1. **SUMMARY AND FUTURE WORK**

In the food service industry, restaurants and bars have different methods of determining the amount of alcohol in their containers. Some restaurants and bars use a scale to take the weight of the keg and enter it manually into an online system that helps track the progress of the alcohol sales for each particular beer. Others might use a different weight mechanism like the human finger or spring device to also test the weight of the keg for records and to determine when to order that particular beer. These methods seem mildly inaccurate and cause a restaurant or bar to dedicate time, physical strength, and resources for only one aspect of running a food business. ALLDET believes these customers would prefer a non-invasive, reliable method to detect the accurate amount of liquid in the kegs with ease.

The ALLDET is a product that serves customers to enable them to detect the liquid level in their kegs and manage their inventory in a timely manner. Currently, most restaurants manually enter inventory data rather than use electronic methods. This product eliminates that process by tracking inventory history electronically via the mobile application. The ALLDET device paired with the application aids customers by saving time and resources which has a return on investment based on the device’s price.

ALLDET includes hardware components and software integration to create a non-invasive device for restaurants and bars to monitor and record the liquid level inside beer kegs. The hardware components of the device are a Raspberry Pi Zero W, mounting magnets, a clamp mechanism, a 3.7 V Lithium-ion battery, piezoelectric sensors, a 12 V solenoid, an analog to digital converter, a DC-DC boost converter, and a battery charging circuit. The device is paired with a mobile application to allow users to read from the device with ease. The Raspberry Pi transmits the recorded data to the cloud server, where it is stored and accessed by the user with the mobile application.

The device caters successfully to customers’ needs who will be in a chaotic, cool, and damp environment. The ALLDET can withstand some liquid spillage and 0 °C, which is slightly below the average temperature of a refrigerator. Also, the device can read accurately ± two pints in one-sixth barrel kegs while remaining a WiFi connection of at least nine meters. With the fast pace environment, the battery is intended to last at least sixteen hours and operates without user intervention. Since ALLDET and the application intend to help with data logging, the device will cost less than $200 since a customer will most likely need to purchase more than one device.

ALLDET is an attachable device that will have a solenoid strike a keg, causing it to vibrate. The vibration sensors will communicate with the Raspberry Pi Zero W to transmit the detected liquid level to the application. This design enables this product to save time and eliminates the need for physically lifting the keg for restaurant and bar employees. For future improvements, the ALLDET device will have more reliable tracking and recording abilities and be tailored to track any fluid including oil in transformers, chemicals in metal containers, and propane levels in propane tanks.

