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IoT ENABLED SHIPPING CONTAINERS WITH LOCATION TRACKING AND ENVIRONMENT MONITORING

[1]Jabeena Shaik, [2]Y.Ruchitha, [3]G.Pavan Kumar,[4]M.Deepthi,[5]M.Vyshnavi

[1]Assistant Professor, Dept of ECE,PBR VITS, Kavali, Andhra Pradesh-524201
[2,3,4,5] UG Students, Dept of ECE,PBR VITS, Kavali, Andhra Pradesh-524201 India

Abstract : The Internet of Things (IoT) is a network of physical devices and objects that connect to provide services to users. Up to 50 billion IoT devices are expected to be deployed by 2020, according to estimates. New products and services.For example, integrating IoT into traditional transportation systems provides increased visibility and traceability, allowing for remote monitoringof transported products. Containers carrying donated organs, medicines etc, should be tightly sealed, kept below a particular temperature, and positioned in a physically safe location in traditional shipping and freight systems to reduce the risk of harm fromjerking and unintentional dropping. This project describes a smart shipping container system through which one can monitor the container position, container temperature, air quality and location using IoT.

Index Terms - IoT, Shipping Containers, Arduino, DHT11 Sensor, LDR Sensor, MQ2 sensor, LCD, Cloud, GPS.

I.INTRODUCTION

The Internet of Things (IoT) describes the network of physical objects “things” that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. These devices range from ordinary household objects to sophisticated industrial tools. With more than 7 billion connected IoT devicestoday, experts are expecting this number to grow to 10 billion by 2020 and 22 billion by 2025. Oracle has a network of device partners.

The field has evolved due to the convergence of multiple technologies, including ubiquitous computing, commodity sensors, increasingly powerful embedded systems, as well as machine learning. Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), independently and collectively enable the Internet of things. In the consumer market, IoT technology is most synonymous with products pertaining to the concept of the "smart home", including devices and appliances (such as lighting fixtures, thermostats, home security systems, cameras, and otherhome appliances) that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers. IoT is also used in healthcare systems. There are a number of concerns aboutthe risks in the growth of IoT technologies and products, especially in the areas of privacy and security, and consequently, industry and governmental moves to address these concerns have begun, including the development of international and local standards, guidelines, and regulatory frameworks.

A system is an arrangement in which all its unit assemble work together according to a set of rules. It can also be definedas a way of working, organizing or doing one or many tasks according to a fixed plan. For example, a watch is a time displaying system. Its components follow a set of rules to show time. If one of its parts fails, the watch will stop working. We can say, in asystem, all its subcomponents depend on each other.

Usually containers carries items that could be damaged in number of ways during transport. The goods in the containers were not reach the destination safely because of change in position and temperature in the container. For some goods, like vaccinesthat must be transported with specified temperature. Having of high temperatures, humidity, exposure of sunlight can also effect's the goods in the containers. This project will give the exact location, temperature detection of the container and also detects the position of the goods.

II. EXISTING SYSTEM

Existing system comes with location and with gas sensing element. According to our extensive research, the cost of the system used for monitoring purposes is high, and it necessitates the supervision of a skilled professional. [1] According to our market research, we discovered that all previous systems on the market are a little bit expensive and not user-friendly because technologicalintegration has not yet entered the shipping industry, making the system complex and difficult to understand by newcomers. Our system, on the other hand, will provide a user-friendly interface and be cost-effective, making it superior to all other systems on themarket.

