Smart Transportation and Storage Unit

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Abstract- Smart containers have made modern transportation and storage more viable and available at all times. Every activity relating to the status of the container can be listed down, whether it occurs during the loading of products, during transportation, or at the receiver's end. It is possible to track the commodity that must be carried. Businesses lose a lot of money when commodities are lost or damaged. The loss required to be tracked or reduced to some level, which IOT allows for. The project's major goal is to develop a smart system that can monitor the container's surrounding circumstances. This device includes a microcontroller that oversees the entire system's activities. Temperature, humidity, container open/close, location, and other variables can all be tracked via an app. The Wi-Fi module creates a link between the microcontroller and the web/application.

Keywords: Temperature, Humidity, Wi-Fi, Sensor, Cloud, Smart Container

I.INTRODUCTION

Have you ever considered how technology can assist us? For many years, the container transportation business has suffered massive losses owing to goods damage. This has necessitated the development of a system that ensures transparency in the transportation and storage of commodities. They must be monitored in order to reduce loss. Now, imagine that we develop a system that can monitor container conditions and help to reduce loss. This is the goal of our research article. This research also highlights the importance of a temperature and humidity monitoring system during transportation. It should be monitored at every level to ensure optimal safety. Temperature, humidity, and other natural variables are measured inside a container. The Internet and the Internet of Things are becoming increasingly crucial in everyday life. Many applications are conceivable with this information, including temperature and humidity, level of items, and much more. This project uses an IoT platform to help monitor containers that have been plundered owing to environmental conditions during storage and transportation. Smart containers are shipping containers incorporating various technologies like IOT, sensors, real time tracking, and solar panels that are utilised in payload and shipment. The containers are designed to control internal conditions (such as temperature), give real-time GPS tracking, increase security, and provide condition data that can alert operators to any potential cargo crisis. The information is automatically updated into digital shipment servers, which may be shared with clients for up-to-date tracking and utilised to better forecast port arrival times, allowing for more efficient container unloading and distribution to the next stage of the supply chain.

II.LITERATURE SURVEY

Smart containers have made modern transportation and storage more viable at all times. Every activity relating to the status of the container can be listed down, whether it occurs during the loading of products, during transportation, or at the receiver's end. It is possible to track the commodity that must be carried. Businesses lose a lot of money when commodities are lost or damaged. The loss required to be tracked or reduced to some level, which IOT allows for. Smart containers have applications in areas such as smart kitchen food containers, which provide information about the contents of the container. Although this is a small-scale application, it has a significant impact on the lives of ordinary people, where IOT plays a significant role. Monitoring commodities during shipment is another application. Smart containers are used in industries to keep track of raw materials in warehouses and storage units by properly storing them in containers and ensuring that they are not accessed by smart containers. In warehouses, knowing the amount of materials present inside the container makes decision-making easier, and it also allows users to see if any materials are missing or have expired.

In this paper, author Shreyas S K1, et al illustrated how the system reacts to changes in the environment utilizing sensors and provides approximate feedback in their initial work. They developed a device that detects temperature changes and ensures the safety and nutritional quality of the products stored inside. The system can assess the temperature and humidity, as well as use smoke sensors to detect gases generated by rotten or decomposed food. This data

is analysed by the microcontroller and sent over GSM to an android phone. [1]

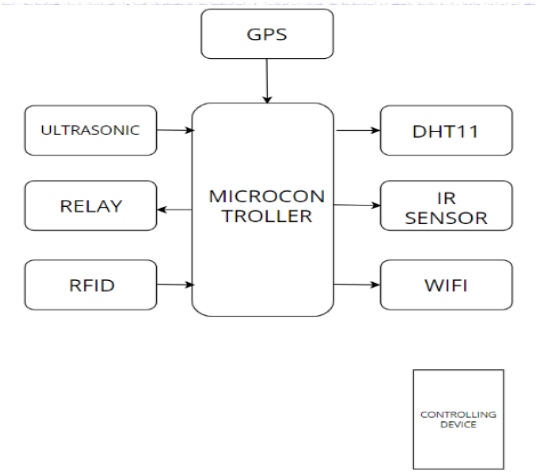
In this paper, author Anup Aravind Lakkanagavi1 et al. showed a smart kitchen container using IOT in their publication. This method shows that when items like rice or wheat fall below a certain level in the container, this smart system sends us an alert. It is suitable for usage in both homes and restaurants. It is useful for the customer and customer should not worry about the items which are going to finish because there is a function which will auto notify the customer and with very little human participation order will get place. Sensors are installed inner side of lid, which point that item within the container, and continuously measure the distance from sensor to item.[2]

