

Cold Chain Monitoring System for Vaccine using Iot

Kishore Kumar K, Balaji S.M, Yeshwanth M, Pavan Teja N

Abstract: In this research work we intend to reduce the burden of human by using IoT tools. Also, the equipment failure scenario which results in products spoilage or any event related to product release must be communicated with the manufacturer end. It is also necessary to remotely accessing the status of a vaccine in the environment. This research work will be based on the IoT system. This checks the stability of product quality. To stimulate the proposed work an IoT based sensor platform is used. This research work portrays cold chain monitoring in Pharmaceutical Drugs Industry.

Keywords: Cold Chain Logistics, GPS module, sensor.

I. INTRODUCTION

A cold chain is a process of maintaining the finest circumstances during transport, storage and handling of temperature-sensitive products, start at the producer and completion with the organization of item to the customer. The focus of cold chain management is on pharmaceutical products, chemicals Sensors and Applications Monitoring of Cold Chain using IoT Platform which synchronizes the physical world things. The smart object which have a unique addressing for identification the object which will capable to transmit the date through communication medium without human to human interaction. Moreover IoT will focus on Machine to Machine Communication. Hear Wireless sensor network will be take part major role on the paradigm. Physical objects are the essential components of wireless sensor network. Wireless Sensor networks is primary networking technique for acquiring the physical objects such as Raspberry Pi, Arduino, Beagle Bone , Particle Fortran and RF Systems, The WSN to associate low cost computational devices using embedded system. Hear thinkspeak cloud has plays a main role for sensing the environmental data in distributing environment. And also governing of physical world should be easy and effective one. Hear information processing using the distributed sensor using smart object is flexible and also easy to reconfigurable of

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Mr.Kishore Kumar, Assistant Professor, Department of CSE, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Avadi, Chennai, Tamil Nadu, India.

Balaji S.M, UG Students, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Avadi, Chennai, Tamil Nadu, India

Yeshwanth M, UG Students, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Avadi, Chennai, Tamil Nadu, India

Pavan Teja N, UG Students, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Avadi, Chennai, Tamil Nadu, India.

platform. This article focuses on how smart objects are useful to make monitoring and controlling operation in cold chain monitoring system. The major contribution from Internet of things, Smart Objects, Thingspeak cloud to maintain of optimal condition while the vaccine have been transporting from Manufacturer to End User[1][2][9].As the name recommends, this innovative progression has prompted the ascent the total number of substantial items being associated with the web. The two essential elements that enable this innovation to thrive are the Sensing substance that faculties or gathers information and the Cloud Service that plays itself as the host to the information gathered. This implied there was an ascent in a blend of remote sensors and distributed computing procedures. IoT Analytics has risen as a lifesaver to the virus fastens coordination's industry because of the way that organizations host to depend on third gatherings (outsider coordination's) to self-report on execution. Sending of a wide cluster of sensors away areas, shipping holders and trucks its difficult to track the humidity and temperature parameters on Real-Time condition and in this way additionally guarantee that speedy and effective move can be made in instances of crises. Along these lines, the IoT has offered an extension to screen the pivotal parameters ongoing as well as help in safeguard and healing activities if necessary through snappy implication[3][6][10].Node MCU is an open-source IoT device which has in-built Wi-Fi and also operative feasibility one. If we are taking open-source IoT stage Node MCU is used by maximum of smart application developers. IN ESPERSIFF system which runs by ESP8266 via FIRMWARE. [4][5][7].