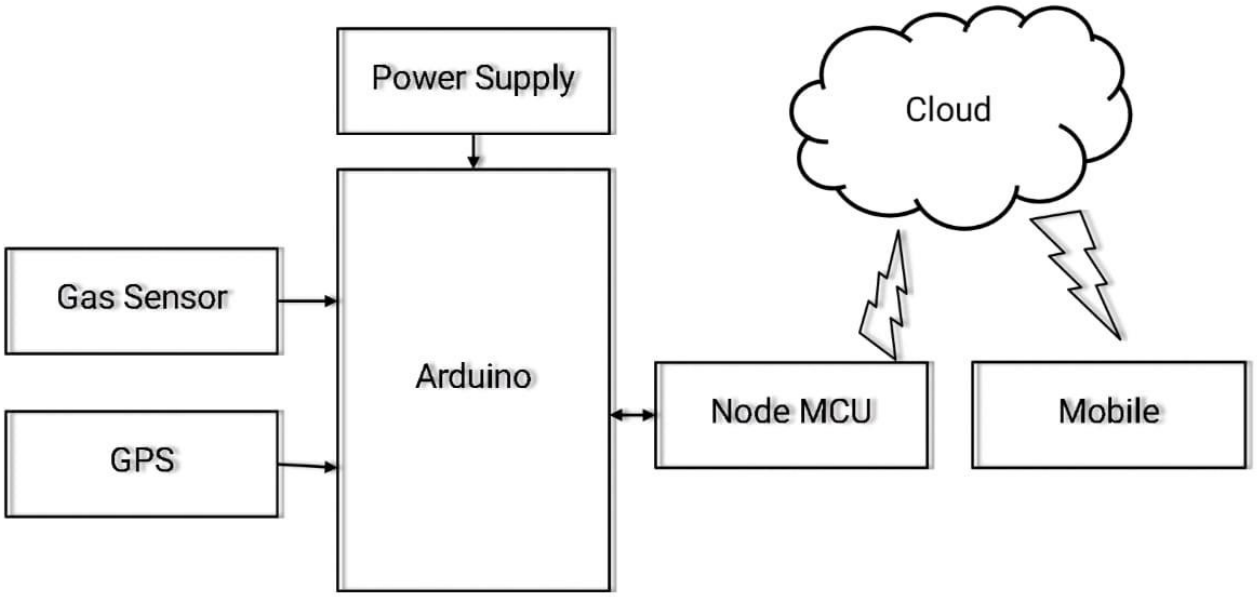

Fig: Block diagram of existing system

DISADVANTAGES

In the existing system we cannot determine the position of the object. When it comes to the medical transportation , if there is changein the position of the box it will damage the medical object. If in case there is a opening of the door occurs in the container, existingsystem doesn't indicate any alert.

III. PROPOSED SYSTEM

In our proposed system, we will monitor the environmental conditions using several sensors. We use temperature and humidity sensors, gas sensors, and LDRs to continuously monitor the weather conditions and reports are transferred onto the website using IoT technology. The temperature and humidity sensor is DHT11 sensor that calculates and monitors the values in the atmosphereand uploads them to the website. [2] Similarly, a gas sensor is used to monitor any gas leaks in the container, and an LDR is used toassess the container's light intensity. The location and values of the sensors will be updated to the cloud server if the parameters cross the limitations so as to send the warning triggered message to the concerned authorities. The reports of the weather conditionwill also get constantly updated in the database and get visible to the users in our website.

