Weight Bearing Sensor

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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

- Working on more solidworks designs
- Some parts arrived, still waiting on the load cell and amplifier
- Circuit construction is mostly finished outside of the load cell and amplifier

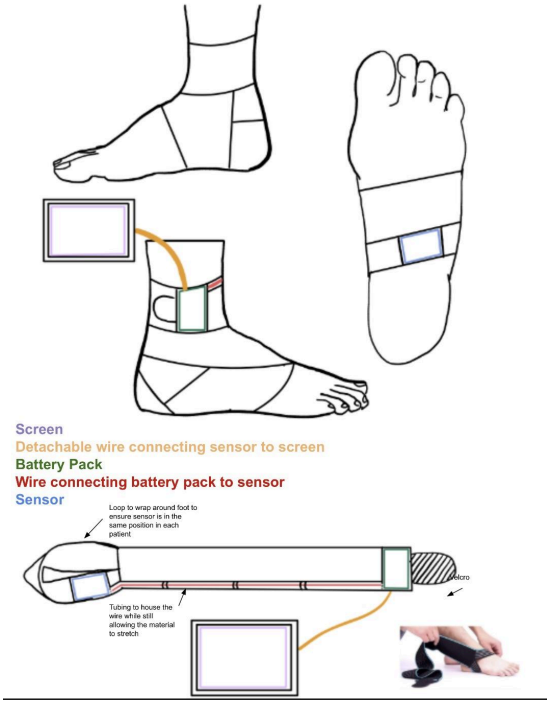
Difficulties/advice requests

- We are still waiting on the parts to arrive, but are hopeful they will be here within the week

Current design

Designs:

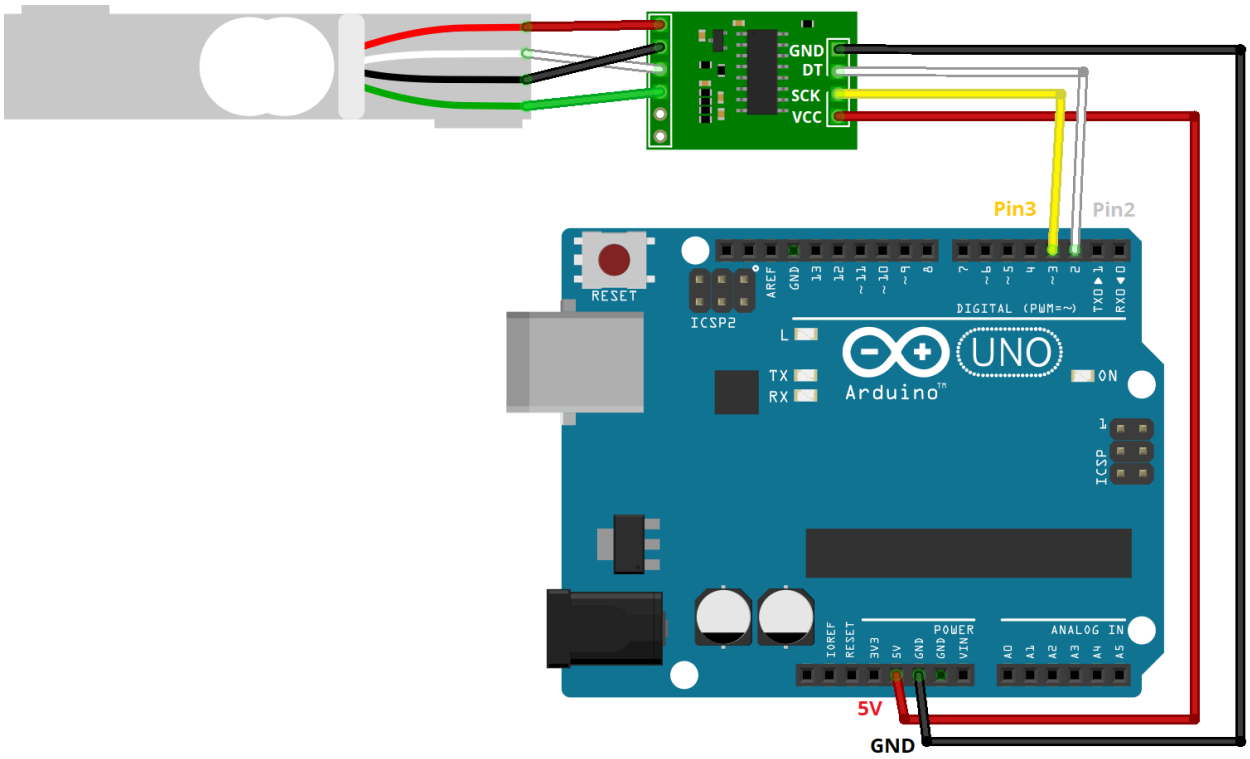
Design 1: Built in Strap



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	Harfingon

Major team goals from last 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

Major team goals for the next week

1. Start testing parts
2. Start assembling product

Last 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

Next week's individual goals

- Nikolai Hess: Finalize work on the circuit once parts arrive, consider soldering parts together once testing has been done. Work with Cassity and rest of group on testing. Research standards.
- Jetzu Thao: Finish designing sensor and putting together parts received.
- Norah Greer: Construct initial prototype and conduct initial testing. See what works/doesn't work, work towards improving prototype.
- Keira Ferrigan: Start fabricating, finalize testing, research standards
- Cassity Dechenne: Finalize testing plan for the parts, start testing parts together and apart from each other. Continue communication with client and advisor

Timeline

https://docs.google.com/spreadsheets/d/1GoAuANy3F-ltP7vhI7g-B9dxuefjj8c50qzYs246SlE/edit?usp=sharing

Activities

Name	Date	Activity/Previous Week's Accomplishments	Time (h)	Week Total (h)	Sem. Total (h)

Nikolai Hess	10/18 10/23	Circuit work	0.5 1	1.5	16
Jetzu Thao	10/23	Drawing of sensor parts	1	1	14
Norah Greer	10/22 10/23	Worked on CAD drawing of strap	0.5 2	2.5	14.5
Keira Ferrigan	10/23	Ordered parts, brainstormed testing plans	1	1	13
Cassity Dechenne	10/23	Testing plan formulation, communication with client/advisor	1	1	15