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## “Intelligent Cargo Management System Using Arduino”

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**Abstract:** The role of the Internet of Things (IoT) through a comprehensive literature review and its impact on the cargo management system. Important aspects of IoT in CMS are covered, including IoT definition, key IoT technology enablers, and various CMS processes and applications. We present several classifications of extinct literature such as supported literature, industry sector and specialize in the classification of a major supported supply chain processes.

Transport of agricultural products perishable in the cargo management system, medicines play an important role for stability of the entire process. In this paper we propose a system to optimize the transport of perishable products. Sensors are employed to observe physical and environmental conditions such as temperature, humidity, cargo conditions, making these low-power devices part of the Internet of Things (IoT).

**Keywords-** Internet of Things (IoT), real-time system, Arduino Atmega328P, temperature sensor, GPS module, RFID module, load cell.

### I. INTRODUCTION

With the phenomenon of intelligent logistics is more and more mature. IoT's application areas cover intelligent transportation environment monitoring, smart cities, smart homes, logistics management and other industries, where we can see its related applications anywhere.

Nowadays, the logistics industry is facing an issues related to transportation of goods. Cargo can be instantly updated with related information (such as storage location, inventory and delivery status) for a comprehensive control, monitoring and tracking through network and system interconnects. By using different algorithms and techniques the cargo tracking manage effectively.

For cargo positioning related tasks, the proposed cargo-level tracking system, which was supported by continuous monitoring cargo. The work integrated the benefits of these to achieve a low-cost and low power scheme. A thermal sensor was adopted to monitor the temperature of the environment. The monitored environment temperature and its status can be sent via Bluetooth communication to Android-based mobile devices. In addition, the monitored environment temperature, its status is also uploaded to server to monitor a status of the refrigerated cargo. The main focus gives to the general cargo situation to know the current status of the cargo shipped. However, these previous actions cannot ensure that the cargo shipped safely arrives and provide a real-time data transmission monitoring for customers. To face such issues, we propose a high-priced / fragile intelligent logistics system.

### II. LITERATURE SURVEY

Before starting with the analysis and elegance of project, we've got a bent to refer many analysis papers, manuals, documents associated with the thought of project there are many paper concerns about cargo tracking systems but many etiquettes. W. They., E. L. Tan, EW Lee, Ti Li, Integrated a Solutions for Integrated Track and Trace in provide Chains supported RFID and GPS Bottom of Form [1]. RFID is used for the inventory and material handling method within the warehouse to control the dropping of products in the warehouse.

These above mentioned systems are great for references. However, none of them operate a system such as a refrigerated cargo tracking system to supply environmental data. Therefore, we will propose a flexible solution to solve this issue.

### III. DETAIL DISCUSSION OF CARGO MANAGEMENT SYSTEM

In supply chain management, intelligent cargo tracking system, thing structure (IoT) is employed because the basic structure. The scope of IoT has been expanded to several areas like environmental monitoring economics, transportation, agriculture education hospitality, etc. IoT technology has since become widely utilized in cargo information management. The IoT uses sensors, gps data and all other objects data so as to prepare a smart system to Identify, to track object, manage parameters

In Cargo Management System we will used Cargo info. Model is used to generate and manage a digital representation of characteristics of a cargo. Using these model we can easily handle all data remotely. Cargo Information includes all the data related to cargo.