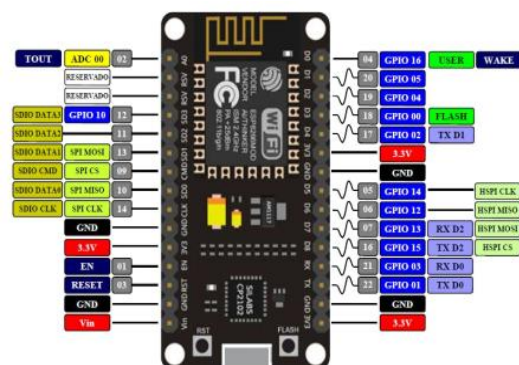


Fig 1.1 Node MCU Pin

Details

II. PROPOSED SYSTEM

In the proposed method we have to place the Temperature and Humidity sensor DHT11 within the vaccine container and the sensor data have to be given to Node MCB as Input and the logic what we have built to be track the temperature of the container with the interval of 15 seconds. The data has been uploaded to think speak an IoT cloud. Hear the data have been visualized and it should track the entire aspects of the vaccine container across the globe with channel ID [11].

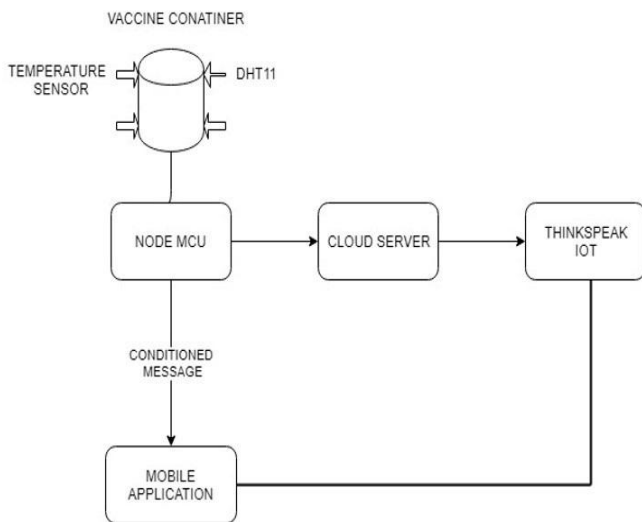


Fig 2.1 Block Diagram of Vaccine Monitoring System

In Figure 2.2 the status of the vaccine has been tracked using the sensor data logic. The logics are proposed in the work. 1. The temperature value has been maintained to be less than 15 degree Celsius then the LED 1 will blink as Green else it will blink with red color and alert the status of vaccine to appropriate user. 2. The humidity value has been tracked at every 15-second interval it should greater than 60 % then it will be in Green color else it will be indicated with Red Color.

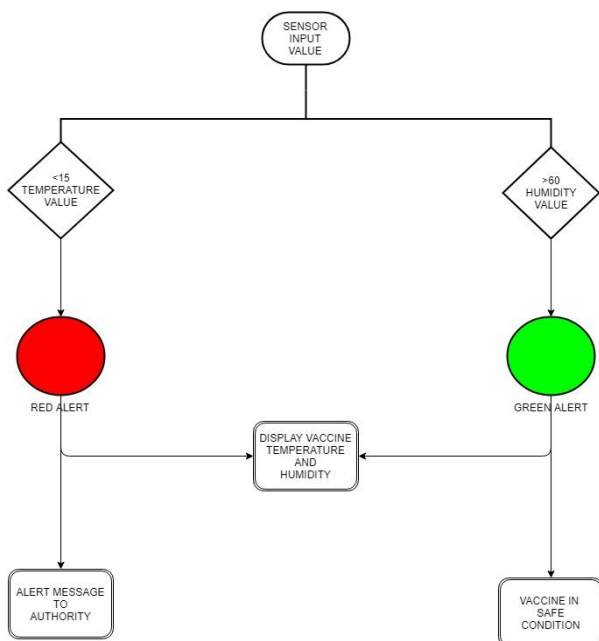


Fig 2.2 Vaccine Status Logic

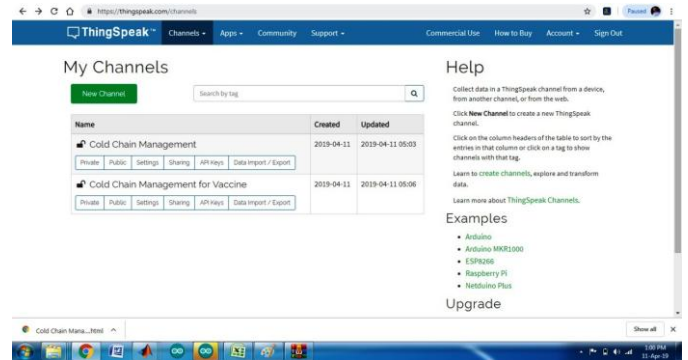


Fig 2.3 Thingspeak Channel Creation

Figure 2.3 represents the thing-speak Channel creation and Interfacing process. Hear steps are given below.