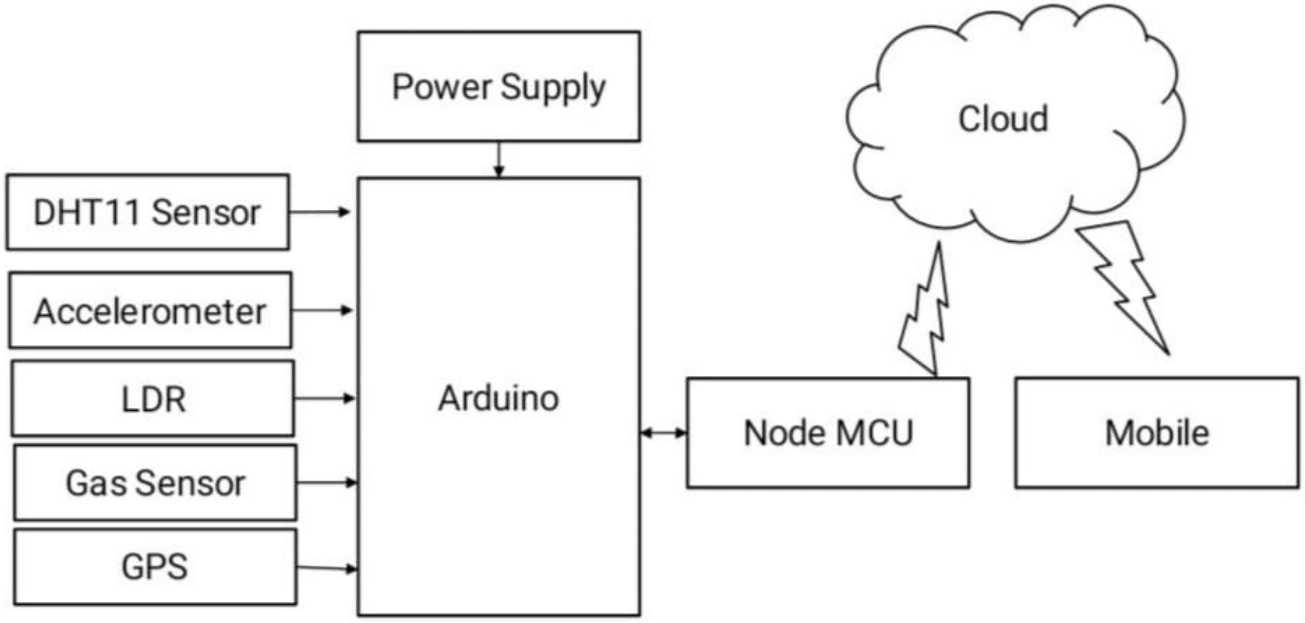

Fig: Block diagram of proposed system

Arduino: The ATmega328-based Uno with Cable is a microcontroller board. It contains 14 digital input/output pins (including 6 PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.The Atmega8, 168, or 328 can be used in the Uno R3 reference design. Current versions use an ATmega328, although an Atmega8is shown in the schematic for reference. On all three processors, the pin arrangement is the sam**e.**
The Arduino uno is a microcontroller board based on the ATmega328P.It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, 1 UART (hardware serial port), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

DHT11 Sensor (Temperature/Humidity): The DHT11 is a basic digital temperature and humidity sensor with a modest price tag.It measures the ambient air with a capacitive humidity sensor and a thermistor and outputs a digital signal on the data pin (No analogue input pins needed). It's simple to use, but data collection necessitates careful timing. The only major disadvantage of thissensor is that it only provides new data every 2 seconds.
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LDR Sensor: The resistivity of a Light Dependent Resistor (also known as a photoresistor or LDR) is a function of the incident electromagnetic radiation. As a result, they are photosensitive devices. Photoconductors, photoconductive cells, and simply photocells are other names for them. They are made composed of high-resistance semiconductor materials. A photoresistor or LDRis denoted by a variety of symbols, one of the most frequent of which is depicted.
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MQ2 Sensor: The gas sensor module is made up of a steel exoskeleton that houses a sensing element. Through connecting leads, current is applied to this sensing element. The gases that come close to the sensing element become ionized and are absorbed by thesensing element as a result of this current, which is known as heating current. This modifies the resistance of the sensing element, resulting in a change in the value of the current leaving it.

Gas sensors are devices that help us understand the amount of gas in the environment and the natural state of its movement. Gas sensors reveal the amount of gas in the environment and the nature of the gas composition with electrical signals and can provide its change.

Node MCU: Node MCU is an open-source firmware and development kit that let you create your own Internet of Things device with just a few Lua script lines. The board has many GPIO pins that can be used to link it to other peripherals and can generate PWM, I2C, SPI, and UART serial communications.
The Node MCU (Node Micro Controller Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Express if Systems, contains the crucial elements of a computer: CPU, RAM, networking (Wi-Fi), and even a modern operating system and SDK. Thatmakes it an excellent choice for the Internet of Things (IoT) projects of all kinds.

LCD: A 16x2 LCD display is a common component found in a variety of devices and circuits. These modules, which include morethan seven parts, as well as other multi-fragment LEDs, are popular. The grounds for this are as follows: LCDs are inexpensive; they are easily programmable; they have no restrictions on displaying unique and even custom characters (unlike in the seven fragments), movements, and so on.

GPS: The Global Positioning System (GPS) is a satellite-based system that measures and computes its position on Earth using satellites and ground stations. Navigation System with Time and Ranging (NAVSTAR) GPS is another name for GPS. For accuracy, a GPS receiver must receive data from at least four satellites. The GPS receiver does not send any data to the satellites. This GPS receiver can be found in a variety of applications, including cellphones, taxis, and fleet management.
GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. From there, it'll receive timestamp from each visible satellites, along with other pieces of data. If the module's antennacan spot 4 or more satellites, it's able to accurately calculate its position and time.