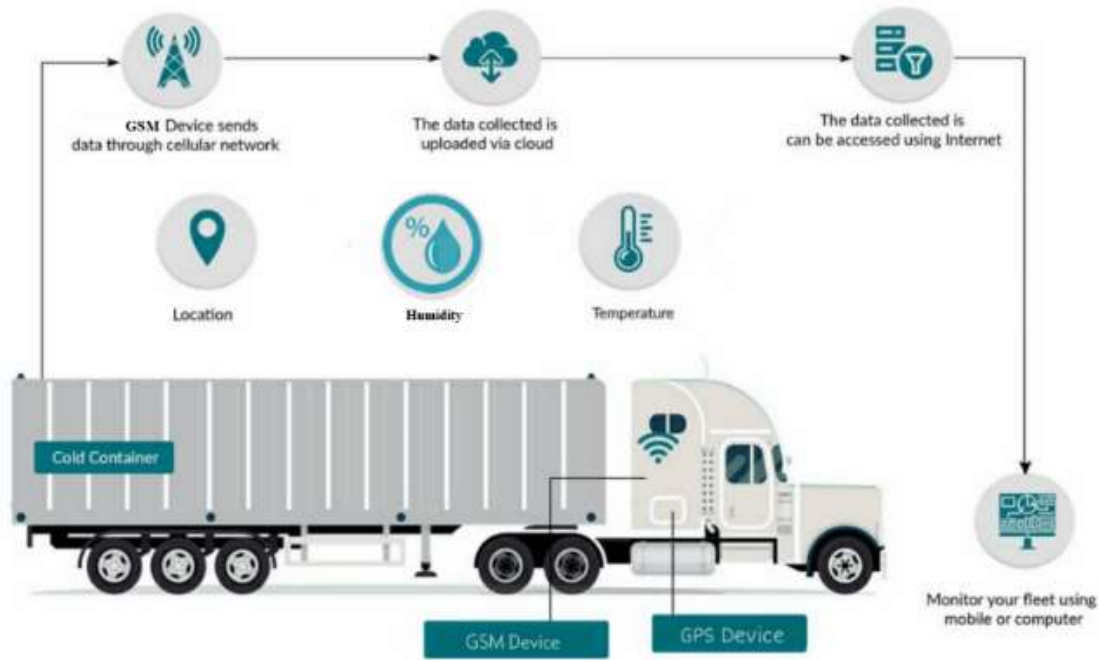


Fig.1 Cargo Management System

**Internet of Thing (IOT)-**

The Internet of Things (IoT) is a network of devices and other embedded systems this give permeation to these objects for share and analyze data. IoT allows objects to be remotely controlled in existing network infrastructure, creating opportunities. Resulting in reduced human intervention additionally to improved efficiency, accuracy and economic benefits. The IoT is connected to sensors and actuators.

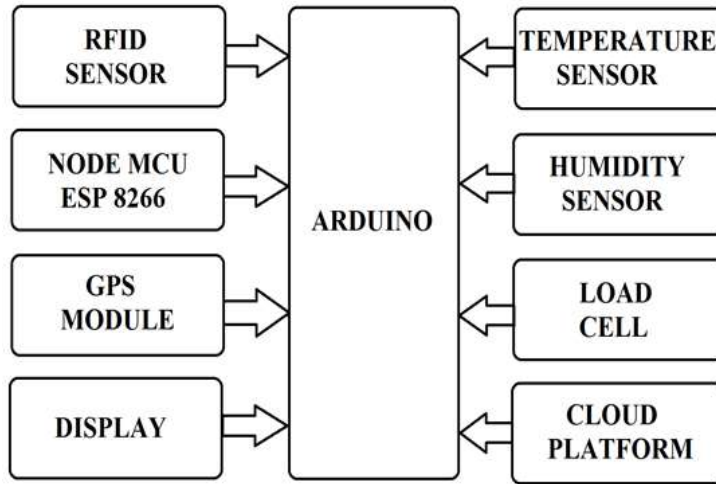
**ThingSpeak [Cloud Platform]-**

It is an open-source API for store and retrieve data over the web using the HTTP and MQTT protocols or through an area area network. Thing Speak was originally launched by Bridger in 2010 as a service in support of IoT applications. ThingSpeak speaks to users to research and visualize uploaded data using Matlab.



Fig: 2 ThingSpeak [Cloud Platform]

