# Physical Design Proposal
# Include your team name and team #

First Student, Second Student, Third Student

*Activity Report*

## 1 Proposed Solution

Very briefly summarize the idea(s) for improving the system. You can copy some text from the logical design document, but you should update it if the idea has evolved. Following an agile methodology, you should be receptive to new information. It's not a negative development to modify your concept and functional requirements based on changing circumstances. It's okay if this is just a few sentences here. Make this section as long or as short as necessary to recap your basic idea.

## 2 System Architecture

This section describes **HOW** you will implement your idea. Provide at **least one diagram** that illustrates your proposed idea, this can be a drawing of the system, wire frame diagram, or model that communicates how you will implement your system requirements. Many ideas will likely require multiple diagrams illustrating different pieces of the system (such as physical construction, software interface and/or circuit schematic). If you have some artistic ability hand-drawn diagrams is fine, otherwise, you should should use some simple software such as PowerPoint.


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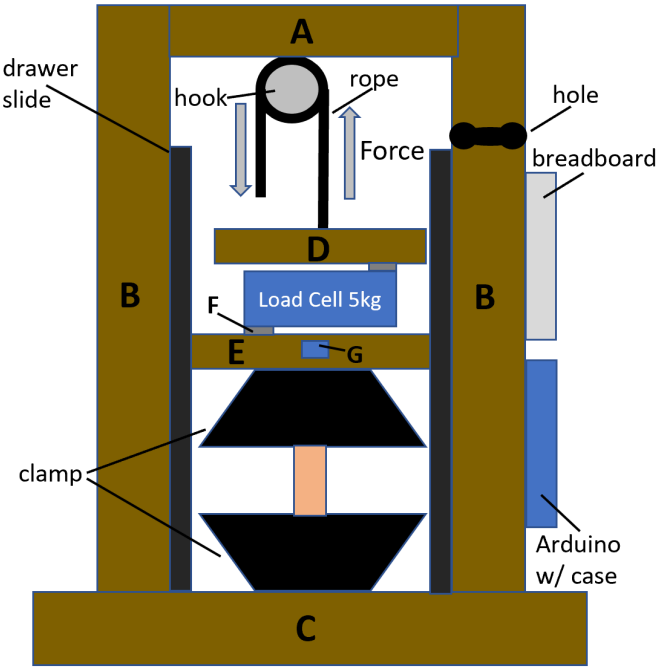


Figure 1. Current state of the tensiometer physical design. You may wish to use letters which can identify components in more detail in the accompanying text description.

Provide technical details describing how you will implement your functional requirements. For example, if you change the circuitry of the system, it's a good idea to provide an updated schematic. Figure 2 depicts the current system circuitry with the load cell acting a wheatstone bridge and the resulting output voltage amplified to the range of the ADC. The HX711 board uses the amplifed value to perform a ADC conversion and then communicates the

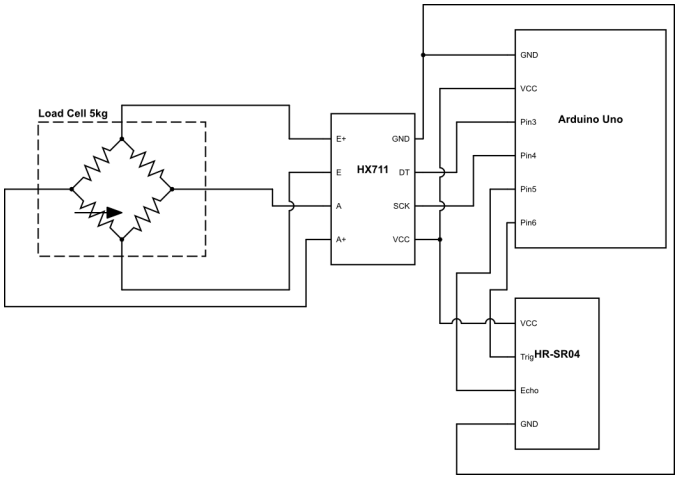


Figure 2. Schematic diagram of tensiometer electronics.

results using the I2C communication standard with the attached microcontroller.

