Ultrasonic Impurity Detection Meter

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DESIGN PROBLEM

Problem Statement

Wouldn't it be nice to not have to sniff the milk to check if its spoiled? Can we go by the UPC label always, before taking a sip of what tastes like uncertainty. There is a need to create a product that can assist the assessment of consumable products that could be passed its own shelf life.

Probing the liquid to test for impurities is not efficient as we can not open break the tamper guards on a grocery container. We must create a design that does not risk cross contamination reusing the same test equipment for different liquids.

Design Objective

We propose to create a design that does not cross contaminate packaged liquid, evaluates as good or bad, and saves the test readings.

Design Criteria/Engineering Requirements

The device should be non-invasive to the product being measured.
The device will have constant low power consumption.
The device should have permanent data storage.
The devise should be palm controllable.

DESIGN ARCHITECTURE

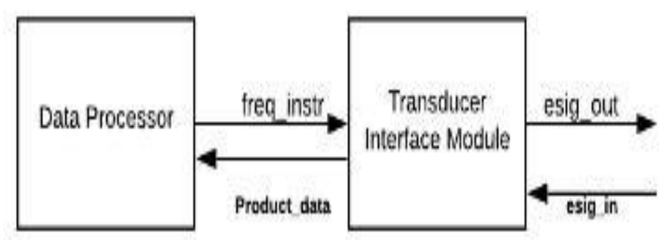


Figure 1. The image above shows the Level 1 Block Diagram ….

DESIGN IMPLEMENTATION

- Through our understanding of ions in liquids, we plan to leverage the frequency of liquids to draw parallels and ultimately a conclusion on the shelf life cycle the liquid is in.
- Configuring 2 MSP430s 1 Tx, 1 Rx with Bluetooth modules HC-05 parent device for connection and databus transmission.
- Define simple communication protocol exchange between devices UART for serial communication.
- On app. GUI monitors the device status by periodically reading back the device status registers. All status error bits must read a given state for the device to be in the normal or working state; and is indicated by a blue back color. If any of the status bits read an irregular state, an operational fault exists or the register map is corrupt, and the device may not function properly, and is indicated by a red back color. The Device status automatically updates after each time of flight

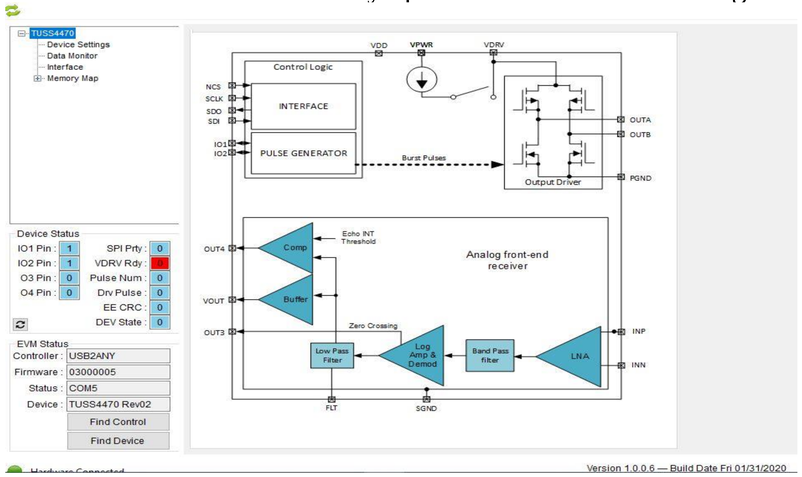
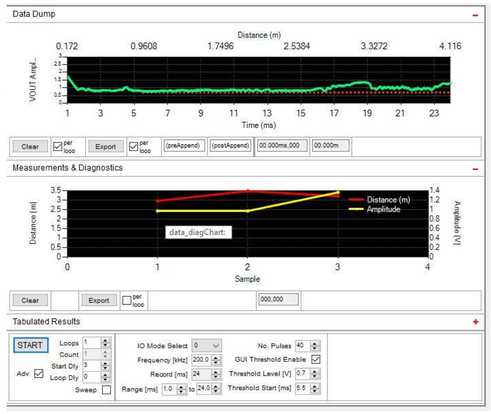


Figure 2. Detailed Design for the Project

RESULTS

Testing Results



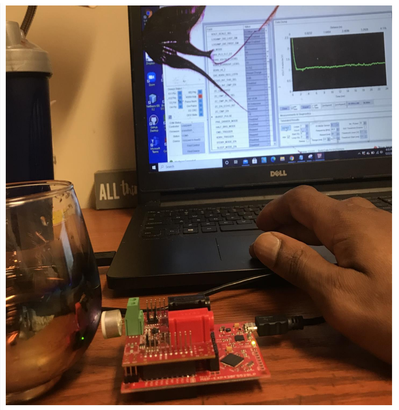
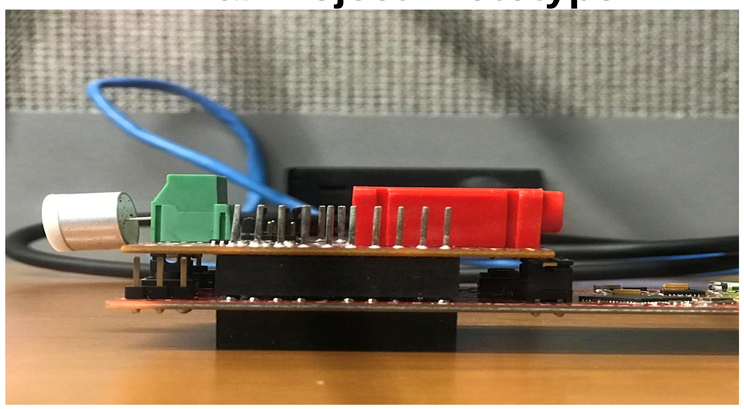


Figure 3 & 4. Test Data showing 2nd impurity Test with glass of milk to test if different background would affect results

Final Project Prototype



DISCUSSION/CONCLUSION

- These results suggest that with any measurement of any liquid, the actual impedance value can be found real time for a real evaluation of if the liquid is consumable or not.
- This development is important because it gives customers and retail grocery stores a way to scientifically ensure the product liquids being sold have the same nutritional value when ordered, to when it is consumed.
- Future development should focus on the memory storage and measurements vs contaminated products.