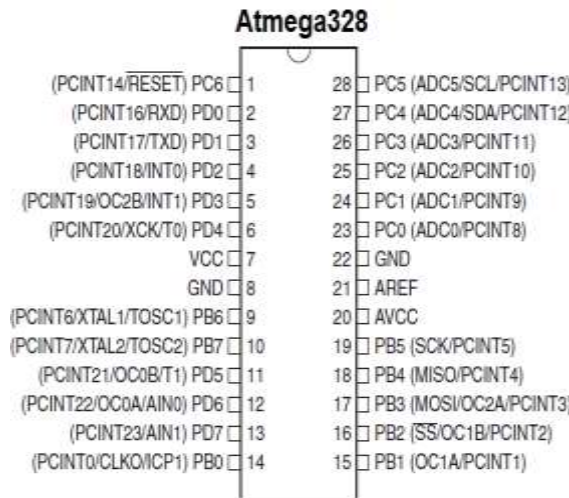
**Block Diagram-**



**Fig.3 Block Diagram of system**

In Cargo Management System, we've used Arduino microcontroller which is an ATmega328 based microcontroller. Temperature-Humidity sensor, Load cell, HX711 Module, GSM Module, GPS Module, Display and temperature sensor all are connected to the Arduino microcontroller. The Arduino is connected to the web using the GSM module which is interfaced serially with it'll the sensor data are going to be collected and uploaded on the server using the GSM module.

**Microcontroller [Arduino Uno Atmega328P]-**



**Fig.4 Pin Diagram of Microcontroller**

**GPS Module-**

It provides output to the transmitter with the default 9600 baud rate using NMEA communication protocol.



**Fig.5 GPS Receiver**

**RFID Module:-**

The RFID module (RC522) comes with a keychain and RFID card. The only user having such a card or keychain is to allow for access. It uses SPI & UART.



**Fig.6 RFID Module**

#### **Temperature and Humidity Sensor (DHT22)-**

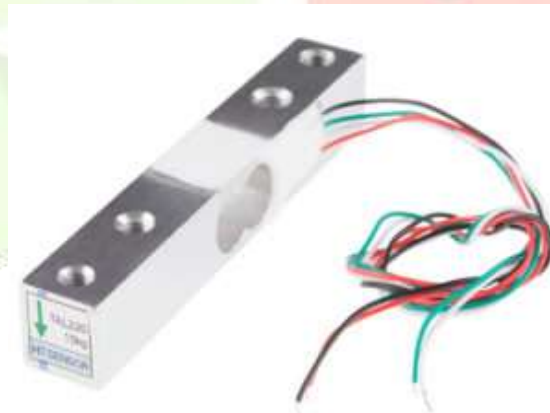
The DHT-22 is used to measure a temperature and humidity it is a sensing element which show outputs in digital form. Room temperature and humidness have gotten to be written on serial monitors.



**Fig.7 DHT-22 Sensor**

#### **Load Cell-**

The load cell comes in several weight counting on your weight, select load cell weight specification, we've used 40Kg, precision grade C2 load cell.



**Fig.8 Load Cell**

## **IV. RESULTS**

DHT11 (for temperature and humidity), GPS module (Neo 6M) (for location) are important sensors utilized in the project to supply the precise value or position of temperature, humidity and site. These results are often viewed on an online website. A sensible cargo monitoring system is successfully implemented using the concept of Internet of Things which can be a boon for the transport sector.

1) **Temperature**

The results on the interface will show the temperature of the system.

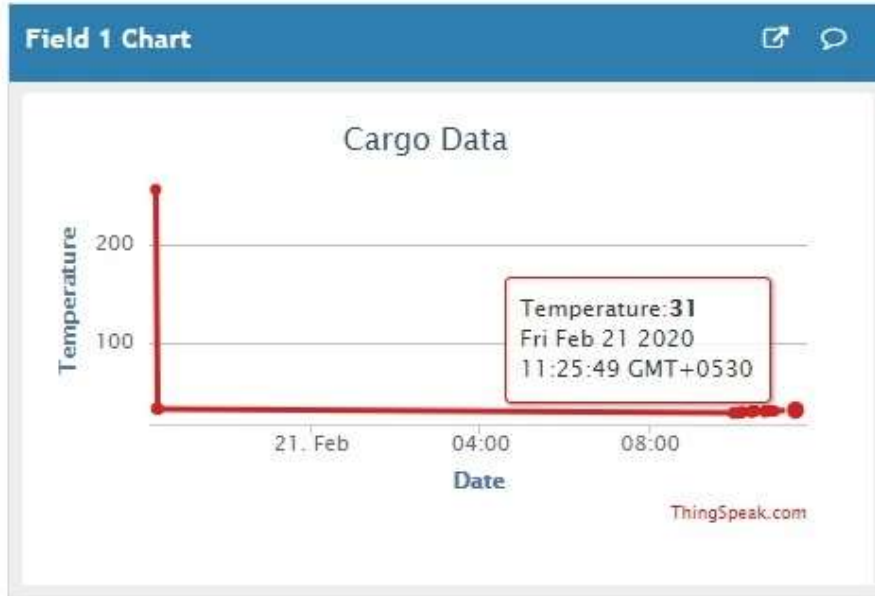


Fig.9 Measurement of Temperature

1) **Humidity**

The results on the interface will show the temperature of the system.