In this paper the author Neha M R1, et al. came up with a way to decrease the tiresome task of manual inventory checks, making life easier and more pleasant. They created a method that focuses on determining the level of items in the container with the least amount of human intervention. When the level of items in the container drops, the sensor sends the information to the controlling unit, which displays it on a web page written in PHP and Java.[3]

In this paper the author Y. Bevish Jinila, et.al offer a smart container which is used to monitor and track the condition of goods present inside the container is given in their fourth article. The proposed method provides an automated response to the level of goods kept in the container, as well as an alarm when the container is about to expire. A smart container is a storage container that can hold pulses, rice, and other products while also informs the level of goods present in container and gives an alert about expire of item.[4]

III.FIGURE

III.I. BLOCK DIAGRAM:



IV. PROPOSED METHODLOGY

In smart container, an IR sensor is used. This IR sensor is mounted on a container lid. The radiation from IR sensor hits the object and comes back to receiver. Similarly, in smart container, whenever the IR sensor mounted on the lid sense any motion. The system has following component requirement:

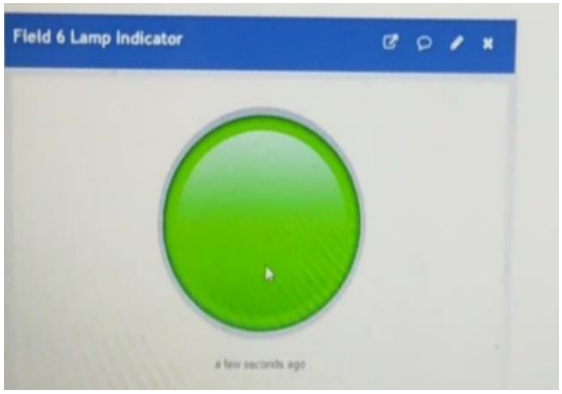
- Node mcu microcontroller
- Ultrasonic sensor (SR04)
- IR sensor
- DHT 11(Temperature and Humidity sensor)
- RFID reader and RFID tag
- SPST relay
- GPS
- Things speak
- Arduino IDE

The signal is sent to node-mcu which is connected with wi-fi. we are notified on the things speak. We are able to see the status of the container lid whether it is open or not. An ultrasonic sensor is used in smart container to know the status of level of commodities present in the container. Ultrasonic sensor is mounted below the lid of container. Ultrasonic sensors use ultrasonic waves to measure distance. It has two pins echo (input pin) and trigger(output) and it sends 10 Ms pulse. The sensor head sends out an ultrasonic pulse, which is reflected back to it by the target. Ultrasonic sensors use the time between emission and reception to calculate the distance to the target. The radiation sent from ultrasonic sensor hits the goods in container and reflect back. This signal is fed to node mcu and the output is seen on serial monitor. We are able to see the level of goods in the container in real time. Similarly, the DHT11 sensor is connected with node mcu. DHT11 is a temperature and humidity sensor. The real time temperature and humidity conditions are recorded. It is made up two parts a capacitive humidity sensor and thermistor. The conditions are recorded and given to Node-Mcu and is displayed on serial monitor and can be monitored from anywhere. This is how goods are monitored in container. RFID, or Radio Frequency Identification Device, is a wireless technology that consists of two parts tags and readers. The RFID is used in this smart container. RFID tag is scanned and a real time information about what is present in the container is known. For instance, we have provided that we have kept rice in it which we are able to see in results section. Positioning, navigation, and timing (PNT) services are provided

