



Intelligent Cargo Management System

*Tushar Shankar Kudale¹, Omkar Subhash Lakare², Tarun Jitendra Pardeshi³,
Prof.Pooja Ambatkar⁴*

Student, of E&TC Engineering, JSPM's Imperial College Of Engineering & Research, Wagholi

Pune, Maharashtra, India

Assistant Professor, Dept. of E&Tc Engineering, JSPM's Imperial College Of Engineering & Research, Wagholi

Pune, Maharashtra, India

Abstract : An extensive literature analysis is used to highlight the role of the Internet of Things (IoT) and how it affects the cargo management system. The article covers a number of crucial IoT-related topics for CMS, such as the definition of IoT, important IoT technological enablers, and numerous CMS procedures and applications. We offer a number of categories for out-of-print books, including industry sector, supported literature, and the classification of important supported supply chain operations. Perishable agricultural product transportation involves the use of medicines in the cargo management system, which is crucial for maintaining process stability. In this article, we provide a method to transport perishable goods as efficiently as possible. Low-power gadgets that monitor environmental and physical parameters like temperature, humidity, and cargo conditions are connected to the Internet of Things (IoT) through the use of sensors. Since internal processes have been consolidated and optimised, the focus is quickly shifting towards defining the content that needs to be consumed by numerous and different actors using different platforms and/or software solutions. In an increasingly interconnected world, the need to exchange information across domain boundaries is becoming more and more common. The transportation logistics industry is no different. Its primary concern is industrial applications that enable the tracking, monitoring, and transmission of freight information throughout the entire transportation chain. This ensures effective communication throughout the supply chain, enabling timely problem-solving and intervention in the event of an emergency as well as overall improvements in transportation efficiency.

I. INTRODUCTION

The suggested cargo-level tracking system, which was backed by ongoing cargo monitoring, was used for activities relating to cargo location. The project used their advantages to provide a low-power and low-cost method. To keep an eye on the ambient temperature, a thermal sensor was used. Android-based mobile devices can get the monitored environment temperature and its status through Bluetooth communication. Furthermore, the temperature of the monitored environment is also transferred to the server to track the condition of the refrigerated cargo. The primary emphasis is on the overall cargo situation in order to ascertain the cargo's present shipping condition. Nevertheless, the aforementioned measures are unable to guarantee the safe arrival of the shipment and offer consumers real-time data transmission monitoring. The logistics sector is now dealing with problems pertaining to the movement of commodities. Through network and system interconnects, cargo can be promptly updated with pertinent information (such storage location, inventory, and delivery status) for thorough management, monitoring, and tracking. Through the use of many algorithms and methods, the cargo tracking system operates efficiently.

In a globalised commercial environment, logistics and transportation serve as the economic system's aorta. The last few years have seen a significant expansion in the logistics sector. One reason for this expansion is that globalisation has created worldwide supply chains that call for sophisticated logistical ideas. The requirement for logistics concepts has increased further due to the exponential expansion of e-commerce. There are now more and smaller consignments that need to be transported to various locations as a result of the consignment size decreasing and the overall consignment number increasing. The logistics service providers find it extremely difficult to accommodate smaller consignments because their objective is to maximise the use of transport vehicles by bundling as many consignments as feasible. This objective hasn't been met thus far, for example, the use of trucks is less than 70% in several nations. This relatively low use of the transport vehicles not only presents a financial challenge for forwarders and logistics service providers, but it also seriously harms the environment.

II. LITERATURE SURVEY

The "private transportation" perspective—that is, the perspective of the private businesses providing logistics and transportation services—is the subject of fewer and relatively more recent papers than the many contributions that adopt the "public transportation" perspective, which represents the interests of public stakeholders. Furthermore, many themes are underrepresented in literature, even though researchers have recently begun to look into the decision-making process of; examples include the topic of integration among various application types and empirical research on the role of technology providers in the adoption process. Regarding technique, the review found that while simulation and modelling are rarely used, many of the papers reviewed are either conceptual papers or empirical research (mainly based on surveys, case studies, or interviews). Despite the attempts to be comprehensive, it's possible that important research was unintentionally overlooked. Nonetheless, the authors feel that confidence may be placed in the evaluations that follow because they think this review accurately represents the corpus of research on logistics and transportation businesses published within the given timeframe.