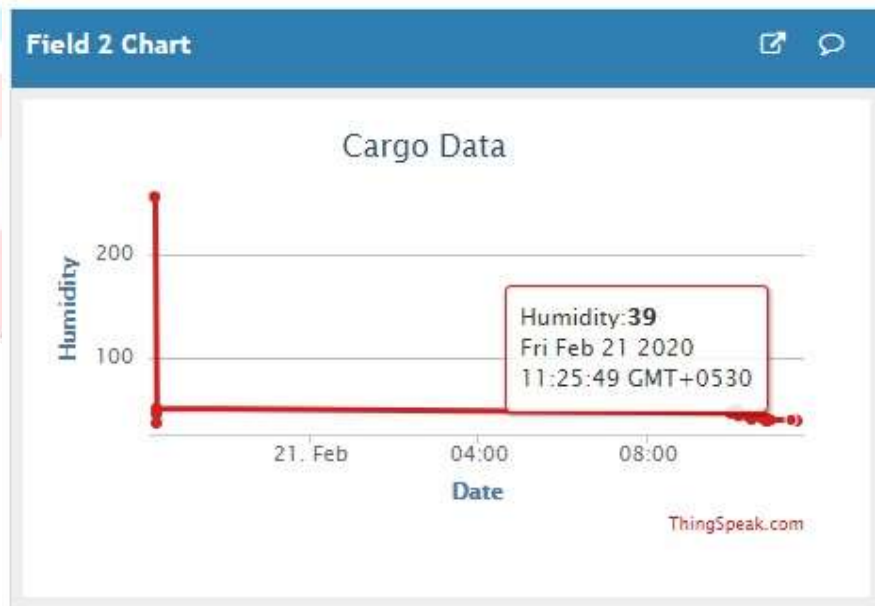


Fig.10 Measurement of Humidity

2) **Location**

The results on the interface will show the routing and tracking function of the system. The project is locating the position of the Truck.

