IoT based Smart bottle for Healthcare

TEAM - SPACEXYZ

TEAM MEMBERS

01

Sri Pavani Manikonda (20BCT0283)

02

Shreya Markhedkar (20BEI0040)

03

Urva Dave (20BCM0086)

04

Aanchal Toshniwal (20BCT0235)

05

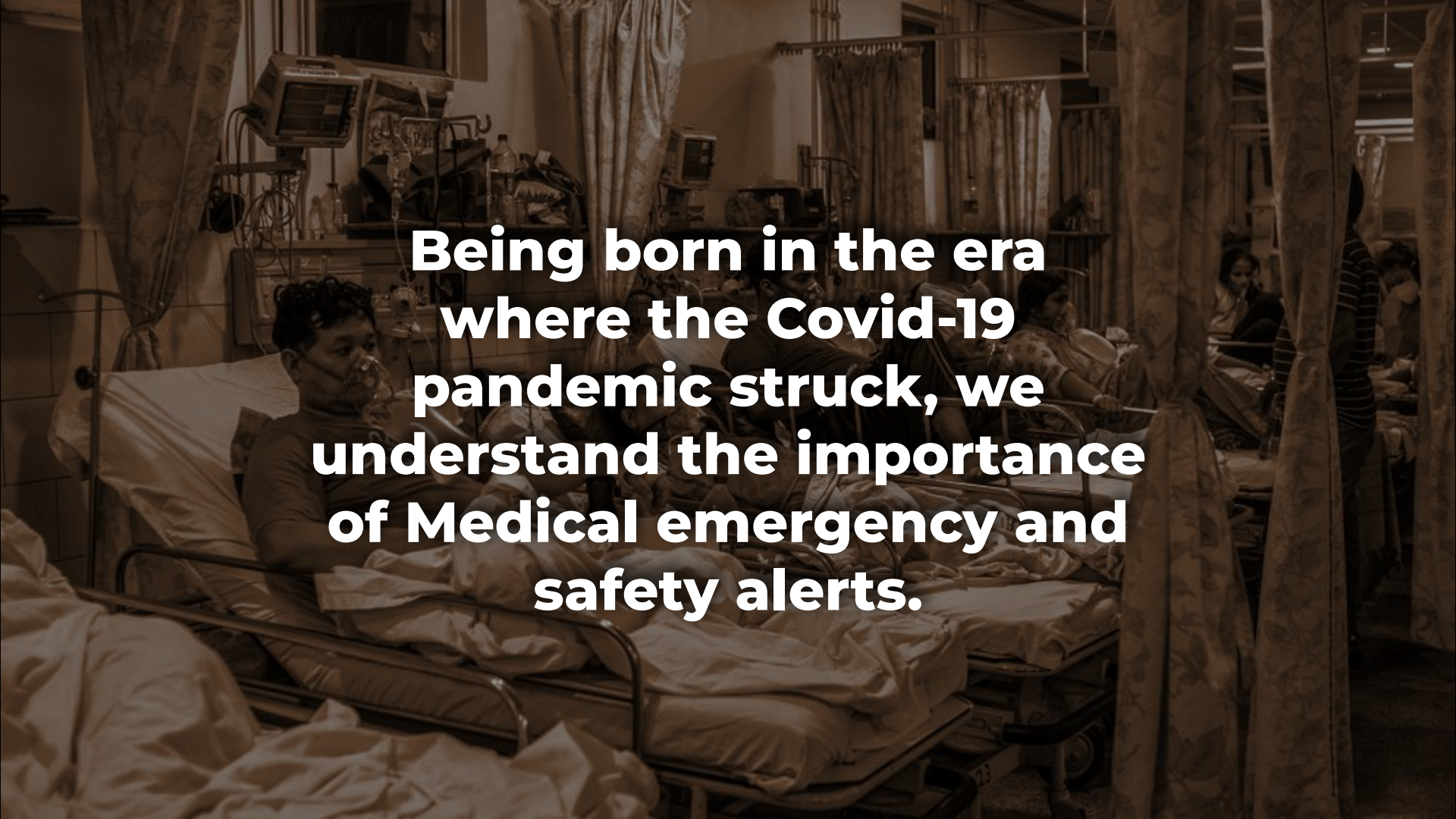
Nishita Jaiswal (20Bei0094)

