

Weight Bearing Sensor

Client: Daniel Kutschera

Advisor: Prof. David Dean

Team Members:

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Problem statement

Patients with, or in recovery from, many conditions have restrictions on how much weight they can safely put onto their legs without causing themselves further injury. While there are some ways to attempt to ensure this requirement is met, they are difficult to implement, do not work as well, or provide as much feedback as would be helpful to patients and those assisting them. The goal of this project is to design a low-profile, easy-to-use device to measure and record the amount of weight put onto the legs of a patient, and give feedback to the patient and care providers to ensure their safety precautions are being met.

Brief status update

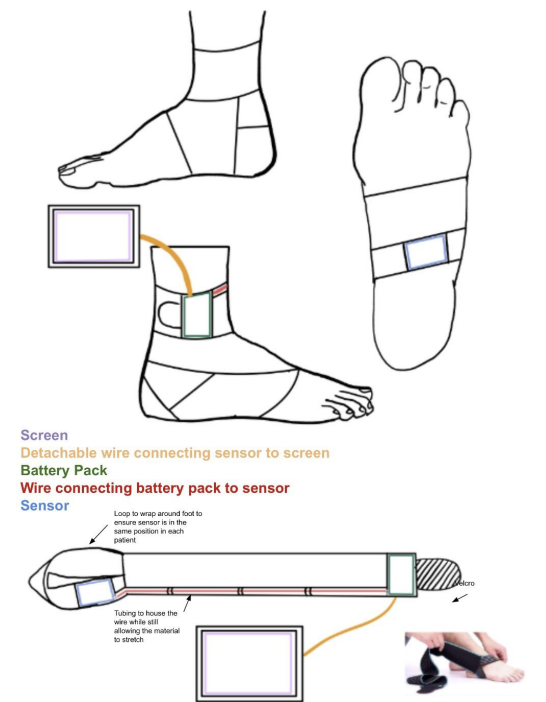
- Began work on circuit
- Ordered and received some of the materials for the device
- Still waiting on pressure sensor components

Difficulties/advice requests

Current design

Designs:

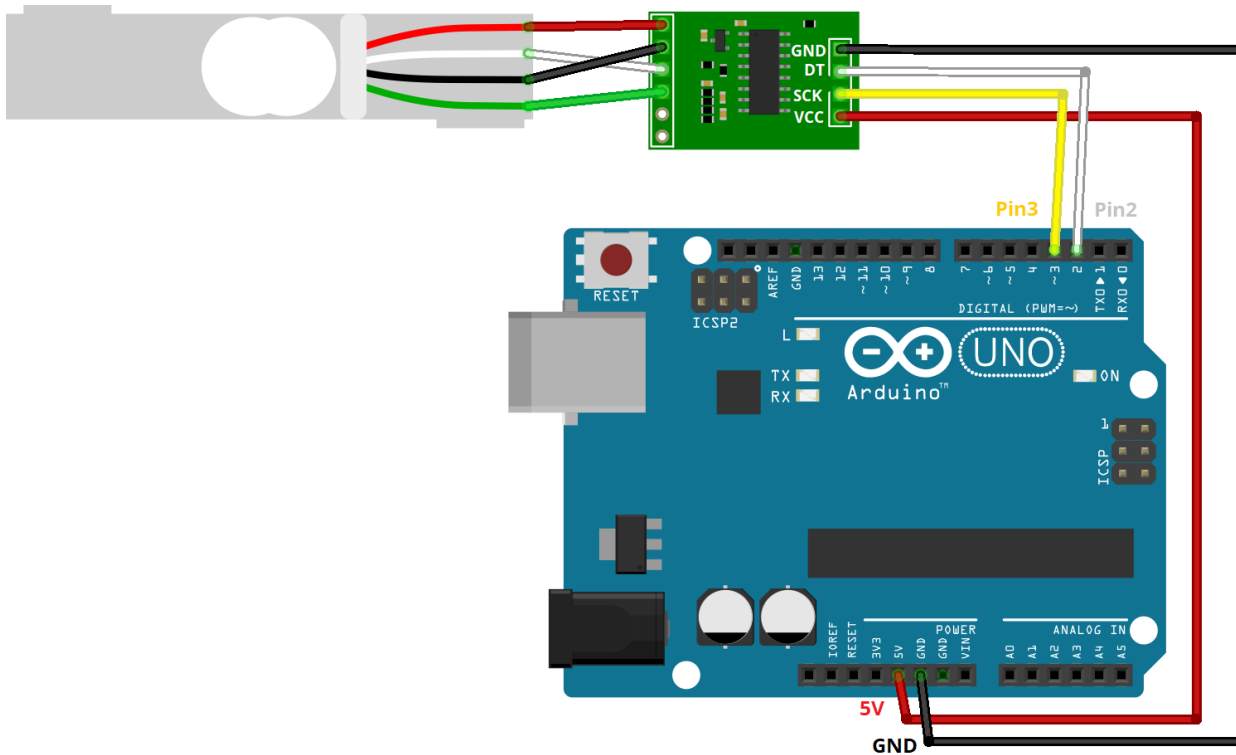
Design 1: Built in Strap



This device uses an ankle-brace like strip of elastic that can be adjusted to fit any patient. The loop at the end ensures that the sensor will sit in the same spot on each person's foot. The wiring will be fed through a tube of fabric to allow it to stay contained while the strap stretches. The battery pack will be fixed to the end of the strap, near the velcro strip. The wire connecting the battery pack/sensor to the readout will be detachable to prevent tangling when putting the device on.

Circuits:

Design 3: Circuit with Amplifier



This circuit is the basic design for a load cell using an Arduino. The Arduino microcontroller is powered by a battery and is connected to a HX711 amplifier, which is a breakout board that allows you to easily read load cells to measure weight. This amplifier would be connected to a load cell, which measures the weight, and the measured weight would then be sent to the display.

Materials and expenses

Item	Description	Number (amnt)	Cost per unit	Total Cost	Link
Category 1					
	Velcro strap for arduino	1 (2" x 16")	10.99	10.99	Amazon
	Ankle strap	1	7.59	7.59	Amazon
Category 2					
	Uxcell HX711 Module Weighing Sensor Pressure Sensor AD Module	1 (34 x 21 x 3mm)	6.39	\$11.38	Harfington
	Uxcell 100kg 42mm x 38mm x 3mm Electronic Scale Body Load Cell Weighing Sensor	1 (42mm x 38mm x 3mm/1.7" x 1.5" x 0.12)	8.12	13.11	Harfington

Major team goals from last week

1. Meet to discuss materials and decide on a materials list
2. Order materials as soon as possible
3. Work on testing protocol

Major team goals for the next week

1. Continue assembly of device
2. If electrical components arrive complete work on the circuit
3. Continue work on solidworks designs
4. 3D print electrical component casing

Last week's individual goals

- Nikolai Hess: Work on solidworks design, finalize materials list, complete as much of the circuit as possible, continue research.
- Jetzu Thao: Start ordering parts, start building basic circuits, fine tune designs.
- Norah Greer: Start ordering parts and constructing our first prototype
- Keira Ferrigan: Continue researching materials, start fabricating with materials
- Cassity Dechenne: Continue communicating with client and advisor, apply client design specifications to current design, continue research

Next week's individual goals

- Nikolai Hess: Finish work on the circuit if electrical components arrive, research, continue solidworks design
- Jetzu Thao: Start fabrication for device, basic testing with possible prototypes, research.
- Norah Greer: Start putting parts together, figure out what works/doesn't work, solve any potential issues.
- Keira Ferrigan: start fabricating with materials, continue research
- Cassity Dechenne: check parts are optimal for intended usage, research, continue communication with client and advisor

Timeline

<https://docs.google.com/spreadsheets/d/1GoAuANy3F-ltP7vhl7g-B9dxuefji8c50qzYs246SIE/edit?usp=sharing>

Activities

Name	Date	Activity/Previous Week's Accomplishments	Time (h)	Week Total (h)	Sem. Total (h)
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Nikolai Hess	10/16/25 10/16/25	Began solidworks design Began work on circuit	0.5 1	1.5	14.5
Jetzu Thao	10/16/25	Ordering parts, research, meeting	2	2	13
Norah Greer	10/16/25	Researched options for parts, ordered parts	1	1	12
Keira Ferrigan	10/16/25	researched parts, ordered parts	2	2	12
Cassity Dechenne	10/16/25	Research, helping to order parts, communicating with group	2	2	14