IOT BASED MEDICATION STORAGE SYSTEM

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ABSTRACT

As the medications like medicines, vaccines, human organs are very sensitive to the parameters like temperature, air humidity and sunlight exposer. While transporting medicines from one place to another place or when medications are stored at some place, It needs to be assure that this parameters must be in required range so that medicines cannot be affected or contaminated. In conventional way if someone has to transport this medication, only ice-box is used to carry it which is just preventing the medication with temperature and even it is not 100% perfect. But our IOT based system which can be easily fixed to anywhere and kept monitoring the medication continuously and it can also collect all data which is measured through sensor which comprises the information about the parameters throughout the time period. Then those data can be uploaded to the internet cloud and by processing it that data can be shown in Graphical Representation which will be studied by doctors and researcher. They can get an idea that how the medications are being affected at different level of parameters. As the different medications have different ranges for mentioned parameters so this developed system is designed in such a way that it is adjustable within any pre-defined range according to medications.

Keyword : - *Air humidity, sunlight exposure, ice-box, Internet cloud, IOT (Internet Of Things).*

1. INTRODUCTION

1.1 Understanding of IOT (Internet of Things)

The Internet of Things (IOT) is a network of dedicated physical objects (things) that contain embedded technology to communicate and sense or interact with their internal states or the external environment. The connecting of assets, processes and personnel enables the capture of data and events from which a company can learn behavior and usage, react with preventive action, or augment or transform business processes. The IOT is a foundational capability for the creation of a digital business[1]

1.2 Understanding This system:

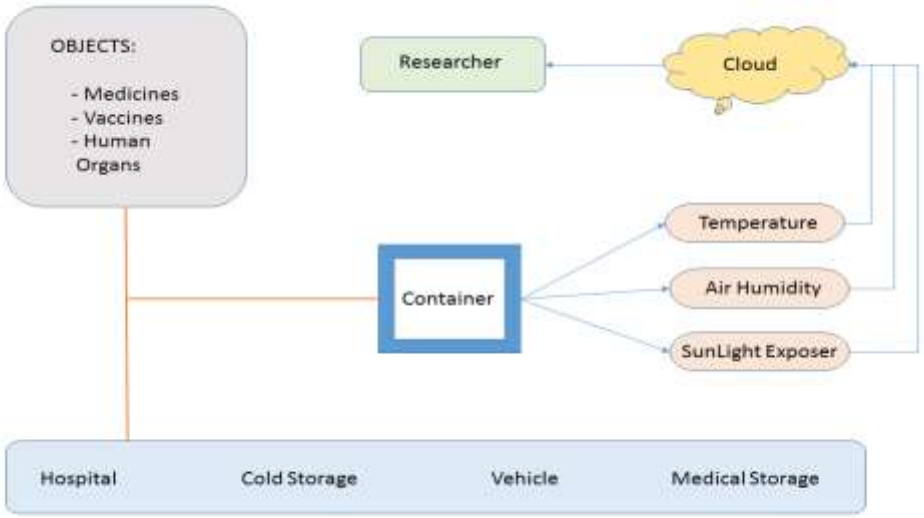
When the environment is not desired (such as temperature is very high), the efficiency of these vaccines is lost. The health workers carry vaccine in a ice box with some cold pads e.g. During door to door polio vaccine campaign. The motto of this system is to ensure the safety and efficacy of these vaccines other medications. While the traveling with medication go around, based on the vaccine type and recommended environment setting, Collected data will be uploaded to the cloud. Using data analysis, it can be predicted if medication is getting spoiled, so that it can be moved to a safe spot on the time. Also, the collected data is helpful to determine if a care taker has not followed the best practices, and take actions accordingly. Also, using mobiles and cloud platform, care takers can prevent vaccine from spoiling. This idea can be extended to efficient storage and handling of other environment-sensitive medicines as well.

Arduino Mega with DHT11 sensor (temperature, Air humidity) attached to it, is running in a ice box with vaccines, which a health worker is carrying. The circuitry can work on two mode which is offline and online mode. During transportation it is in offline mode which only real-time monitoring different parameters like temperature, humidity indicate user when the parameters are being disturbed

2. Problem Specifications:

As our problem is to prevent medications from damage which includes medicines, vaccines, human organs. In order to do it first we understand what are the parameters which can affect the medications, which includes parameters like temperature, air humidity and sunlight exposer. This parameters are very crucial in order to prevent medications there are some range of each of medication which can be like for temperature it is 2-8 C and for humidity it can be about 40-60%. Now we just have to assure that this cut-off range must be maintained.

3. Basic Block Diagram:



4. Design Parameter:

Most of the sensitive medications are having ranges of Temperature and humidity are as per in given Table:
So for according to range the Sensor DHT11, which Is fit for most of medications, is selected for this project.

