**Sensorized Glove**

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May 11th, 2015 (Lab)

* Jobs to do: Improve glove design, improve (organize) wiring harness, adjust/repair the use of FSR and FSR attachment to glove, incorporate resistor board into Arduino attachment to arm, enable wireless capabilities
* Today go online find methods of applying the FSRs to the glove, find a schematic for the wiring to make the wiring harness, look into materials and methods for glove re-design, go through report to see reasoning behind certain materials and methods used
* Possible adhesives: **locktite flexible adhesive**, flexible fabric glue
* Find reasoning why they used the adhesive they did in the report
* Test the pressures on the sensors without the use of strong backing so something flexible or how the pressure is dependent on the backing (mainly for the use of adhesive)
* Keep Arduino board it is programmed and fully functional
* Look into certain types of wires that need to be used and find out where orange connector is used for
* **4 main wiring harnesses**
* 1. Orange connector
* 2. Accelerometer connector
* 3. Arduino connections to sensors
* 4. Resistor board connections to sensors
* **2 minor wiring harnesses**
* 1. Resistor to Arduino (green)
* 2. Resistor to Arduino (grey)
* Probable replacement parts: 10 sensors, breadboard, Bluetooth shield, new wiring, wiring harnesses
* Fix roll angle problem adjust to do angles between 0-180
* Find programs needed to run files and the program given on the CD
* Look into making pockets on the glove design to let the sensors sit in them (check to see if adhesive on back will keep in place or if the sensitivity is to high)
* Adjust connectors to the ends of the FSRs to reduce damage due to heat

May 12th, 2015 (Lab)

* Make hand schematic of wiring
* Continue going through report
* The FSRs rear adhesive seem to be strong enough to hold them to the fabric without extra glue in the case that there is a sewn pocket to hold the sensor
* Test the glue on the fabric prior to attaching FSRs so if the glue is too hard for the backing of the FSRs then do not use it

May 13th, 2015 (Lab)

* Possible future iteration is similar to the Banisha project where we could use a similar motion sensing strip along each finger which would give accurate displacement and movement measurements along each finger
* Also the strips would allow for data on individual finger angles instead of the use of an accelerometer
* The use of a substrate material which would allow for movement, more comfortable fitment, and the Bluetooth to be connected and also a battery similar to Banisha
* The microcontroller and diode PCB board would all be integrated onto a much smaller board with a microcontroller chip
* Buy electric tape to start working on rough wiring harnesses
* Look into elastic materials that would form to the hand of the user better (spandex), check fabricland for the fabric and try making a few possible prototype gloves and then look into which is best designed and if it’s possible to make pockets for the sensors with a more thin material for the pocket

May 14th, 2015 (Lab)

* <https://www.youtube.com/watch?v=lqcydcIuzuU> Tekscan solution for the gripper
* Drew out schematic for how the system should be wired
* Find out if there is some way to integrate the Tekscan design with similar strips to those on the Banisha which allowed for the acceleration, jerk and angle to be recorded
* If the Tekscan design is followed then the glove will be able to read pressure and force then similar wiring harness and schematic will allow for room on back of hand for strips to be attached allowing for readings of flex, acceleration, jerk and angle
* Look into acceleglove for accelerometer on each finger then use something similar to Tekscan for forces
* Mini accelerometers with X,Y,Z axis on each finger then one main source on center of back of hand
* Also look into the software based off of the software from the acceleglove
* <http://www.robotshop.com/blog/en/arduino-5-minute-tutorials-lesson-6-force-bend-stretch-sensors-3635>
* <http://www.sensorprod.com/tactilus/pdf/tactilus-stretch-sensor.pdf>
* <https://www.tekscan.com/products-solutions/systems/grip-system?tab=description>

May 19th, 2015 (Lab)

* <http://multimedia.3m.com/mws/media/765023O/iatd-product-info.pdf>
* Use similar adhesive to this or pretape spray on the adhesive already on the FSR then put them inside the pockets on the glove to ensure stability and no loss of sensitivity
* <http://www.idealabi.com/media/docs/Industrial/9235%20Data%20Sheet.pdf>
* Use this tape for the adhesion of the FSR to the material chosen
* Use Lycra for the material for the glove and the Arduino mount on forearm
* <http://www.fabriclink.com/university/char.cfm>

