Project Requirements

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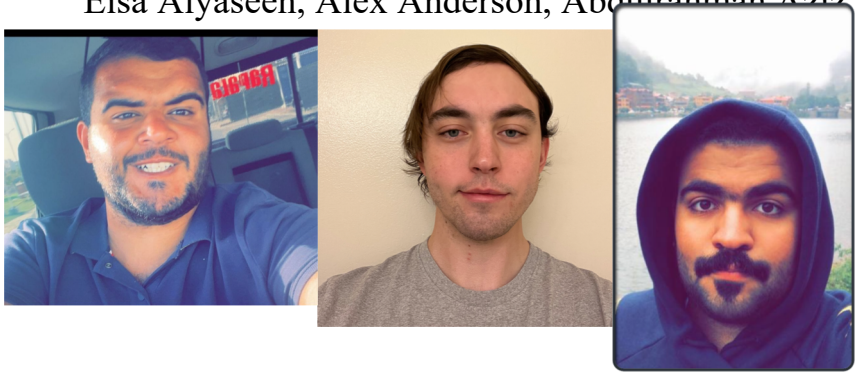
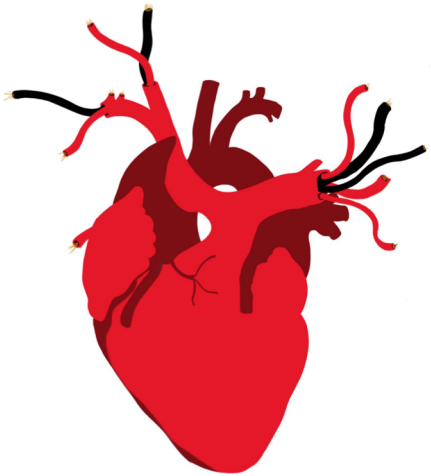
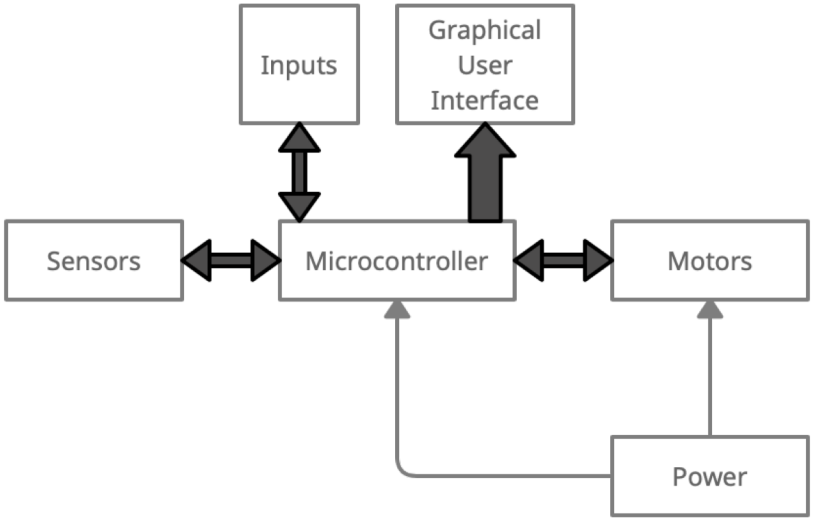
Eisa Alyaseen, Alex Anderson, Abdulrahman Aziz





Overview

- The Heart Bytes team is working with a Mechanical Engineering capstone project in order to develop a stent crimper for W.L. Gore & Associates
- The Heart Bytes team is responsible for making the electrical hardware for the machine. The system architecture of the device can be seen to the right



General Design Requirements

- The stent crimper must utilize an iris shaped design
- The device must meet OSHA and ANSI safety standards
  - Warning labels
  - Emergency stop
  - Pinch points
  - Electric shock protection
  - Device has to be fully sterilized with UV radiation before use.
- The machine should be powered by a wall socket

