

Intelligent Packaging System for Safe Delivery

Bharath Raj T S¹, K Karthik Raj², Mohammed Ruman³, Nikhil R Gosal⁴, Vyasraj T⁵

^{1,2,3,4}UG Student, Dept. of ECE, BNMIT, Bengaluru, VTU, Belagavi, Karnataka India

⁵Assistant Professor, Dept. of ECE, BNMIT, Bengaluru, VTU, Belagavi, Karnataka India

Abstract - The Intelligent Packaging solution aims to use an electronic packaging solution to combat the problem of opening packages during transportation and also to measure the inner and outer atmosphere of the package. IPS uses many sensors that continuously track the physical parameters inside the package to ascertain if the package has been opened, or there has been some rise in the temperature. Once this alert has been sent to those concerned, they can take necessary action. If there is no alert and a normal delivery takes place, the customer uses his/her mobile phone to scan a QR code displayed on the IPS kit. This will result in an OTP that is received at the customer's mobile number and entering the OTP will reset the device. The proposed system ensures that the customer receives the assured products.

I. INTRODUCTION

The Internet of Things (IoT) is a scenario in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. IoT has evolved from the convergence of wireless technologies, micro-electromechanical systems (MEMS) and the Internet. With IoT, devices typically gather data and stream it over the Internet to a central source, where it is analyzed and processed.

In the modern world, human mistakes sometimes lead to catastrophic events leading to loss of valuables. One such instance, sometimes intentional is the over loading of all the packages in vehicle. It leads to damage and mishandling of the package. Increased customer's experience, expectations and product complexity are driving traditional packaging techniques obsolete. In addition to this, traditional packaging methods do not provide the customer as well as the manufacturer with important information about the product during shipping. To develop an intelligent packaging system that uses the Internet of Things and Machine Learning for authenticating, securing, and tracking high-value packages. The

proposed system aims to design a kit that is able to detect any kind of intrusion in its space, it should be able to give information about all the necessary parameters of the environment in which the product is kept inside the package, should alert everyone who is in charge of the delivery cycle of the product and the kit should be able to reset at the end of the delivery cycle and be reusable on the next instance.

The primary aim of this project is to provide safety of the packages during transportation as well as to measure the characteristics of the product, the inner and outer atmosphere of the package. The project Intelligent Packaging System aims to use electronic packaging solutions to effectively trigger an alert when a package is opened. The objective of the kit that has been designed is to detect any kind of intrusion in its space, by giving information about all necessary parameters. When the values in these parameters crosses a threshold value the customer gets an alert and the buzzer goes on. If there is no alert a normal delivery takes place, the customer uses his/her mobile phone to scan a QR code which results in OTP that is received at the customer's mobile and after this the kit can be reset and re-used.

II. METHODOLOGY

The proposed methodology of Intelligent Packaging Solution is as shown in the figure 1. The system uses LCD display to display each operation, LDR sensor is used to determine whether the IPS properly closed or not, MEMS sensor is used to determine whether the IPS box have been mishandled or not. IR Sensor is used to determine the package presence in the IPS kit. GPS tracks the current location, GSM (Node MCU) will send the message to user about any mishandling of the product, and DHT sensor monitors the temperature and humidity inside the IPS.

III. EXPERIMENTAL RESULTS

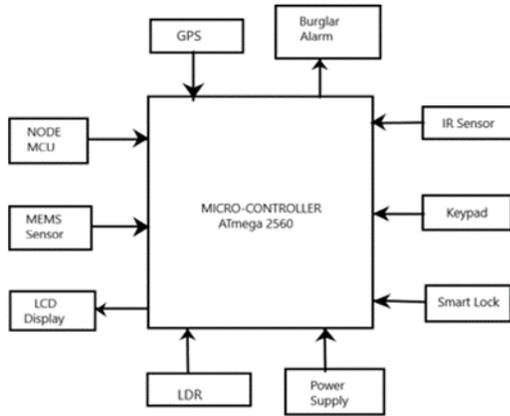


Fig 1: Block diagram of Intelligent Packaging Solution
 The IPS development kit will be made into a compact space and placed inside the package that is to be secured. The sensors that are used in the IPS development kit will be turned on and will start working. The kit will travel within the box till the destination and will be removed after verification of the data. The IPS development kit is first placed in the package, So that it is to be tracked. This is placed inside the package along with the contents of the package. The kit in order to work properly and without any interruptions it must be placed as close to the package contents as possible. The IPS development kit starts running the program that is coded into it and hence starts transmitting data to the cloud. The data on the cloud is visible on the web interface that has been built for this specific purpose. The data is monitored in real-time on the cloud as well as in the IPS development kit. On receiving the OTP, the IPS development kit is reset and it is ready to be taken back by the shipping company and installed on another parcel and the cycle of the IPS development kit continue.

