SafeShunt

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.

normal brain

brain with hydrocephalus

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

JOHNS HOPKINS BIOMEDICAL ENGINEERING

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Patient Journey

Meet Tyler, a 36-year-old shunt patient diagnosed with congenital hydrocephalus.

"Every time I have symptoms of a malfunction, there are days, weeks, and even months of doctor visits, tests, medications, and frustrating waiting, which can be disheartening"

At age 20, Tyler's shunt failed, starting a long, straining cycle of failure diagnosis and reinsertion.

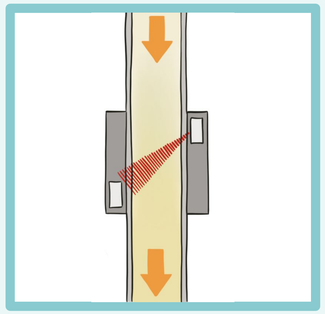
The next time Tyler's shunt fails, he gets a notification and can schedule a checkup right away.

Tyler is put in control of his health, gaining faster diagnoses and peace of mind.

Needs Statement

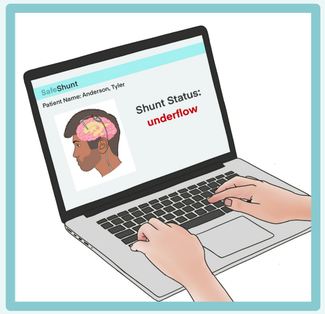
Hydrocephalus patients need a way to **monitor** their shunt to **reduce** the **time**, **expense**, and **risk** of additional procedures after shunt insertion.

Solution



SENSOR

PATIENT INTERFACE

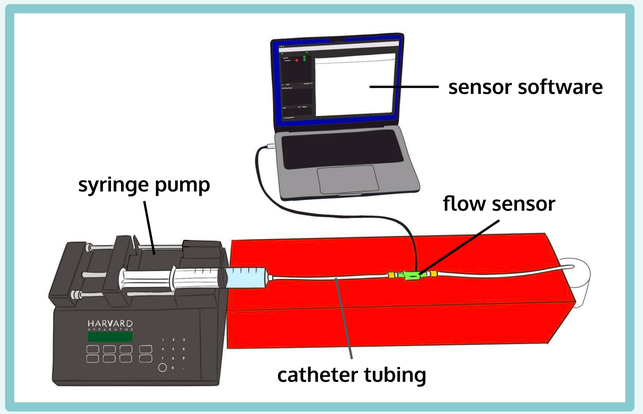


PHYSICIAN INTERFACE

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

Verification 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

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