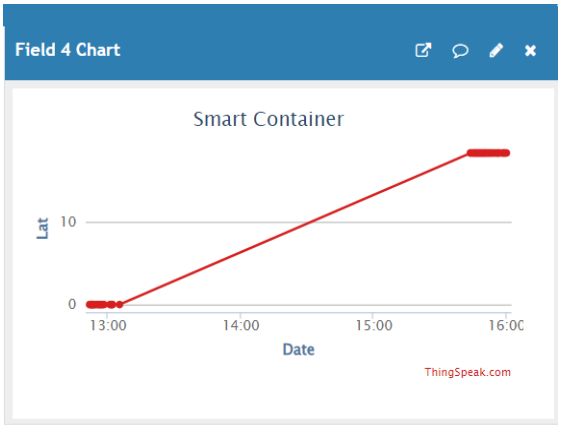
by GPS. It uses the coordinates LAT and LONG to work. The GPS transmits the signal to Node Mcu and co-ordinates of the container are observed on the things speak. The co-ordinates are in the form of latitude and longitude. The relay module is an electrically controlled switch that can be turned on or off, allowing or disallowing current flow. We can switch the power supply to the circuit using single pole single throw (SPST).

V.RESULTS AND DISCUSSION

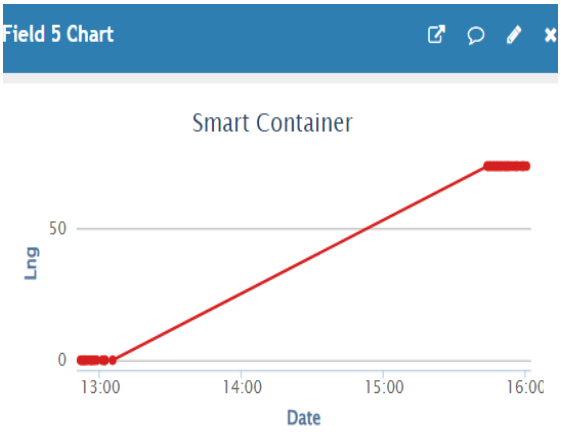
The IR sensor used in the smart container helped us to know when the container is closed or open. We are updated with the status of container every time. We are also able to see the lock status whether the door knob is locked or unlocked on things speak. The green colour shows that container is closed.



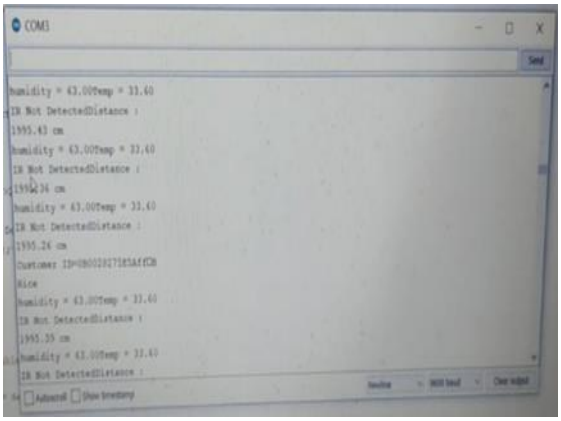
The temperature and humidity sensor give us real time information about the temperature and humidity conditions of the container. We are able to track down accurate inner container conditions.



The GPS will track the actual location if the container at anytime from anywhere. It will provide us a precise location in form of latitude and longitude which can be seen from the above results.



The ultrasonic sensors continuously monitor's the level of goods and commodities and keep the user informed. By RFID tag is scanned by RFID reader, we are able to note down what is present inside the container without actually opening the container. For ex: Rice as shown in below.



VI.CONCLUSION

The emerging technology like IOT had come to be essential part in transportation and storage of goods which might face accidental damages. By integrating sensors and IOT technology the monitoring system will become handy. Unusual interfering with the containers can be closely monitored. Every aspect like real time tracking and monitoring can be achieved. This will not only help in reducing the damage to the goods but also the loss of capital behind it.

VII.FUTURE SCOPE

- We can improve the overall efficiency of the system many other IOT applications in it.
- We can make the system blockchain dependent for more customer security and transparency.

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