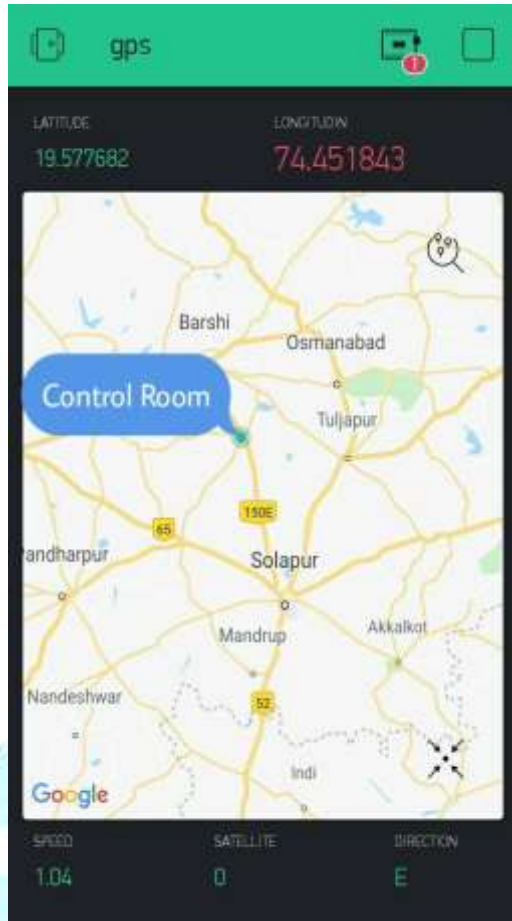


Fig.11 Control Room Location

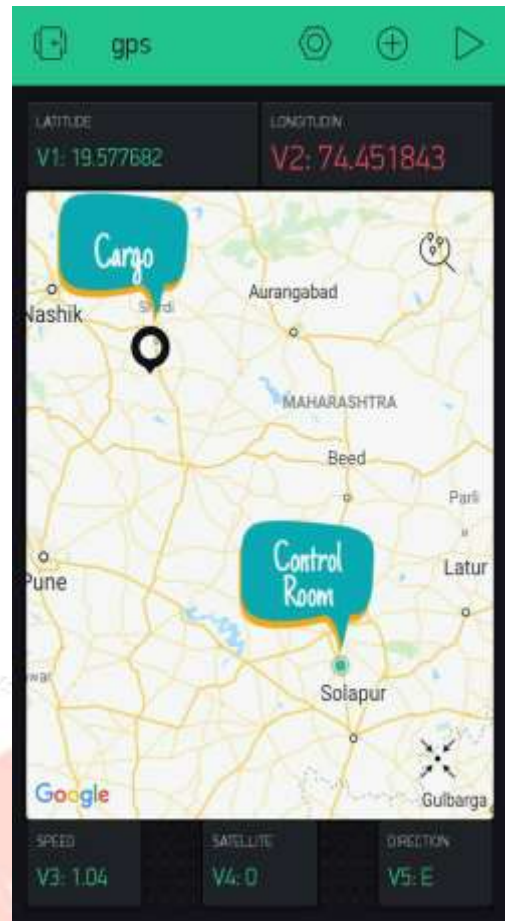


Fig.12 Control Room & Cargo Location

3) **Weight**

The results on the interface will show the load of the system.

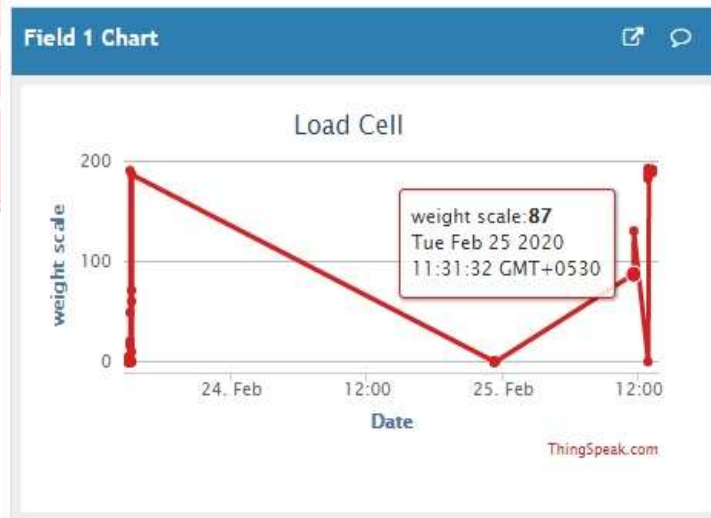


Fig.13 Measurement of Weight

2) **Cooling System**

The results on the interface will show the Cooling system of the project



**Fig.14 Cooling System for**



**Fig.15 Cooling System for**



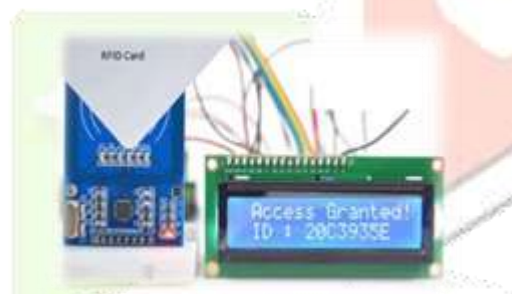
**Fig.16 Cooling System for**

3) **RFID Secured Door Access**

The results on the interface will shows the various states of RFID reader RC522 for secured door Access of cargo Project. Access to cargo is granted for person when correct card is Scanned, otherwise access is denied.