For Majority of sensitive medications

Range of Temperature: 2-8°C

Range of Humidity: 40-60%

DHT11 Sensor Specifications:

Temperature Ranges: 0-50°C

Humidity Ranges : 20-80%

5. Working modes of System:

This developed system can work in 2 mode:

5.1 Online mode:

This mode is used when medications are stored at some places such as hospitals, medical stores. In this mode system keep checking temperature, air humidity and expiry date which needs to be set in system using keypad of system. In undesirable range, system will give alert message by Buzzer ringing and LED blinking and also notify smart phone which is connected to system through Wi-fi.

5.2 Offline mode:

This mode is used when medications are being transported at long distance from one to another place. In this mode, whenever ranges of parameters will go beyond desirable limits, system will start saving that data in its database and at same time give alert message by buzzer ringing and LED blinking. When system will get connected to internet through Wi-fi, it will upload all data stored in database to Internet cloud(platform) for future use to doctors and researchers

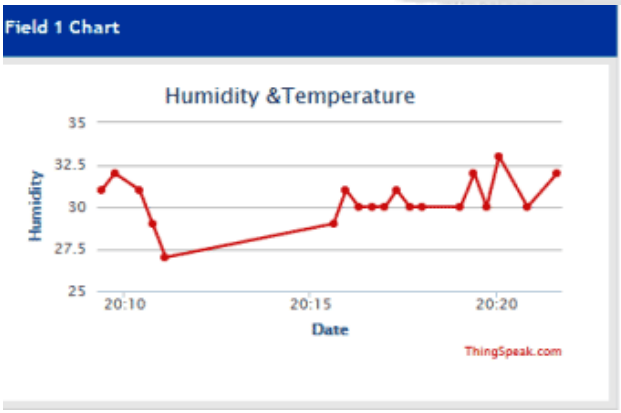
6. Programming:

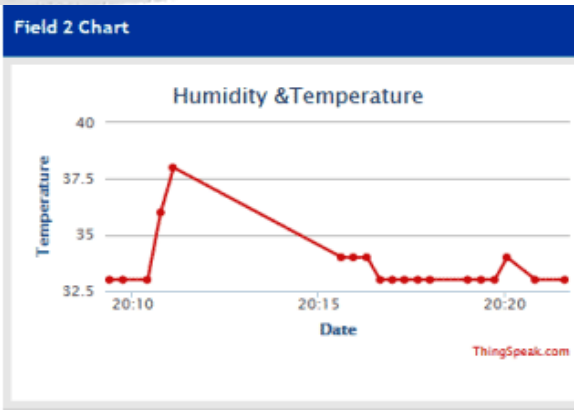
1. This is image of Arduino IDE(Integrated development Environment) in which we have done Programming of Atmega2560, LCD, Sensor and Keypad interfacing.

