

## Leg Stress Device

- What the prototype does:

The first idea I thought of was the flex sensor we talked about in class. I would like to insert them into leggings or running tights to gauge the pressure and the amount your muscles in the calf, hamstring, and quadriceps flex on and around the knee. You could take Electric Stimulation used in physical therapy and re-engineer them to take information in and process them to a wrist mounted LED display. Either way, it would send a signal to a LED screen on your wrist that lets you see in real time what forces your knees and legs are experiencing during a workout.

The LED display mounted on your wrist would include all the hardware and electrical components that would be mounted onto a platform or box; either laser cut or 3D printed. The tights would have sensors and wires sewn into them running up both sides of each leg until meeting your waist where a small external pack would include all electrical components and a Wi-Fi or Bluetooth signal that would be sent to the watch for communication.

- How participants would interact with the system:

The way the leg stress device works is a simplistic but complicated system of a wrist watch lit LED display that shows you a ranking of stress and forces on your muscles in the calf, quadriceps, and hamstring on and around the knee. The user will put on the sensing tights and turn on the tights followed by making sure the LED device is on and can pair to the tight. It's as simple as making sure your last run or exercise is cleared and then pressing the start button. Begin running and it immediately starts appearing.

- How each project meets the criteria listed above:

The product meets the criteria by having electronic components along with a special program. A Laser cut or 3D printed box will be used for the wrist watch casing. The strap for the LED wrist watch and tights will be modified in the shop.

- How it will be evaluated:

It will be evaluated by a trained professional to make sure it meets all safety regulations.

- How it will be built within budget:

It will be built within budget by finding cheap but durable materials, along with electrical components gotten off the web from [Adafruit.com](http://Adafruit.com) or [Sparkfun.com](http://Sparkfun.com).

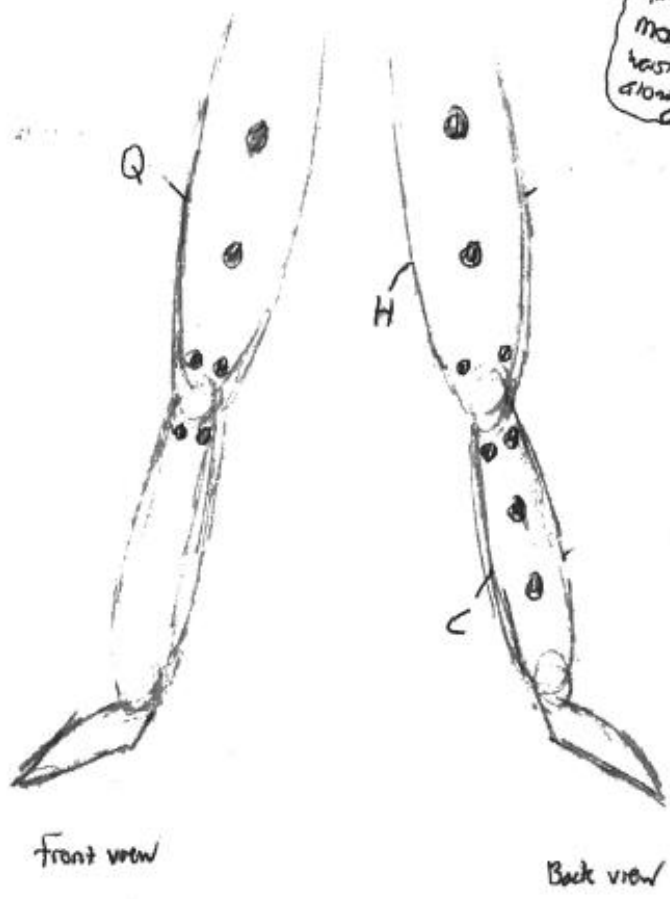
- How will people interact with it at the symposium:

At the Symposium demonstration, one volunteer would be wearing the tights for the entire day. As people walk by the booth, they would be offered to engage and to interact. The wrist mounted display would then simply be put on the interested person. As the volunteer begins to run in place the person wearing the display at that time would be able to see all movements and forces acting upon your legs during a workout.

