Background

Hydrocephalus is a disease characterized by the buildup of excess cerebrospinal fluid (CSF) in the brain, which can lead to irreparable damage. Hydrocephalus can be treated with the insertion of a shunt, which drains CSF from the brain into the abdomen, where it can be reabsorbed.

There are 125,000 patients with CSF shunts in the US, with 33,000 new shunts placed each year. ~70% of shunts fail within 10 years of insertion. On average, diagnosing shunt failure costs $970 per visit.

Needs Statement

Hydrocephalus patients need a way to monitor their shunt to reduce the time, expense, and risk of additional procedures after shunt insertion.

Solution

SafeShunt is a three-part shunt-monitoring system:
1. Sensor tracks the rate of CSF drainage
2. Data is transmitted to a patient interface alerting them to abnormal CSF flow
3. Flow rate data is sent to a physician interface, where the physician can review the past and current performance of the patient shunt

Verify Testing

Initial tests of the prototype can:
- detect flow to precision within 1 ml/min
- detect change in flow of different viscosity liquids
- detect change in flow through catheter with an obstruction