- Step 1: Signup with Thingspeak using user credentials
- Step 2: Create a channel
- Step 3: In-Channel Settings Add the No of Fields required for Sensor data
- Step 4: Copy the channel ID and Write API key details to interface Sensor data.
- Step 5: Sensor data have been visualized in Thingspeak field.

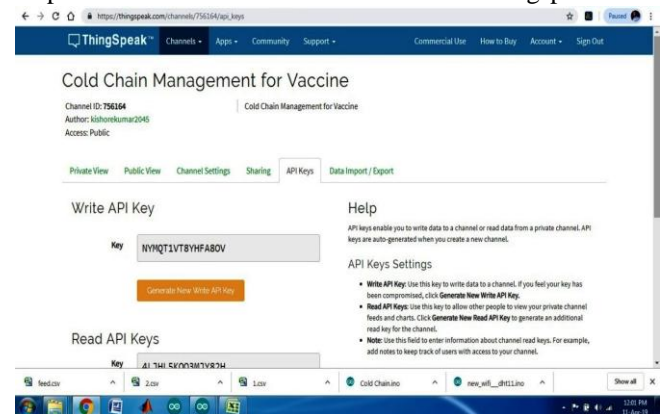


Fig 2.4 Thingspeak API Key

In figure 2.4. It represents the think speak API Key for both reads and Writes process of sensor data have to be upload to the environment[8].

III. RESULT AND DISCUSSION

The cold chain monitoring systems measure the temperature and humidity of the environment and upload it to DHT11 sensor cloud where it is monitored. Besides the environmental parameters, the voltage level of the battery is also uploaded to monitor the power level at the nodes and transport facility. On DHT11, the data is updated in real-time. DHT11 also allows setting up of triggers to send notifications about abnormal events. Zapier service was used with DHT11 to configure applications through which notifications are sent. The application used here was email service. The system also monitors the inventory of the environment. The tags read through an emailed to the monitoring personnel to provide up-to-date



information regarding the items present in the facilities.

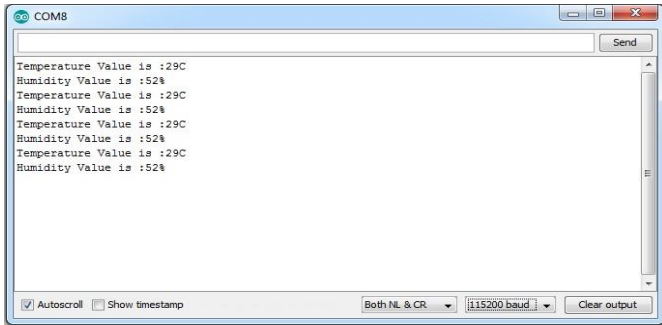


Fig 3.1 Serial Monitor Vaccine Status

In above figure 3.1 have represented the temperature and humidity value present in the vaccine container. The sensor placed in vaccine container Hear the output has visualized using with the baud rate of 115200 in the serial monitor.



Fig 3.2 Thingspeak Temperature data visualization.

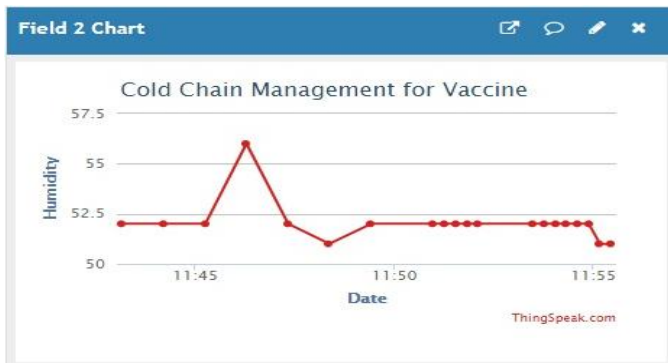


Fig 3.3 Thingspeak Humidity data visualization.

