

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

- Circuit prototype construction is finished
- Testing plans and LCD display coding is in progress
- Circuit box and display box designs are in progress

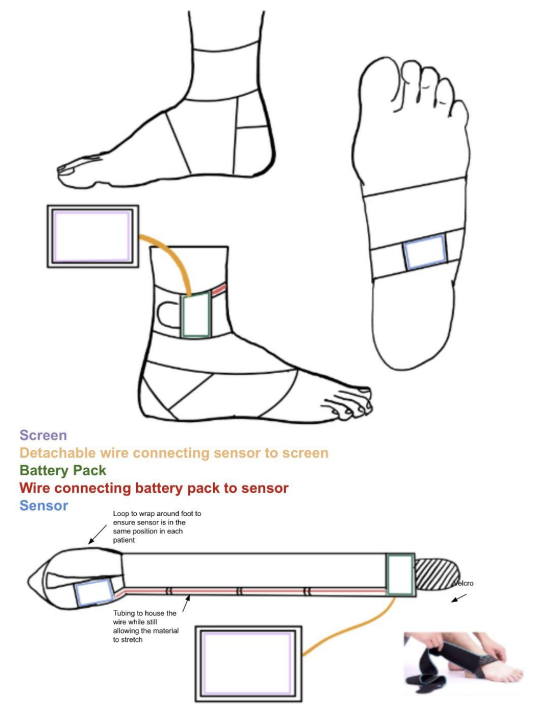
Difficulties/advice requests

- Debugging the circuit
- Lining up schedules for testing

Current design

Designs:

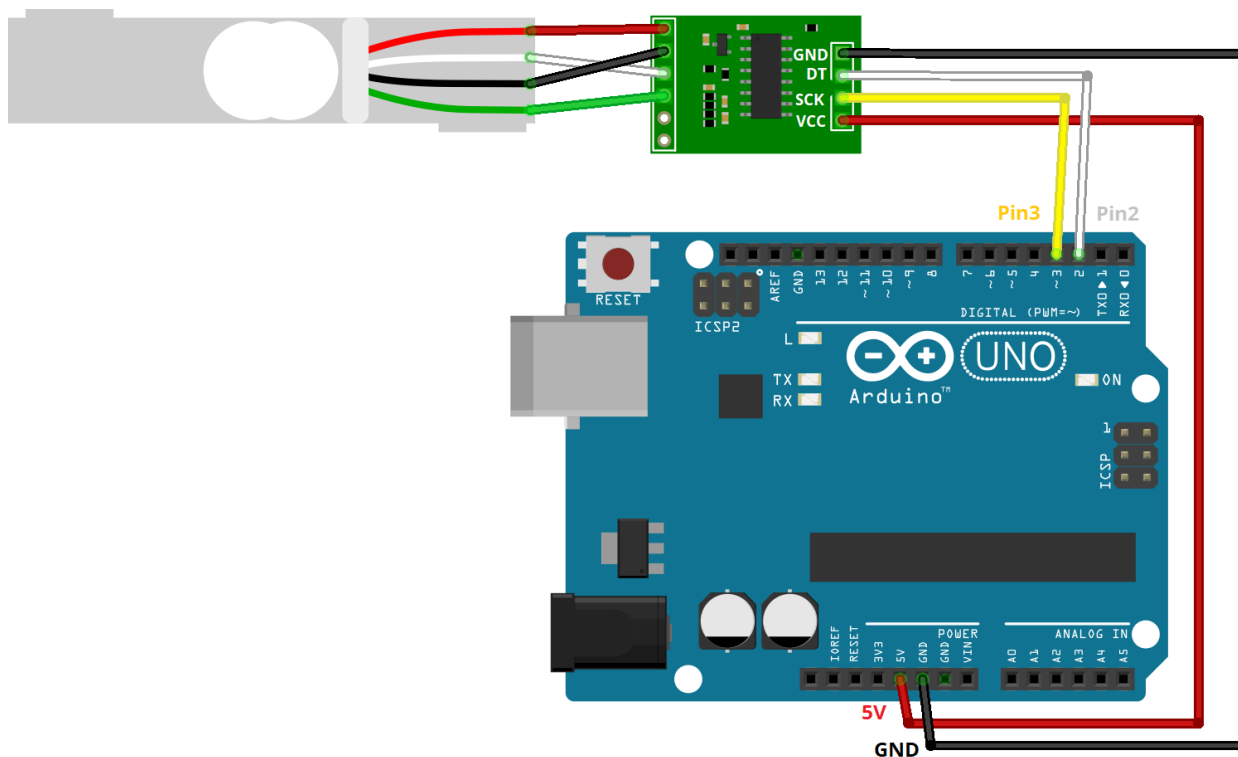
Design 1: Built in Strap



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. Start testing parts
2. Start assembling product

Major team goals for the next week

1. Finalize testing plan and testing data analysis document
2. Begin testing prototypes
3. Finish debugging circuit
4. Present at Show and Tell

Last 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

Next week's individual goals

- Nikolai Hess: Finish debugging circuit and code, begin testing and calibration of sensor, begin work on final version of code and circuit.
- Jetzu Thao: Debug code, help with testing, troubleshoot issues, being working on integrating circuit and strap designs.
- Norah Greer: Finish CAD model for load cell, help with testing
- Keira Ferrigan: Finish 3D modeling the boxes, getting the boxes printed, assisting in the debugging process for the arduino
- Cassity Dechenne: Finalize work on a document for testing data analysis, help to formulate elevator pitch, present at show and tell, communicate with client/advisor

Timeline

<https://docs.google.com/spreadsheets/d/1GoAuANy3F-ItP7vhl7g-B9dxuefji8c50qzYs246SIE/edit?usp=sharing>

Activities

Name	Date	Activity/Previous Week's Accomplishments	Time (h)	Week Total (h)	Sem. Total (h)
Nikolai Hess	10/28 10/30	Circuit work	1 1.5	2.5	18.5
Jetzu Thao	10/30	Worked on code and arduino troubleshooting	2	2	16
Norah Greer	10/29 10/30	Worked on CAD drawings for load cell	1.5 1	2.5	16.5
Keira Ferrigan	10/30	Worked on CAD drawing, planned for show and tell	1	1	14
Cassity Dechenne	10/30	Worked on testing and testing analysis doc, prepared for show and tell	2	2	17