StreamFi

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Introduction

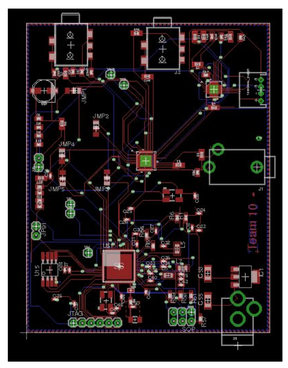
In large public settings such as sporting events, stadiums, or music festivals, it can often be difficult to determine how much liquid is in a large beverage container without opening the container or tilting it. For other applications such as gas companies that have a large number of gasoline tanks, it is sometimes unsafe to open up the container and determine how much liquid is in them. Our product, StreamFi, is a self-contained, retrofit volume-level acoustic sensing device which can be safely applied to the outside of any of these large containers and is able to provide the users real-time fill-level notifications for their users through a web application.

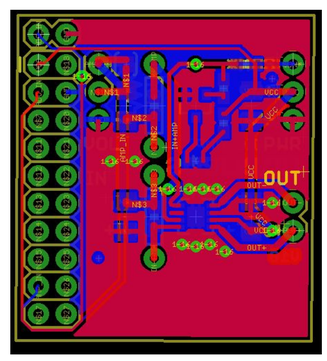
Meet our Team:

Design Goals

- Be non-sparking and non-invasive to container
- Retrofits to exterior of container
- Easily transportable and non-specific to container
- Report fill level in increments of 25%
- Notify user through front end web interface and notifications
- Store lifetime data and represent this in front end web interface
- Durable and water-resistant
- Quick and easy user interface for checking fill level

Hardware



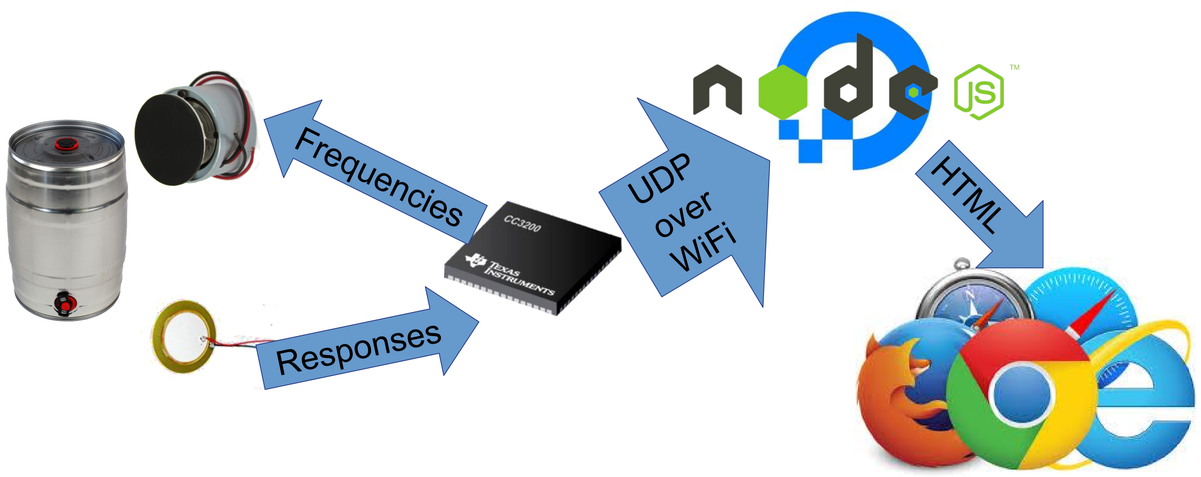


Custom PCB

System Setup

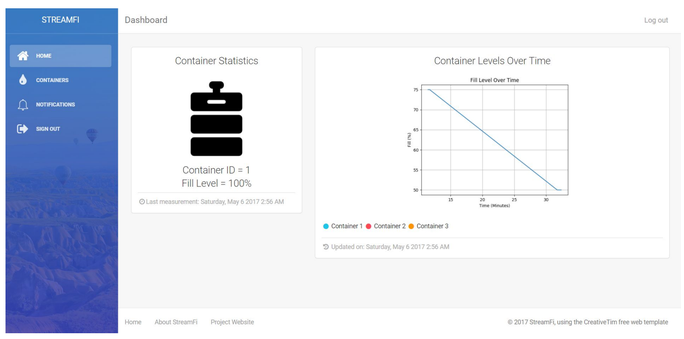
CC3200 Launchpad

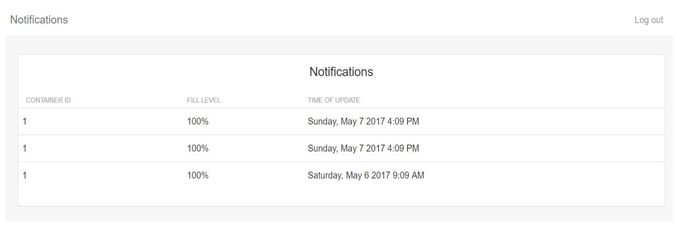
Concept / System Architecture



Web Application / User Interface

By visiting our web application, users are able to easily monitor fill levels for any of the containers they are tracking. In addition, users can view graphs and notifications which dynamically update to show fill levels over time.





Fill Level Classification

To convert readings from the piezoelectric sensor into a fill level classification, we first took 100 samples at each fill level. We then fingerprinted these samples based on their resonant frequencies. Reclassifying a random sample from the 100 samples has success shown in the confusion matrix below.

		Predicted				
		Empty	Quarter	Half	Three Quarters	Full
Actual	Empty	12	8	2	0	0
	Quarter	2	14	4	0	0
	Half	3	10	4	0	0
	Three Quarters	2	1	2	15	0
	Full	0	0	0	0	21