**The (Dr. Matthew) Walker Texas Rangers III**

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Due Date: March 3, 2017

Our objective is to develop a smart-shunt design for hydrocephalus treatment that detects and communicates intracranial pressure changes of 3-5 mmHg by measuring the pressure both inside the shunt and at the tip of the shunt inside the third ventricle.

We decided to focus on strain gauges as our pressure measurement mechanism. After measuring the dimensions of the shunt tubing we acquired from Dr. Feldman, we found a strain gauge with suitable sizing and ordered it from Vishay Precision Group, expected to arrive in 3-4 business days. As part of the design phantom, we have also ordered Albumen and hope to obtain saline from Dr. Feldman. We will use these to mimic CSF in our pressure testing. Additionally, as part of our remote pressure communication system, we also obtained an Arduino with an NFC shield for use with a strain gauge. The current design is to put the strain gauge in a Wheatstone bridge configuration to detect the resistance changes as a result of ICP pressure. The Arduino will then be used to read this resistance value, convert the value into pressure, and then write the measurement to an NFC tag. The NFC tag can be read by placing the phone near the NFC tag, which will read the measurement with the use of a smartphone application.

Currently we are in a bit of a holding pattern as we wait for materials to be delivered for use. This has limited our ability to begin physically testing the design and its layout. Once we receive the strain gauge, we will work with lab facilities available on campus to make our first prototype. We will make a PDMS block into which the strain gauge will be incorporated, and this PDMS block will replace a portion of the shunt wall.

Per Dr. Miga's suggestion we will be mocking up the design in Creo to do some preliminary testing with a computer model. Using Creo Simulate we should be able to assess the stress profile on the side of the shunt at the location where the "window" containing the strain gauge will be.

Currently, the code for the Arduino must be written to both read and write to an NFC tag. Due to the strange gauge not arriving yet, however, a variable resistor from the instrumentation lab will be used to see if measurements can be written. Additionally, methods of saving energy usage from the Arduino must be explored. Possible approaches include stripping of the LEDs, regulating the time of measurements, and use of different batteries.