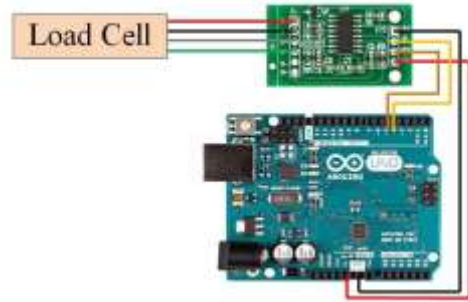


Software Design



Sensor design

- Originally we planned to use two sensors, One to measure the tension of reel and the other to measure the aperture radius of stent crimp.
- The radial sensor is an analog sensor that will be used to detect the change in diameter of the aperture of the stent crimp
- The load sensor is a digital sensor that will be used to measure the radial force exerted by the stent crimper
 - In order to get measurable data out of the load sensor, a hx711 chip is needed.

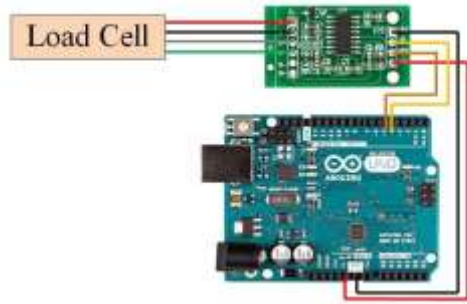


<https://www.google.com/search?q=stent+radius&sxsrf>

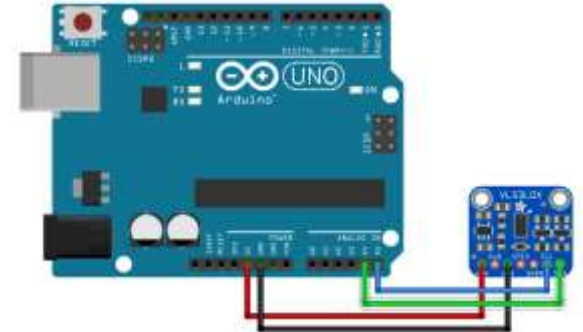
The prototype I designed

- Radial force sensor Prototype circuit layout
- Radial sensor prototype circuit layout

Radial force sensor prototype circuit layout

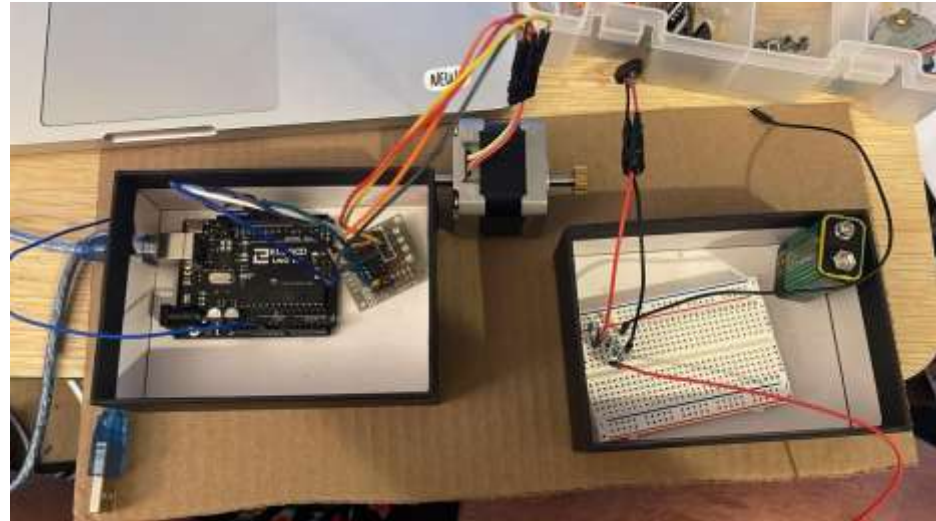


Radial sensor prototype circuit layout



Motor Design and Prototype made

- Originally Includes one stepper motor which will rotate anticlockwise and clockwise depending on the switch that is pressed.
- Control of radial force and aperture radius



Problems faced and improvements

- Compatibility- Several Compatibility issues were faced as there was a compatibility issue of the stepper motor along with the motor control.
- Improvements- We hope to make more upgraded gear systems to better control the aperture radius of the stent crimp using stepper motor.