**Fig.17 Waiting for Scan RFID Card On Condition**



**Fig.18 Access Granted Heating for On Condition**



**Fig.19 Access Denied Cooling For On Condition**

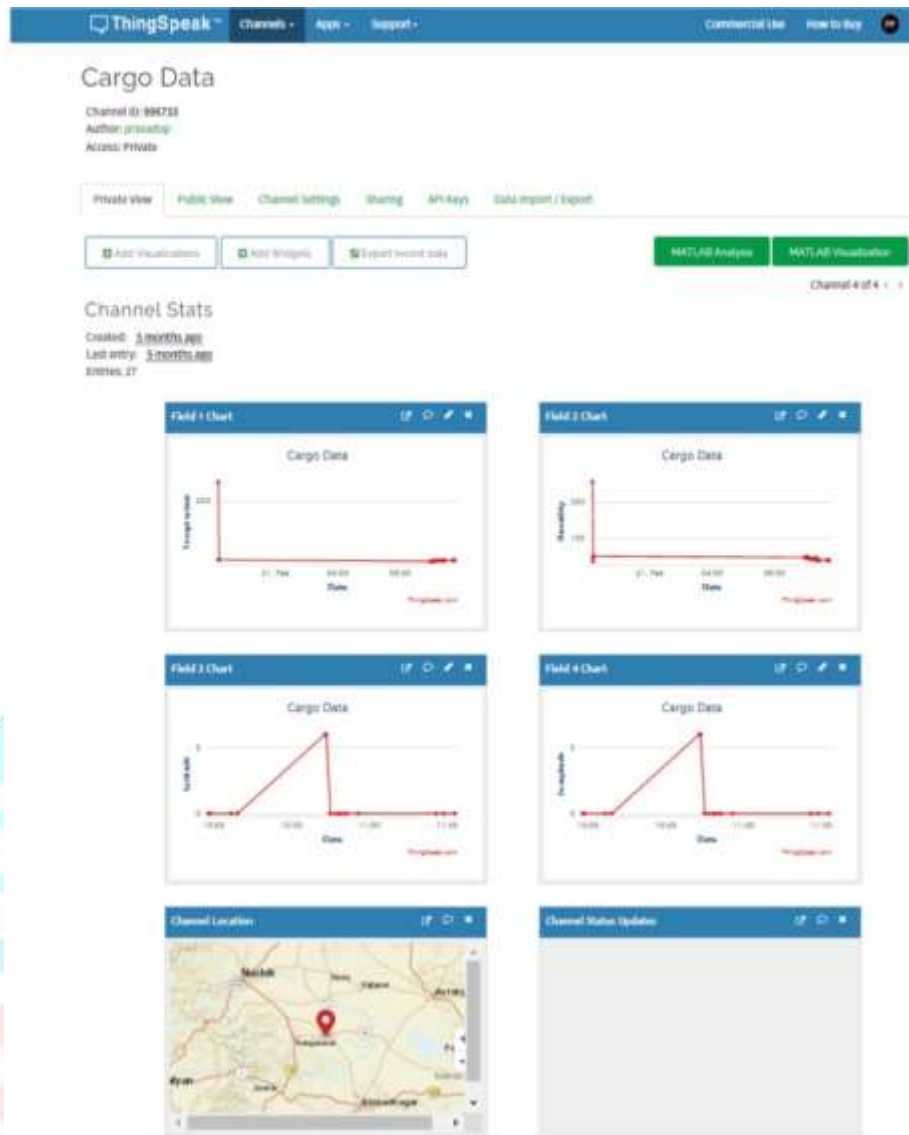


Fig.20 View of Control Room

#### Advantages-

- 1) Manipulation of cargo are often easily tracked.
- 2) Cargo can be in surveillance during journey
- 3) Easy to manage all the parameter data securely and easily.
- 4) Centralized database helps in avoiding conflicts between different branches.
- 5) Due to cloud based automatic system is used the data is more error free.
- 6) Can generate required reports easily.

#### Disadvantages-

- 1) Internet connectivity is mandatory.

#### Applications-

- 1) Industrial applications:-These system are often used for transportation of products equipment's carriers in industries replacing traditional cargo systems.
- 2) It's used for transportation of perishable Agricultural products.
- 3) It's used for temperature sensitive Medicine's transportation.



## V. CONCLUSION

Some well-known and fashionable wares management system are antecedently developed that are classified on completely different technologies. However this project is used IOT based mostly system for wares management long with cloud-based services and cargo load management, RFID secured access technology so as that the protection of the door are typically managed by remote location. Since our planned system is created over wireless sensors network. It's a simply be put in and friendly for the users with none overheard difficult work and it conjointly doesn't would like a lot of coming up with and wired association. Real time detector knowledge are typically obtained exploitation varied routing protocols over a wireless medium.

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