Arduino IDE*:* The Arduino IDE (Integrated Development Environment) is an official software developed by Arduino.cc that is primarily used for authoring, compiling, and uploading code to an Arduino device. Almost all Arduino modules are compatible with this open-source software, which is simple to install and begin compiling code on the fly.
The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a messagearea, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

Flow chart:

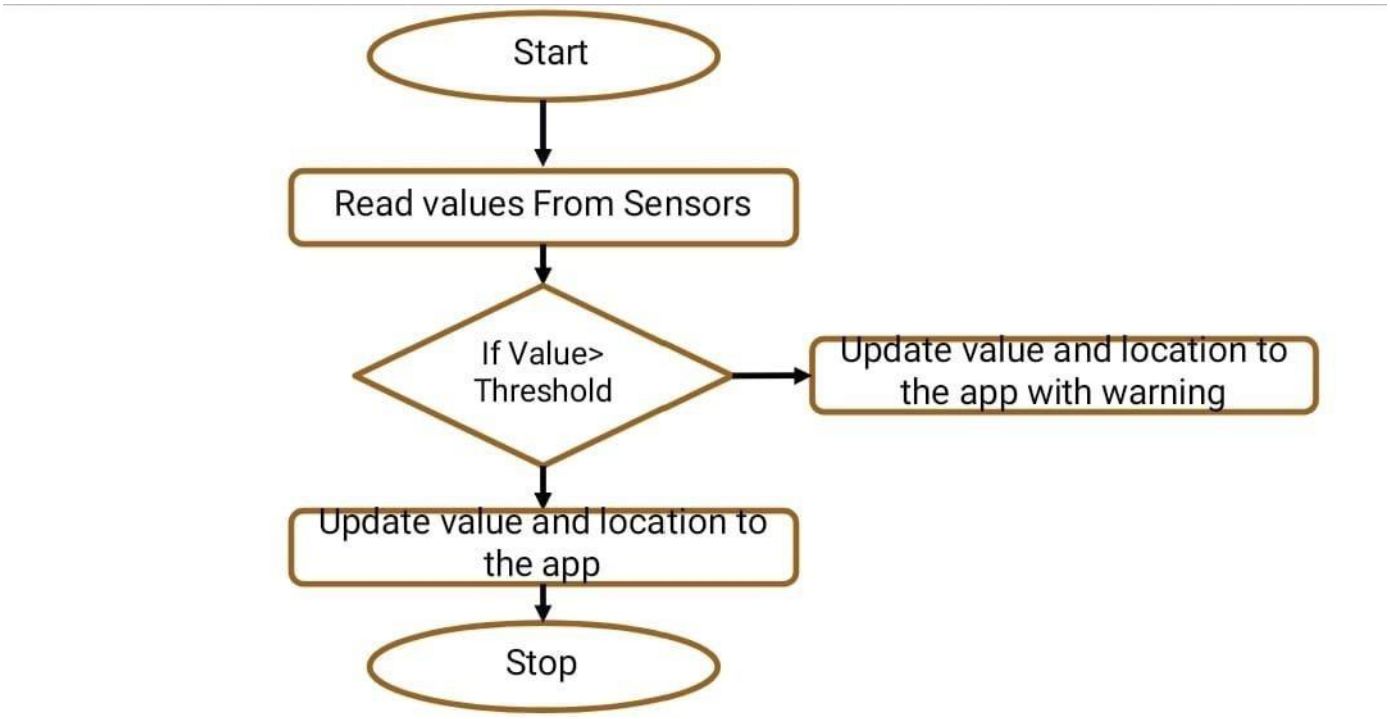

Fig: flowchart of proposed system

In the above flowchart the values are taken from the sensors used in the proposed system and then the values were read by the arduino. If the value is less than the threshold voltage then it will update the value and the location to the app. It will be notified bythe mobile app. If the value is greater than the threshold voltage it will update the value and location to the app and sends the warning to the mobile app. If there is increase in temperature then it will give the update to the mobile app by the indication of the gas sensor.When there ischange in the object then it will give the update to the mobile app.

IV. RESULTS AND DISCUSSION

We had tested the project under different scenarios under different circumstances and it was clearly visible that our project was working with 90% accuracy and the data collected by the sensors were constantly stored in our cloud servers and transmitted throughthe mobile application. The format of the data stored in the cloud is attached below along with the app.