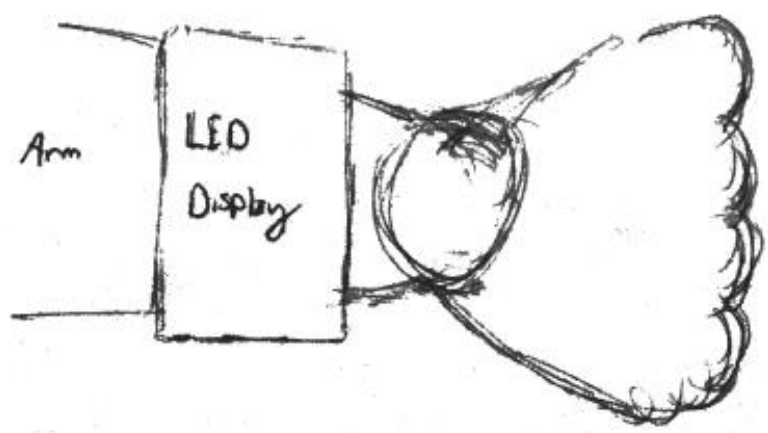
# Leg Stress Device

- Key
- - Sensor
  - H - Hamstring
  - C - calf
  - Q - Quadriceps

Back view  
Sensors and wire  
Diagram



All Head wear  
mounted into  
waist line  
along spine



*Brody*

## No Sleep Watch

- What the prototype does:

The second idea I came up with is the vibrating wrist watch. I would like to place a heart rate sensor and 2 vibrating sensors into the wrist watch. The product is designed to help you stay awake in class, at work, or just in your everyday life. The way this product works is, when your heart rate drops below a set range while experiencing half asleep and fully sleep, the watch will start to vibrate only one of the vibrating sensors. If you don't wake up within 1 and a half minutes, the second vibrating sensor will turn on along with the first making for a twice as powerful vibrating sensor.

- How participants would interact with the system:

The way you interact with this device is very simple. Place the No Sleep Watch on your wrist and buckle the strap. Start your everyday life and if the No Sleep Watch catches your heart rate dipping below average sleeping rate, the watch will begin to vibrate and if longer than 1 minute and 30 seconds, the second vibrate will turn on. With the simple push of the face right in the middle you can stop the No Sleep Watch from vibrating.

- How each project meets the criteria listed above:

The product meets the criteria by having electronic components along with a special program to run them. It will have a Laser cut box to place all the components in. The strap for the No Sleep Watch will be modified in the shop.

- How it will be evaluated:

It will be evaluated by a trained professional to make sure it meets all safety regulations.