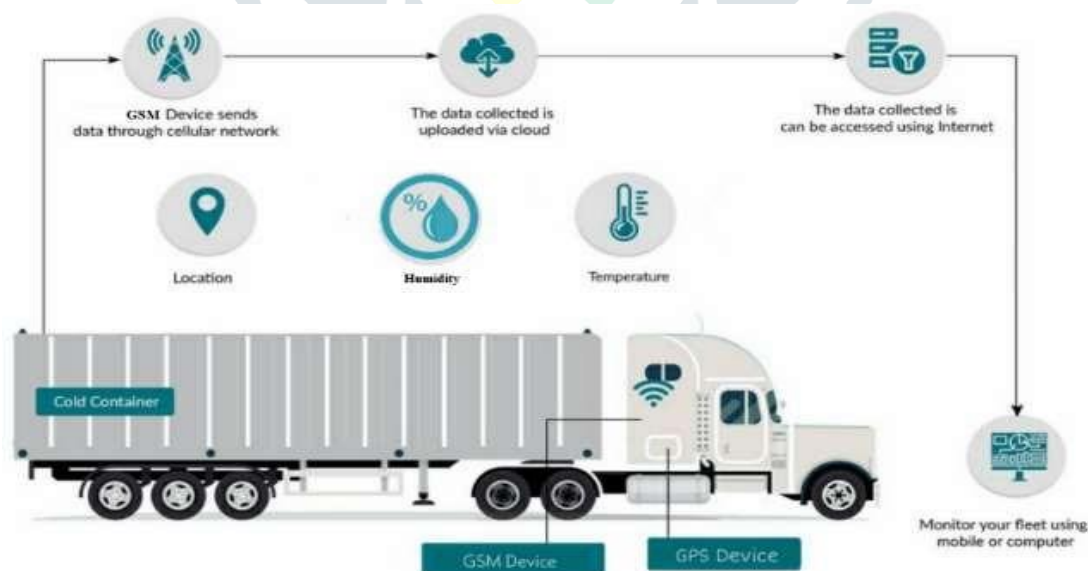
Prior to delving into the analysis and elegance of the project, we have a tendency to consult a number of analysis papers, manuals, and other materials related to the project's concept. These papers address a variety of topics, including cargo tracking systems and manners. Using RFID and GPS bottom of form support, W. They., E. L. Tan, EW Lee, and Ti Li integrated a solution for integrated track and trace in supply chains.

III. METHODOLOGY

WORKING PRINCIPAL

As we begin our project, we will use a load cell and a HX711 module to check and tear the weight of a weighing panel. Use the load cell &hx711 module to determine the precise weight of the cargo or package that is positioned above the weighing panel. The identified weight of the cargo is kept in a database that is accessible online from a distance. Using a GPS module, the speed of the freight movement is determined. Programming logic will ensure that the weight of the cargo is checked recursively using the exact value contained in the database whenever it moves inside the minimum speed restriction. We treat weight values as noisy data as soon as the speed beyond the minimal limit because the cargo will be affected by g-factors and other forces. We continue detecting speed recursively by utilising the GPS module. We continue monitoring the cargo weight as soon as the speed reaches the minimum limit. If there is any modification of the cargo weight in the scenario above, we will use the GPS module to obtain the time, longitude, latitude, and altitude. There are two ways to receive the tracked values:

- Sms using gsm module.
- Database which is present remotely using internet



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.

