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

- Met with client over design/final product specifications
- Calibration code debugged
- Sensor tested with weight
- New display, microcontroller

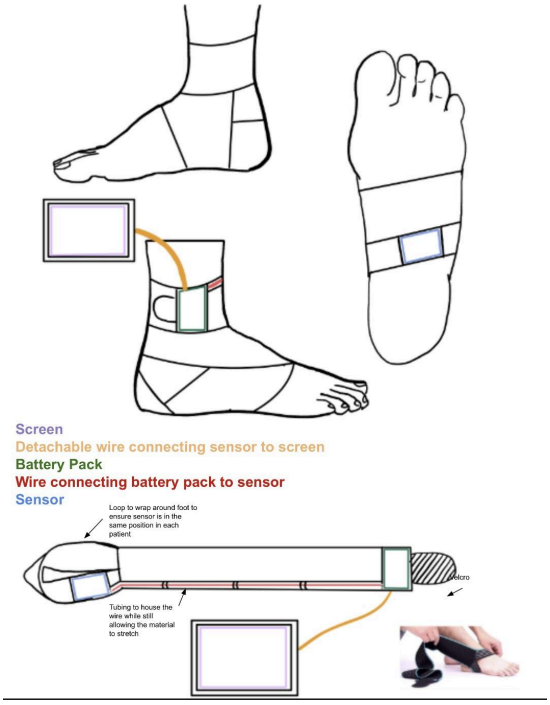
Difficulties/advice requests

- Lining up schedules for additional testing

Current design

Designs:

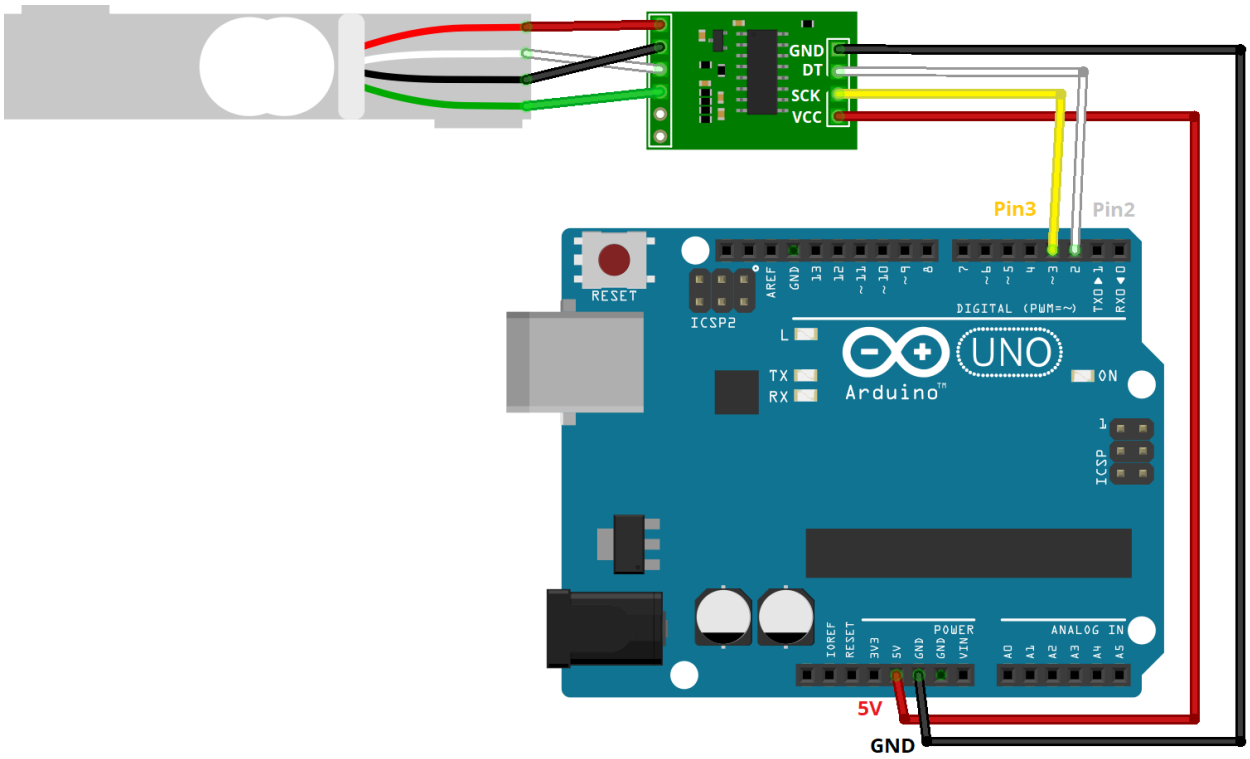
Design 1: Built in Strap



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	Harfingon

	LCD display	1	6	6	Makerspace
	pin headers (for amplifier and display)	6	$0.02	0.12	Makerspace

Major team goals from last week

1. Continue testing and calibration of sensor
2. Continue production of circuit boxes and sensor platform

Major team goals for the next week

1.

Last week's individual goals

- Nikolai Hess: Continue working on final code, work with other team members to get required pieces printed and assembled, begin final testing if progress is completed quickly.
- Jetzu Thao: Work on testing, and combination of the strap and hardware, clean up anything that may it.
- Norah Greer: Get sensor platform laser cut/3D printed
- Keira Ferrigan: get final parts ordered, finish fabricating the pocket on the strap
- Cassity Dechenne: Finalize design of cloth pocket and wire in strap, continue communicating with client/advisor.

Next week's individual goals

- Nikolai Hess: Finish circuit assembly, and test code and readout with set weights once completed
- Jetzu Thao: Finish circuit for new screen and controller.
- Norah Greer: Redesign and re-lasercut platform to better fit screws. Construct load cell/platform, look into padding and begin sewing to strap.
- Keira Ferrigan: Continue researching potential materials, continue fabricating and 3D modeling
- Cassity Dechenne: Communicate with client/advisor, continue finalizing/testing product

Timeline

https://docs.google.com/spreadsheets/d/16zWtF1-gL17xbjSfm-4aDRiTb-1oFXjDqdXYRBUVdkQ/edit?usp=sharing

Activities

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

Nikolai Hess	11/18	coding work	1	1	22.5
Jetzu Thao	11/20	Research and putting together new display with controller	3	3	21
Norah Greer	11/17 11/18 11/20	Worked on laser cutting file Laser cut platform for load cell Tested platform with load cell, started looking at screws to hold the two together	1 .5 .5	2	21
Keira Ferrigan	11/20	Ordered 3 parts, Continued 3D modeling, looked for screws to fit our part	2	2	19
Cassity DeChenne	11/20	Looked into design fabrics, formulated pocket and wire design procedures	1	1	20