PROBLEM SELECTED

Problem statement: IoT based Smart bottle for Healthcare

Problem Statement Code: IA05

Description: “A proposed IoT based automatic alerting and indicating device for monitoring electrolyte bottles in hospitals, based on a sensor that triggers an alert when fluid level/weight is below a certain limit, to overcome the critical situation of observers forgetting to change bottles due to their busy schedules, which can lead to better patient care and faster recovery times.”


Being born in the era where the Covid-19 pandemic struck, we understand the importance of Medical emergency and safety alerts.

Solution Achieved

- Our solution is a reusable cap designed to work with IV bottles. The device is used to monitor patients' electrolyte levels in real-time and provide personalized care based on their individual needs.

The hospital will have a centralized control unit where they can access all data of each bottle through their unique ID. There is a customized app specially devised so that the individual personnel can access the information on the IV drip bottle level. The app provides insight on the level, real-time data with the entire history of the level of the IV drip.

In case the level drops below the critical levels, an alert signal would be sent through the app plus a buzzer would be activated. This would alert the nurse to check the bag immediately.

TECHNOLOGY USED

We used **Firebase** as our database and cloud to receive data and send data to mobile app using API.
We use **Blynk** for Application development. The app will include live status update, adding more devices or bottles, monitoring patient and push notifications for alerts.
Arduino IDE will be used to communicate with the microcontroller, cloud and **Thing-Speak** will be used for live status visualisation of the data

Technology Used

We use **ESP32 Development Board with Wifi and Bluetooth** as microcontroller to connect to the sensor and send data to the cloud.
Ultrasonic sensor which is a **Level sensor** is used for level measuring of the liquid irrespective of the type or density of liquid. This would be used to detect the distance at which the fluid is present. This would help in the continuous monitoring of fluid levels in the IV Bottle.
There is a buzzer included in the circuit to alert when the level is below the critical level

FEATURES ACHIEVED

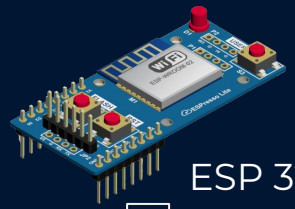
The unique cap has an ultrasonic sensor for distance and level measurement. The ultrasonic sensor sends data to the ESP32 which is WIFI enabled so the data can be accessed through the database and app. The data is also dynamically visualized through Thingspeak.

The app’s main functionality is to provide an alert to the personnel through notifications in the app. Due to the critical and importance of constant monitoring, the alert stays till the problem isn't rectified.

The control unit has a firebase cloud as its center with parameters like alert and level. This data can then be used for multiple purposes through the data JSON files.

There is buzzer for alert as a physical indication of the critical level.