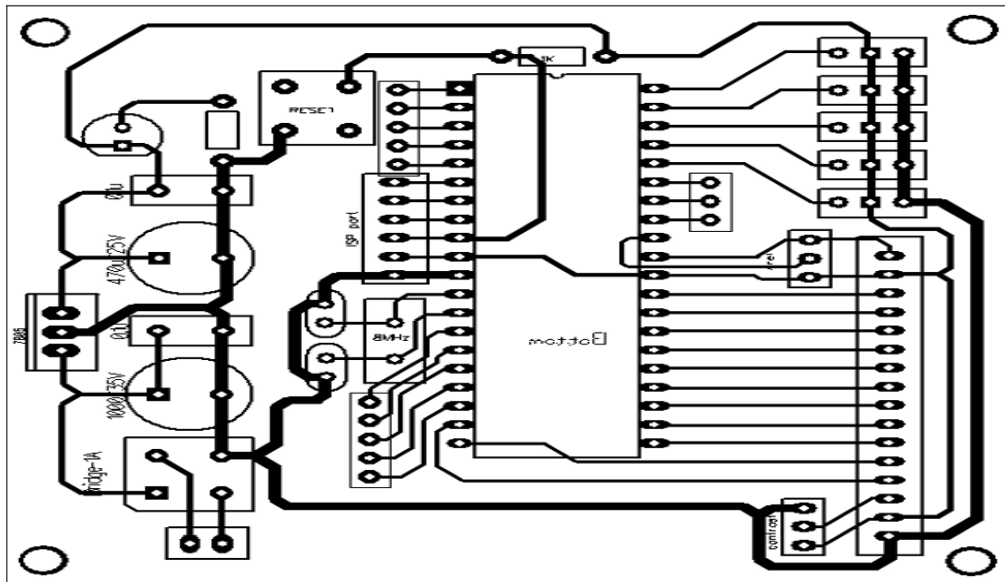
ThingSpeak [Cloud Platform]-

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.

DESIGNING OF PCB:

The connections on the PCB should be identical to the circuit diagram, but while the circuit diagram is arranged to be readable, the PCB layout is arranged to be functional, so there is rarely any visible correlation between the circuit diagram and the layout. PCB layout can be performed manually (using CAD) or in combination with an Autorouter. The best results are usually still achieved using at least some manual routing - simply because the design engineer has a far better judgment of how to arrange circuitry. Surprisingly, many autorouted boards are often completely illogical in their track routing - the program has optimised the connections, and sacrificed any small amount of order that may have been put in place by manual routing. Generally autorouted boards are somewhat harder for a technician to repair or debug, for this reason. Historically, PCBs used to be laid out by drawing or using stick on paper shapes on Mylar film, - that really WAS manual routing! The printed circuit board manufacturing process is a difficult and complex series of operations to make a printed circuit board. The process starts once our files and specifications have been decided.

PCB Layout:



IV. RESULTS



Fig.1 When cargo is empty

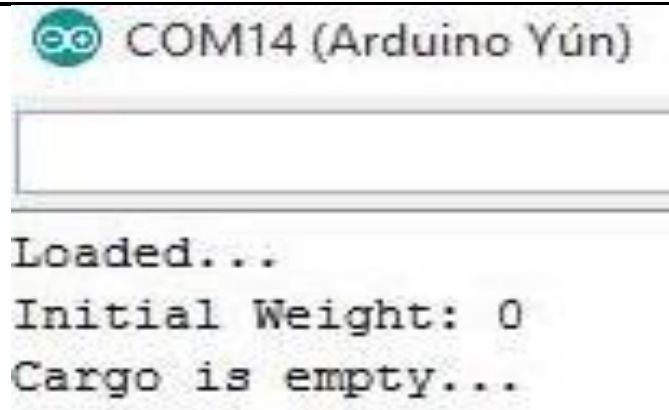


Fig.2 Checking initial weight

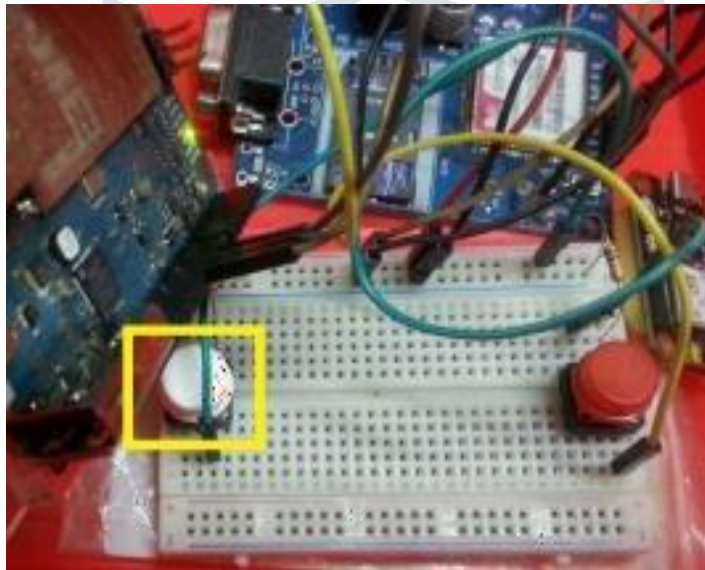


Fig.3 When loaded button is pressed



Fig.4 When cargo is loaded

Loaded...