In figure 3.2 and figure 3.3 represents the temperature and humidity concerning every 5 second interval period in the thing-speak environment.



Fig 3.4 Thingspeak Humidity data visualization.

Figure 3.4 has represents the vaccine container has in safe state else the vaccine has expired due to exciding the withstanding temperature. Hear threshold has been fixed based on visualized data in figure 3.2. Hear it has two conditions 1. If the sensor data has less than 15 degree the vaccine has in safe state and gazette alert in Green color, same value exits 15-degree alert in red color, It tells vaccine have maybe spoiled. For tracking the vaccine conditional status we can install think view android application from Google Play

- Step 1: Install Thingview from Google Play
- Step 2: Either choose Add channel else Add All my Channel
- Step 3: Using Server Url and User API Key can add the channel in Android Application.
- Step 4: By selecting the added channel sensor data has been visualized remotely.

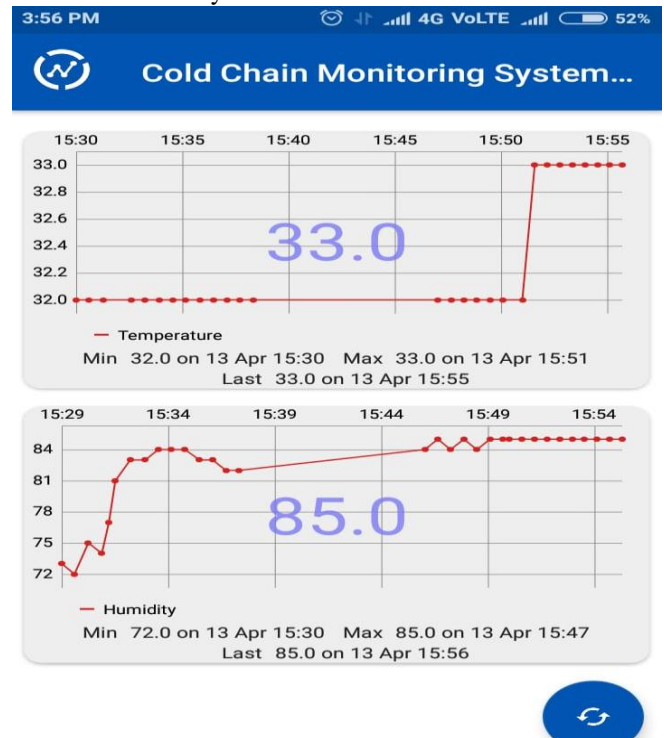


Fig 3.5. Temperature and Humidity data visualization.
In figure 3.5 has visualized the vaccine temperature and humidity value via thing view application remotely.

IV. CONCLUSION

In this paper, we have proposed a model for cold chain monitoring system for the vaccine transportation from Production till it reach the consumer. This model will help the paramedical industry to track the vaccine stability check to know the status of medicine. Hear the cold chain status has been frequently checked with web as-well as mobile application to track the condition in remote location. Our mechanism will provide the trustworthy of Vaccine stability by remote monitoring during the logistics, transportation, and delivery of Vaccine.



Yeshwanth M, Final Year B.Tech CSE, Vel Tech, Chennai.



Pavan Teja N, Final Year B.Tech CSE, Vel Tech, Chennai.

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AUTHORS PROFILE



Mr. Kishore Kumar K, He had completed M.E - CSE from Anna University in the year of 2013, and currently working as an Assistant Professor and Pursuing Ph.D. in Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Chennai. His area of research is focused on the Internet of Things for Smart Agriculture.



Balaji S.M, Final Year B.Tech CSE, Vel Tech, Chennai.