Below, you'll describe each separate component, and also include how they integrate together to implement the desired system requirements.

## 2.1 System Components

Document each component of your system that has changed from the original system. **Do not bother documenting anything that has not changed from the current system.** Describe how did you decided on each part? What was your analysis process? Sometimes, it is prudent to test multiple parts to see which works best. That's fine. If you are testing multiple parts, document which parts you are testing and your process for determining the most appropriate part.

Before describing each part in the following subsections, it's a good idea to include a table that summarizes any new parts and a cost estimate. An example table summarizing the parts and budget is shown in Table 1.

### *2.1.1 Load Cell (5kg) / HX711 Amplifier*

or each component, describe the functionality. You don't need to include components that did not change from the current system state. These subheadings are here as an example.

| Item | Part # | Cost |
|---|---|---|
| Ultrasonic Range Sensor | HR-SR04 | $4 |
| Load Cell 5kg | SEN-14729 | $12 |
| Amplifier | HX711 | $10 |
| Microcontoller | Ard. Uno | $15 |
| **TOTAL** | | **$41** |

Table 1
Provide an overview of any new parts that need to be purchased and their estimated cost. Each team is responsible to order their own parts.

### *2.1.2 Ultrasonic Range Sensor*

For each component, describe the functionality. You don't need to include components that did not change from the current system state. These subheadings are here as an example.

### *2.1.3 Microcontoller*

For each component, describe the functionality. You don't need to include components that did not change from the current system state. These subheadings are here as an example.

### *2.1.4 Graphical Display*

For each component, describe the functionality. You don't need to include components that did not change from the current system state. These subheadings are here as an example. The current system uses the serial monitor to collect the data. If this changes, document the new methodology.

### *2.1.5 Laptop w/ Arduino Software*

The current system requires use of a computer running the Arduino IDE to collect data from the serial monitor. If you change this process, document it.

## 2.2 Engineering Standards

Document which engineering standards are incorporated into your system design. In the current system, there are two communication standards (protocols) that are utilized: I2C and UART, as shown in figure 3. Briefly describe how these work. Are there any other standards that are included in your system, such as data formatting standards? If so, briefly document them.

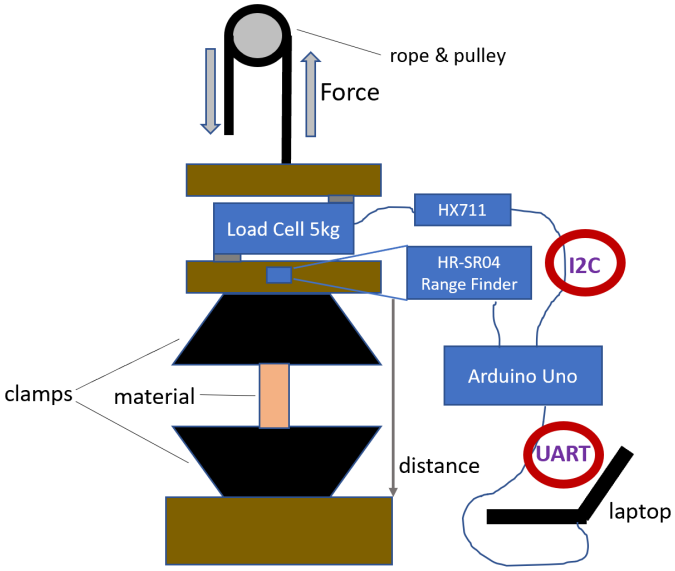


Figure 3. The current tensiometer system implements two communication standards (protocol) I2C and UART.

### *2.2.1 I2C Protocol*

Briefly describe how the protocol works as part of the system.

### *2.2.2 UART Protocol*

Briefly describe how the protocol works as part of the system.

### *2.2.3 Data Standards*

Are their any data standards that you are using, such as CSV files. If so, describe the standard and how it uses it.