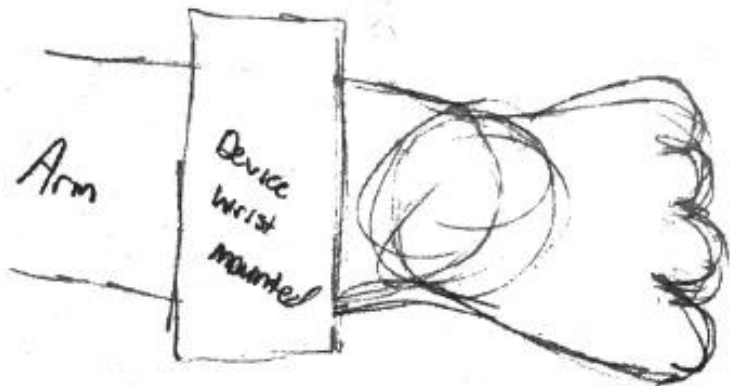
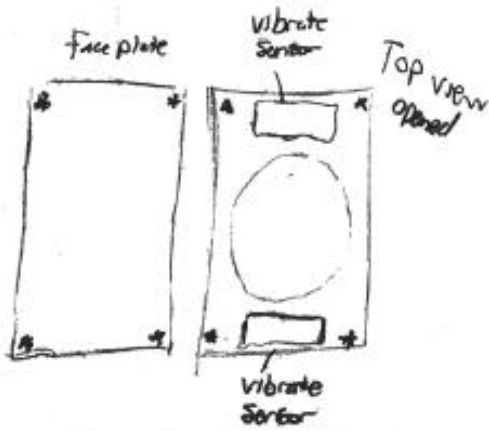
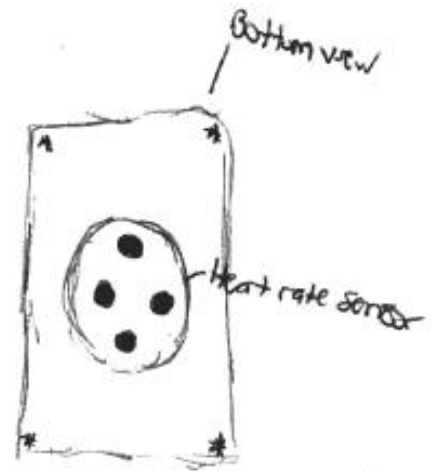
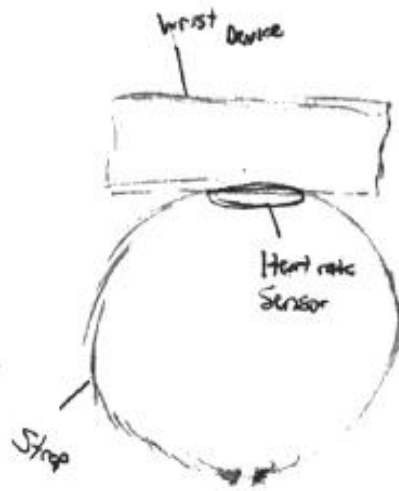
- How it will be built within budget:

It will be built within budget by finding cheap but durable materials, along with electrical components gotten off the web from Adafruit.com or Sparkfun.com.

- How will people interact with it at the symposium:

At the symposium people will interact with the No Sleep watch. Since it will be a demonstration, the heart rate range will be modified from a sleeping heart rate to a more relaxed rate so that way participants can try the watch on and sit down in a chair and begin to relax. As the participant begins to relax and their heart rate drops into the range, the Vibrating sensor number 1 will activate. Then, if their heart rate does not increase above the range the second heart rate sensor will begin to activate thus causing both vibrating sensors to be activated. With a simple firm press right in the middle of the face, the No sleep watch will deactivate the heart rate sensors if you're awake but your heart rate has not yet gotten above the targeted range, so the watch is not just vibrating for a while on your wrist.

no sleep watch



## Bed Extension

- What the prototype does:

The third prototype is designed to be a bed extension; it was designed after a friend who is very tall and has issues fitting on any bed. The way it works is there is a pressure plate in-between your mattress and box spring. What happens is when the pressure plate reads a certain value, there is a device attached to the end of the bed with a folded down piece of mattress mounted onto it. When the pressure plate reads elevated, from the person laying on the bed, the folded down section of mattress at the end of the bed will begin to rise by an Electric actuator cylinder giving you one foot (12 inches) of extended leg room for those exceptionally tall people.

- How participants would interact with the system:

Participants interact with the Bed Extension simply by laying down to take a nap or go to bed for the night. Once the Pressure plate reads a value of a person sitting or lying down the extension rises and gives you the extra foot (12 inches) of leg room. No user input needed as the entire system is automated.

- How each project meets the criteria listed above:

The product will meet the criteria by having electric components and a program. The metal frame will be modified in the shop and a Laser cut box will be created for both sliders.

- How it will be evaluated:

It will be evaluated by a trained professional to make sure it meets all safety regulations.

- How it will be built within budget:

The project will be able to stay within the budget by finding cheap components from Adafruit.com or Sparkfun.com. The frame will be from recycling old scrap metal or even made of wood for the prototypes.

- How will people interact with it at the symposium:

At the symposium, since this prototype involves lying on a bed and we all know that those are very large, the prototype will be scaled back to be attached to a chair. Therefore, when participants walk by they can sit down in the chair and experience the Bed Extension in action. It will raise or lower based upon the reading from the pressure sensor.



# Bed frame extension