temperature	humidity	luminousity	openclose	latitude	longitude	timestamp
23.50	66.50	831	0	24.42	54.51	"18/03/12 20:15:47+00"
23.50	66.50	831	0	24.42	54.51	2018-03-19 18:16:25
23.50	66.50	831	0	24.42	54.51	2018-03-19 18:24:20
24.70	51.30	797	1	24.416462	54.499798	2018-03-19 18:31:53
24.70	51.70	777	1	24.416462	54.499798	2018-03-19 18:32:28
24.70	52.00	787	1	24.416462	54.499798	2018-03-19 18:33:03
24.70	52.20	778	1	24.416462	54.499798	2018-03-19 18:33:38
24.70	52.50	781	1	24.416462	54.499798	2018-03-19 18:34:13
24.70	52.50	776	1	24.416462	54.499798	2018-03-19 18:34:48
24.70	53.00	778	1	24.416462	54.499798	2018-03-19 18:35:23
24.70	53.10	784	1	24.416462	54.499798	2018-03-19 18:36:54
24.70	53.10	802	1	24.416462	54.499798	2018-03-19 18:38:24
24.70	53.00	780	1	24.416462	54.499798	2018-03-19 18:38:35
23.60	52.00	793	1	24.416462	54.499798	2018-03-19 18:39:07
24.70	52.60	785	1	24.416462	54.499798	2018-03-19 18:40:58
24.70	52.00	789	1	24.416462	54.499798	2018-03-19 18:41:32
24.70	51.20	793	1	24.416462	54.499798	2018-03-19 18:42:04
24.70	50.30	800	1	24.416462	54.499798	2018-03-19 18:43:49
24.70	50.00	811	1	24.416462	54.499798	2018-03-19 18:44:21

Fig: Logged Data at Cloud Server.

Fig: Data Shown on Smartphone Application.

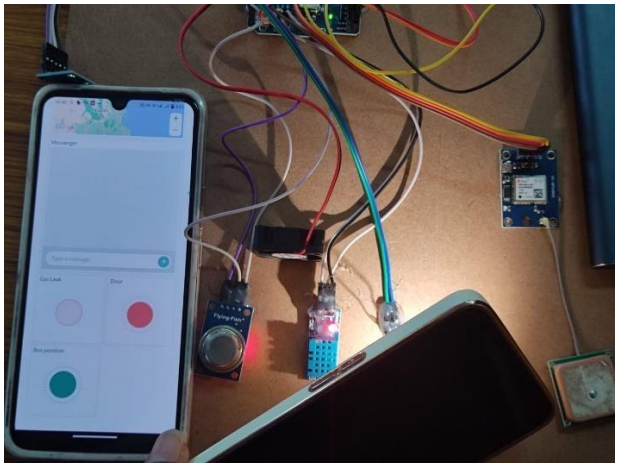

Fig: Result of LDR

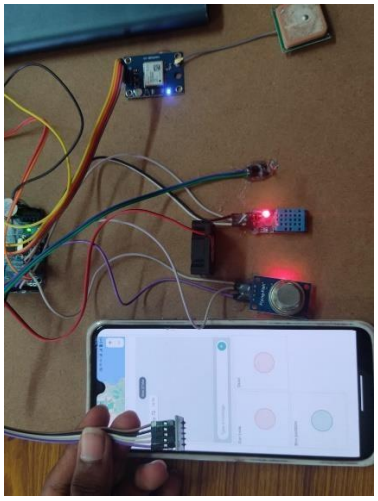

Fig: Result of accelerometer

V. CONCLUSION

The concept of environmental monitoring using IoT was proposed in this project to monitor the city from the cost of damage that may influence the people's way of life. We implemented an IoT of a proposed system as a proof of concept. We demonstratedthat our system can access data without the need for an embedded system. There are a few disadvantages to our strategy. It can onlydetect 90% of the time at the moment. We also need to make sure that correct detection is enforced. We may look into improved exploration methodologies in the future to lessen the possibility of missing breaches.

VI. REFERENCES

[1] B.S Rao, D. K. S Rao and M.N Ome, "Internet of Things (IOT) Based Weather Monitoring system," International Journal of Advanced Research in Computer and Communication Engineering, vol. 5, pp.312-319, September 2016.

[2] Prof. C. H. Chavan, Mr. V. Karande "Wireless Monitoring of Soil Moisture, Temperature and Humidity utilizing Zigbee in Agriculture", International Journal of Building Trends and Technology (IJETT)- Volume 11 Number 10 – May 2014.

[3] M. Rahaman Laskar, R. Bhattacharjee, M. Sau Giri and P. Bhattacharya, "Climate Forecasting utilizing Arduino Based Cube-Sat", Twelfth International Multiconference on Information Processing (IMCIP) – 2016 .