Initial Weight: 1032Trying to connect to server..

Connection Successful

Fig.5 When cargo is loaded checking the weight

id	truck_no	date_time	initial_weight
36	AP13L290	Thu Mar 8 09:57:44 UTC 2018	189
37	AP13L290	Thu Mar 8 10:08:59 UTC 2018	1269
38	AP13L290	Thu Mar 8 10:14:24 UTC 2018	1032

Fig.6 Start record



Fig.7 Cargo is manipulated

Trying to connect to server...
Successfully Connected.

truck_no=AP13L290&date_time=Sat Mar 17 09:10:55 UTC 2018
sinitial_weight=631&status=3&latitude=1000.00&longitude=1000.00&

Function Invoking...

17.520591
78.630493

Fig.8 GPS is invoked when cargo is manipulated

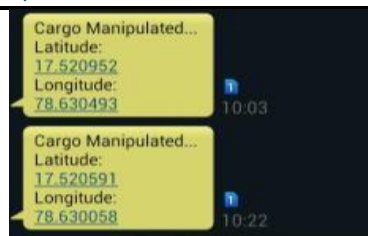


Fig.9 Message invoked through gsm latitude & longitude is displayed

id	truck_no	date_time	final_weight
1	AP13L290	Thu Mar 8 09:44:03 UTC 2018	1032
2	AP13L290	Thu Mar 8 09:58:07 UTC 2018	189

Fig.10 Manipulated Record

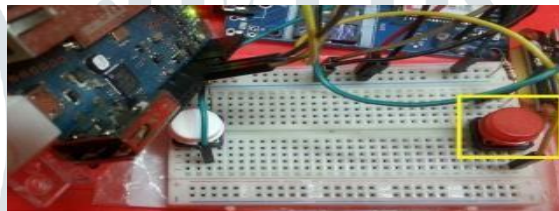


Fig.11 When unloaded button is pressed

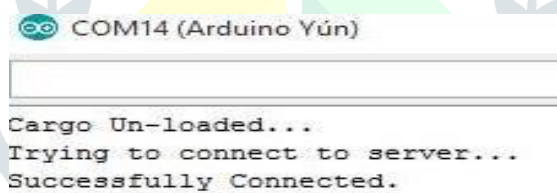


Fig.12 Printing when cargo is unloaded

54	AP13L290	Sat Mar 17 09:10:21 UTC 2018	17.5212	78.6301	303.00
55	AP13L290	Sat Mar 17 09:10:24 UTC 2018	17.5212	78.6301	315.00
56	AP13L290	Sat Mar 17 09:10:28 UTC 2018	17.5212	78.6301	305.00
57	AP13L290	Sat Mar 17 09:10:32 UTC 2018	17.5212	78.6301	300.00
58	AP13L290	Sat Mar 17 09:10:36 UTC 2018	17.5212	78.6301	313.00

Fig 13 End record

V. CONCLUSION

In this project, we've put in place an intelligent cargo system to move items from a specified source to a destination efficiently. The route map is used to imitate the sensors. To efficiently maintain the product's status in the desired condition, the most preferable path is chosen. Route trajectories are generated by simulation. Real-time scenarios, such as traffic, truck breakdowns, and catastrophic repercussions, can be taken into account for future work to enhance the outcomes. In this study, we have developed an intelligent cargo system to move items from a specified source to a destination in an effective manner. To efficiently maintain the product's status in the desired state, the most advantageous path is chosen.

A test set is subjected to these forecasts. The cars are tracked using the GPS trajectories in addition to determining the best path. Route trajectories are generated by simulation. Real-time scenarios, such as traffic, truck breakdowns, and catastrophic repercussions, can be taken into account for future work to enhance the outcomes. Several routing techniques could be used to obtain real-time sensor data over wireless media.

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