May 20th, 2015 (Lab)

* Find Arduino jumper wires to use instead of having to solder the connectors to wires saving time and keeping system neat
* Hand size (150mm-200mm)

May 21st, 2015 (Lab)

* Take the Sensorized glove home use desktop and download both Arduino program and java
* Connect the glove and test which receivers come up when using the GUI and see which FSRs connect to which fingers and connections
* Record all data and then when rewiring follow same setup and same pins

May 27th, 2015 (Lab)

* Use ribbon wire as it will allow for neater wiring similar to wiring harness
* Set up eclipse on windows and use it to find out which sensors are at which position and to give the GUI a practice run
* Discuss materials for design
* Discuss plans for glove so far and what to do with the sensors
* The glove will be made to fit all sizes using the lycra or similar to the design the group came up with will be used along with pockets for the sensors after testing the sensitivity of the sensors
* The accelerometer is being worked on with a code similar to Hilary’s but for multiple axis allowing for the angle to be measured too
* The final component after that is the Bluetooth capabilities
* Flexible rods could be used on the back of the hands to run wires along and with the groups design of individual straps will give stability to Velcro
* If there is enough time the sensors may be improved to tactile sensors and would also need to read accurate values while displaying the force patterns
* After testing the FSRs with the Arduino code it was found that the FSRs should have no problem inside the pockets of the glove as the sensitivity range is not in this range
* Next step is to begin building the actual glove or begin testing possible designs
* During this process run the GUI and the Arduino code and test the GUI and accelerometer to fix the angle issue and to improve the GUI (possibly rebuild the GUI using QT)
* Some more tests have to be completed using a new FSR to ensure testing data is actually accurate also testing must be completed on sample once the FSR is mounted to the Lycra as last time there were some issues with mounting and values will change accordingly
* Check what the past relation with RCtime and force values was that they used to write the GUI
* By tomorrow have at least 3 complete glove designs completed with wiring patterns
* 1 similar to given design
* 1 similar to standard glove with stretchable material
* 1 similar to flexible rod behind hand and straps secured to flexible rod

June 5th, 2015 (Lab)

* Create new GUI but contact tim and ask him how to get the current GUI to work on new computer (Locations for files have changed)
* Find flexible backing for hand
* Work on GUI on QT creator and use code from original GUI to make it
* Possibly use soldering wire due to its flexibility and conforming aspect
* Use to route the wires along the back of the hand
* Possible problem is that the wire could cause a resistance against straightening hand
* Possibly use a silicone based material which will allow for flexibility and then put inside a tube sewn together with the routed wires
* Look into possible 3D printed backing of glove
* <http://mashable.com/2012/08/11/smart-surgeon-gloves/>
* <http://www.instructables.com/id/Sensitive-Fingertips/>

June 9th, 2015 (Lab)

* <https://www.youtube.com/watch?v=Dgqu36Cx9MA>
* <http://www.instructables.com/id/Make-Gloves-for-Yourself/>

June 10th, 2015 (Lab)

* <https://alicelc.wordpress.com/page/2/>

June 12th, 2015 (Lab)

* <http://www.kobakant.at/DIY/?p=772>
* <http://arduino.stackexchange.com/questions/8328/getting-sensor-data-wirelessly-from-arduino-to-pc>
* <http://www.instructables.com/id/Control-your-arduino-from-your-PC-with-the-Qt-Gui/?ALLSTEPS>
* <http://ww1.microchip.com/downloads/en/DeviceDoc/rn-41-ds-v3.42r.pdf>
* <https://books.google.ca/books?id=t0Txgwjarf8C&pg=PA18&lpg=PA18&dq=rn41+use+for+wireless&source=bl&ots=lf8zlg2H-a&sig=r36OixP86QD3AJN1hISpIBx5ogg&hl=en&sa=X&ved=0CEIQ6AEwBmoVChMIm6LZ9tqKxgIVziWMCh0AOwmu#v=onepage&q=rn41%20use%20for%20wireless&f=false>
* Check with PPS to see if I am able to buy individual sensors and check the costs of them

June 18th, 2015 (Lab)

* <http://uhra.herts.ac.uk/bitstream/handle/2299/6381/905798.pdf?sequence=1>
* <http://www.arduino.cc/en/Tutorial/Graph>