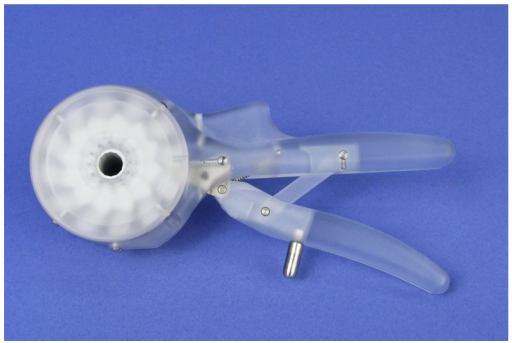
Microcontroller Minimum Requirements

- Must be able to have 3 input pins for controls
- Must have an additional 2 inputs for the required sensors
- Must be able to drive at least two motors at the same time
- Must be able to support a graphical user interface
- Must have memory in order to store project files
- Must be able to handle the power needed for the device

https://en.wikipedia.org/wiki/Arduino_Uno

Input Requirements

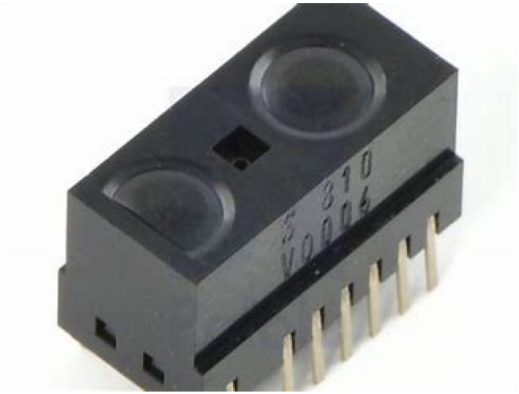
- Must have a method to adjust radial force of the stent.
- Must have a method to adjust diameter of the stent.
- Must have add a stop button in order to stop the current processes of the device.
- Must have a method to adjust length of the stent from insertion point.



https://msi.equipment/product/hh100hh200/

Sensor Requirements

- Radial force sensor
  - Must be able to read forces around 132.94 Newtons or 28.9 N/cm
  - Must be accurate up to 1%
- Length and diameter sensor
  - Must be able to measure distances between 1 to 100 mm
  - Must be accurate up to 1%
- A nano ultrasonic sensor
  - Must be able to give a length reading from point of crimp.



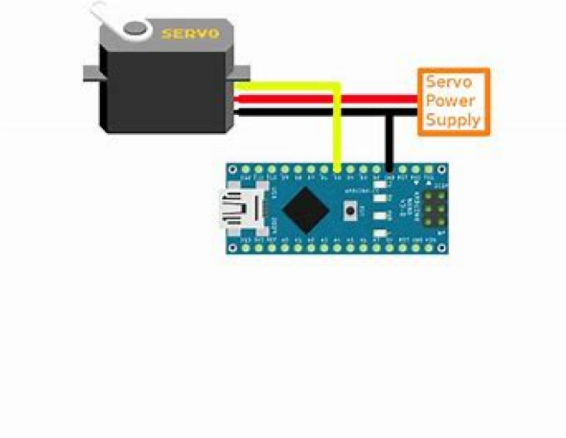
https://www.hackster.io/ingo-lohs/sharp-gp2y0d810z0f-digital-distance-sensor-2-10-cm-d82ea0/

Graphical User Interface (GUI) Requirements

- The GUI must be a seven segment display
- The interface should be able to display radial force.
- The interface should be able to display diameter.

Motor Requirements

- The device must have a remote controlled nano motor.
- The nano motor will also be used both to contract and expand the Gore stent using the crimper.
- Stent loading should be fully automatic, using a nano servo.



https://ozeki.hu/p_3056-how-to-setup-a-servo-motor-on-arduino-nano.html

Photos cited

1) “Arduino Uno”, Used 3/9/22, https://en.wikipedia.org/wiki/Arduino_Uno
2) “MSI HH100”, Used 3/9/22, https://msi.equipment/product/hh100hh200/
3) “Sensor”, Used 3/9/22, https://www.hackster.io/ingo-lohs/sharp-gp2y0d810z0f-digital-distance-sensor-2-10-cm-d82ea0/
4) “Motor Diagram”, Used 3/9/22, https://ozeki.hu/p_3056-how-to-setup-a-servo-motor-on-arduino-nano.html