The IPS development kit is made into a compact space and is placed inside the package that is to be secured. The package is having enough space for the kit to work properly. The sensors that are used in the IPS development kit will be turned on and will start working. The kit will travel within the box till the destination where it will be removed after verification of the data. The IPS development kit starts running the program that is coded into it and hence starts transmitting data to the cloud. If there is any mishap with respect to the package then an alert is sent to the manufacturer of the product, the logistics partner as well as the customer. This enables them to take any action that is necessary to either stop the package in transit or to verify its integrity. On receiving the OTP, the IPS development kit is reset and it is ready to be taken back by the shipping company and installed on another parcel and the cycle of the IPS development kit continues.

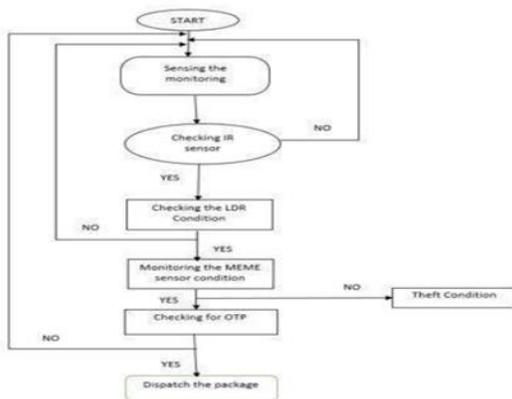


Fig 2: Flowchart of the working model

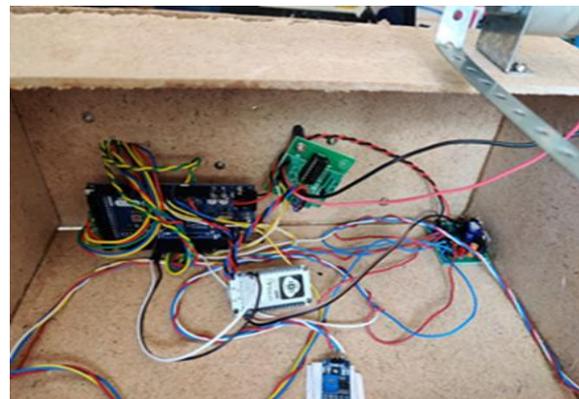
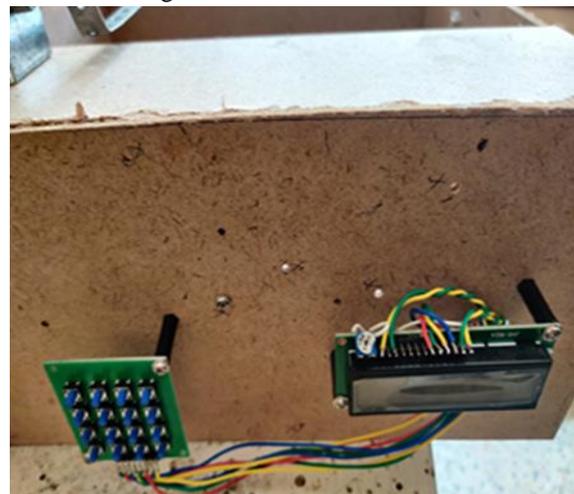


Fig 3: Overview of the model



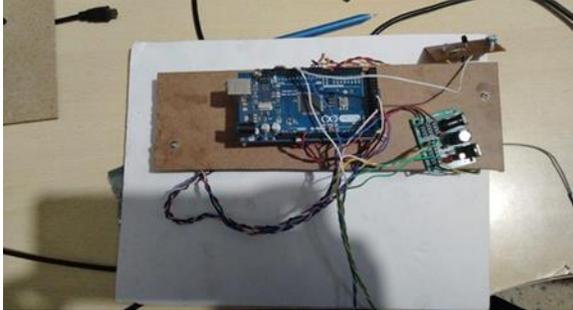


Fig 4: Interior look of the designed model

IV. CONCLUSION

The deficiency in security of courier delivery can be improved in our proposed system. This implementation can prove to be very effective in providing security for the goods and also ensures the safe delivery of goods to respective enterprises/customers. With the help of GPS we can track the location of the package that has to be delivered from source to customer's destination. In vehicle, a server and smart phone are used for courier tracking. A vehicle geographic co-ordinate and vehicle unique ID obtained from black box will be recorded who's location can be tracked from anywhere at any time. This system brings innovation to the existing technology and improvising the safety of the packages.

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