Ultrasonic sensor



ESP 32

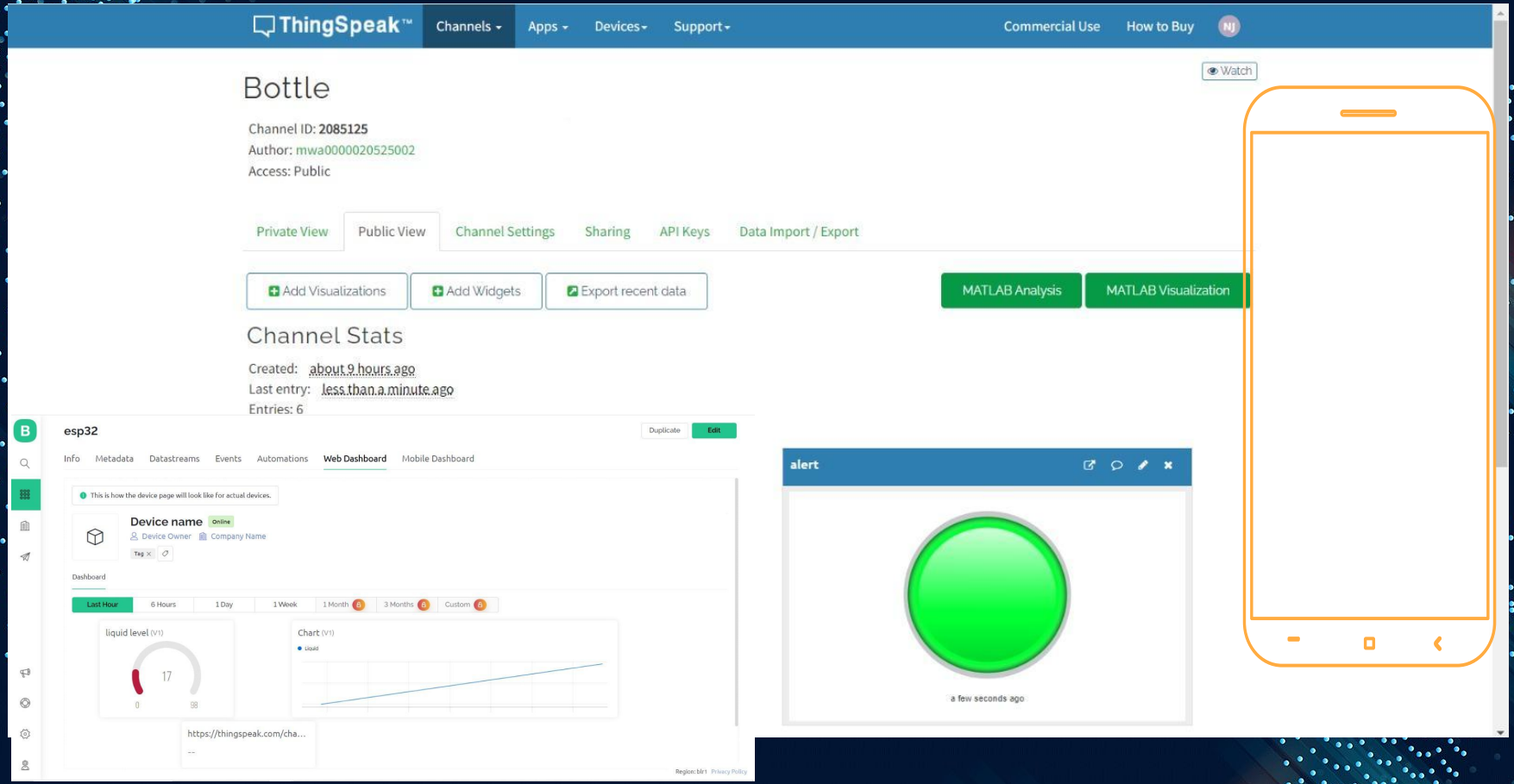
Blynk

ThingSpeak

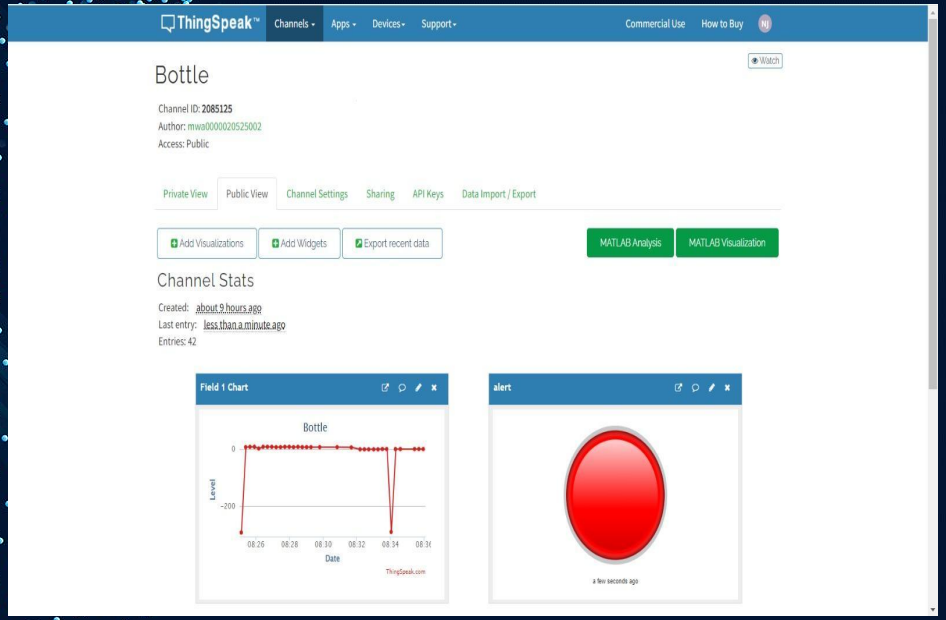
Firebase

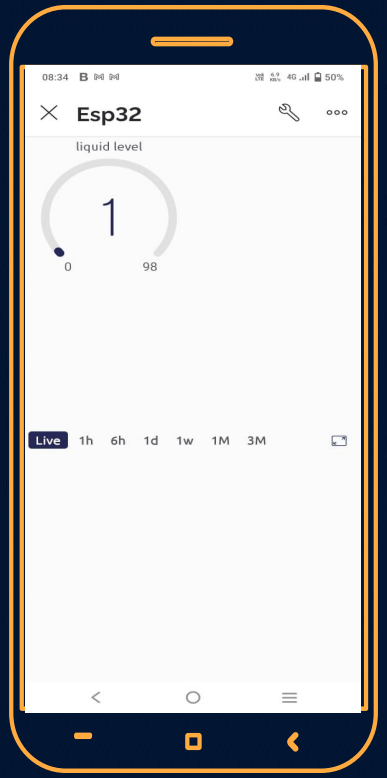
The flow

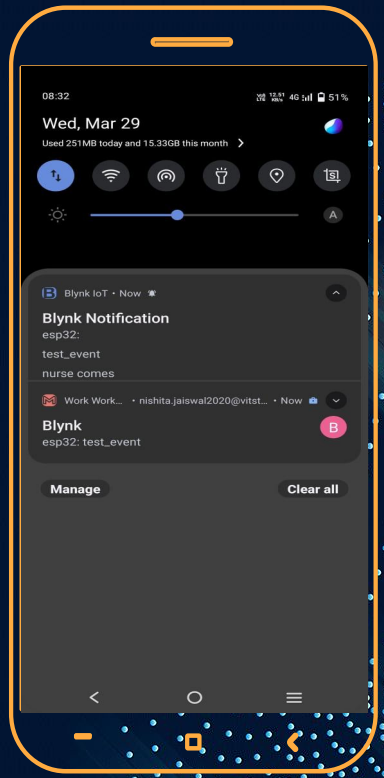
MOBILE APP FOR LEVEL > 2cm



MOBILE APP FOR LEVEL < 2cm







ALERT WILL BE SENT TO THE APP

FUTURE SCOPE

- Leak-proof design: Sending alert if case of a leakage. Also, the smart bottles can be designed to be leak-proof, ensuring that users can carry them wherever they go without worrying about spills or leaks.
- Identify leak: The app can have a system to identify potential leakage from the bottle via the Load cell. This way the hospital can identify the faulty inventory and reduce wastage.
- A 0.22 Micrometer thick cellulose acetate membrane could be tested to cover the saline bottle in order to sterilize the bottle from the cap.
- The Volume of the fluid present in the cylinder is formulated through the Pi*(r^2)*h formula and this is used to determine the flow rate of saline injected to the patient.

GITHUB Link

- https://github.com/pavanimanikonda09/Smart-Bottle-Makeathon.git

Video demonstration of prototype

- https://drive.google.com/drive/folders/1R43CetQNWm0njQM-gtzLaDOtsls1hYkk?usp=sharing

THANK YOU!!