2. We have used some libraries such as keypad.h, DHT.h, and lcd library

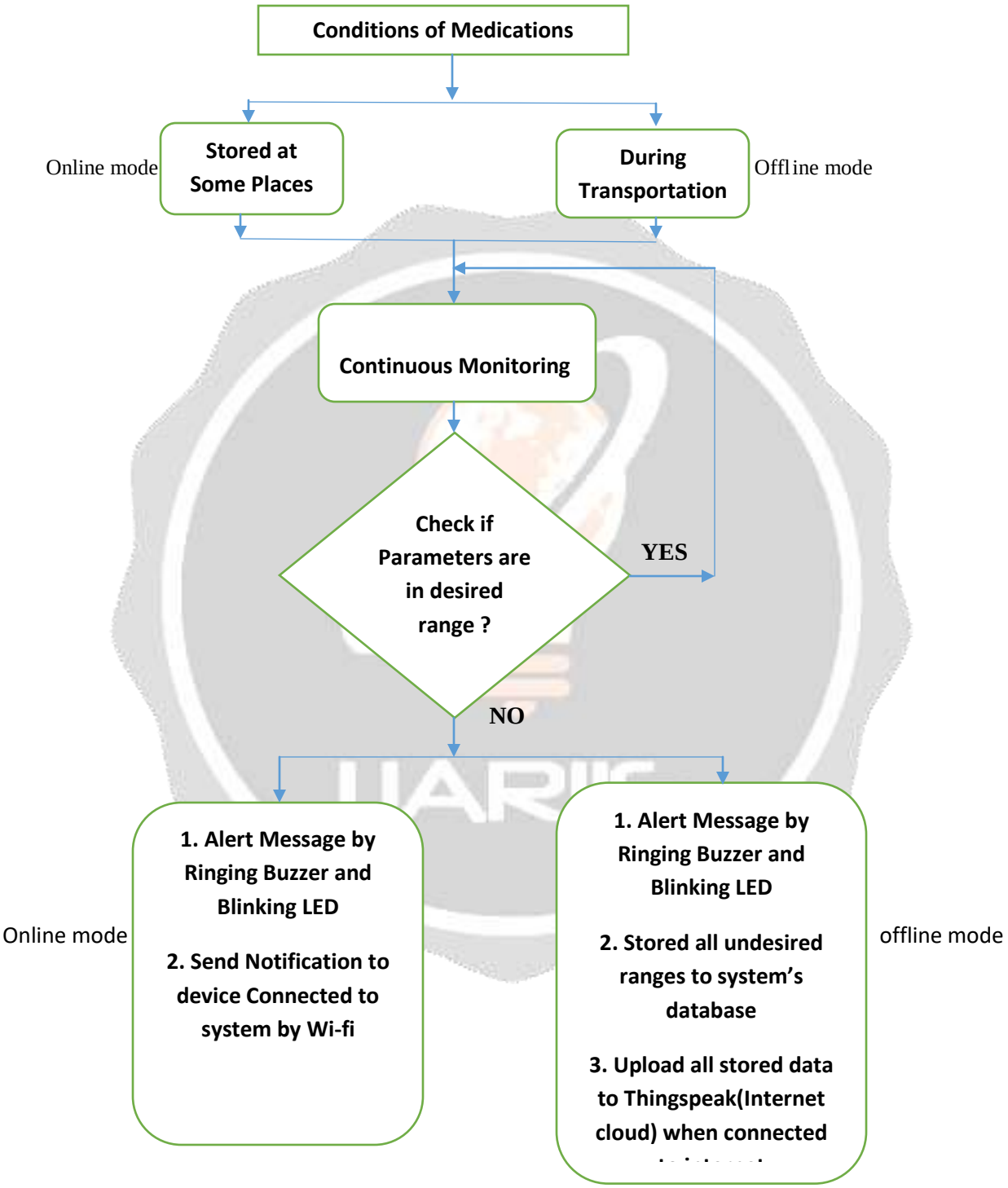
7. Graphical Analysis of collected data from Thingspeak cloud:

All the readings of humidity and temperature collected by System whether in offline or online mode are stored in Database of Thingspeak cloud. **This data in graphical can be seen from anywhere using Internet. This is main feature of our IOT based System**





8. Working Algorithm:



Terminology: Thingspeak – online data storing cloud platform for IOT application , www.thingspeak.com

9. WORKING DESCRIPTION:

First when any medicines or any organs are needed to be transported then it is kept in container which is also embedded with our device having DTH11 sensor and other peripheral.

During transportation though there is no internet connection, sensed data will be stored to that arduino after some regular interval

In case of outer parameters changed and if temperature or humidity got changed then it is instantly sensed by DTH11 and data will be stored to arduino and also send data to buzzer so that it will notify instantly and counter action can be taken to prevent that losses.

In other scenario if medicines is stored in warehouses or medical store where internet connection can be easily available at that time if parameters got changed then at the same time data will be sensed and through internet, it will be sent to cloud for further analysis for researchers.

That is the online mode of this device.

The data stored in arduino during transportation can also be sent to online after reaching at destination and having internet connection.

10. Fully functioned Prototype:

As it can be seen in picture, there is keypad using which we can set desirable range of any parameters as it changes for every medications.

Here we can see Esp8266 wi-fi module through which any device can connect to system using Wi-fi. This wi-fi name and password can only be set through programming by Developer.

11. Main Components Used:

11.1 Temperature and Air-Humidity Sensor – DHT11[2]:

This sensor consists of resistive-type humidity measurement sensor and a temperature measurement sensor and connects to a high-performance 8-bit microcontroller, offering excellent quality, effective response, and low cost. The calibration coefficients are stored as programs in the memory, which are used by the sensor's internal signal detecting process. The single-wire serial interface makes system integration fast and simple. The component is 4 - single pin package.

11.2 Arduino Mega –Atmega2560 micro-controller:

Arduino Mega is a board which is based on controller ATmega2560. It has more no. of Digital I/P pins compare to Arduino UNO. It works on 16 Mhz crystal oscillator. It has a power jack as well as a USB Port. It can be programmed with Arduino IDE software.

11.3. Wi-fi chip ESP-8266:

Esp8266 is a wi-fi module with MCU capability. It is also low price module. It is having total 8 pins which contains GND then GPIO 2 and 0 , RX and RX pin then pin of reset and chip power down. This can work on 3.3 V. Here we have used this module to made connection with mobile through hotspot connection of it.

12. CONCLUSIONS

This IOT based medication Storage System is cost effective, reliable and sensitive. It can be used as real life application for better transportation of medications. From this prototype model, after several modification it can be developed as fully detachable, plug and play product.

13. REFERENCES:

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