

Smart Bag based on RFID and Internet of Things

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doi: <https://doi.org/10.21467/proceedings.115.13>

ABSTRACT

The Smart Bag is a very innovative and helpful project that uses RFID Technology [1] for identifying books / items smartly. The Radio Frequency Identification sensor uses a reader to get information about the item from a tag attached to it. Smart Bag initially used this technology. Technologies or devices which are used in development of The Smart Bag are RFID Sensor, HX711 Load Cell Sensor, NodeMCU, Arduino, and GPS. The Books / items can be identified by using RFID tag and it will store the count of books / items to its memory and matches the items according to schedule. The circuit for communication comprises of NodeMCU and RFID receiver in which passing of messages / alerts, reading of books / item is done. When the books / items are placed inside the bag, the RFID receiver reads the RFID Tag and sends the Books / items in the bag to the NodeMCU [2]. The NodeMCU compares it with the schedule list. If any book / item is missing then the NodeMCU generates an alert of missing books / item. The smart bag has GPS function also, which sends the Real-time Location of a Bag or a Kid to the Guardian or Parents. Initially, this project is for those small kids who regularly go to school.

Keywords: *RFID, NodeMCU, Arduino, HX711, GPS, IOT*

1 Introduction

The world is going to be digital, some of our things or gadgets of our daily life is also digital. This project is for those small kids who regularly go to school, and their parents or guardians worried about them regarding safety, thus, there is a need of The Smart Bag. Initially, the bottom of the bag from inside the bag, The HX711 Load cell sensor will be placed which tells the weight of the bag [3]. The smart bag also has a RFID reader with NodeMCU to check the number of books ties with the schedule for the day as predefine in database. We can also identify by using RFID if any book / item is missing or if there is an extra book inside the bag. There will be a notification or alert send to the user for a missing book / item or extra book / item, which is not required in the schedule. Lastly, the GPS tracking system tracks the real-time location of your Kids and by using GEO Fencing Technology the parents or guardians will be notified if the kid is crossed the area which is not covered in GEO Fencing.

1.1 Existing system

This project is for those small kids who regularly go to school, and their parents or guardians worried about them regarding safety, thus, there is a need of The Smart Bag. To ensure more security precautions for example the ordinary bag may be theft or stolen. In the case of forgetting to take the books, the user is left with no other option. Now if the required books are very important for that time then in case the person have to go to home with no option left becomes more difficult. The user may face many problems. Now, to get out from this problem, we are making this project in order to remind or notify the owner of the bag about the schedule through



notification or alert. In this project, the bottom of the bag from inside the bag, The HX711 Load cell sensor will be placed which tells the weight of the bag. The smart bag also has a RFID reader with NodeMCU to check if the number of books matches with the schedule for the day. We can also identify by using RFID if any book / item is missing or if there is an extra book inside the bag. There will be a notification or alert send to the user for a missing book / item or extra book / item, which is not required in the schedule [4]. Lastly, the GPS tracking system tracks the real-time location of your Kids and by using GEO Fencing Technology the parents or guardians will be notified if the kid is crossed the area which is not covered in GEO Fencing.

2 Proposed approach

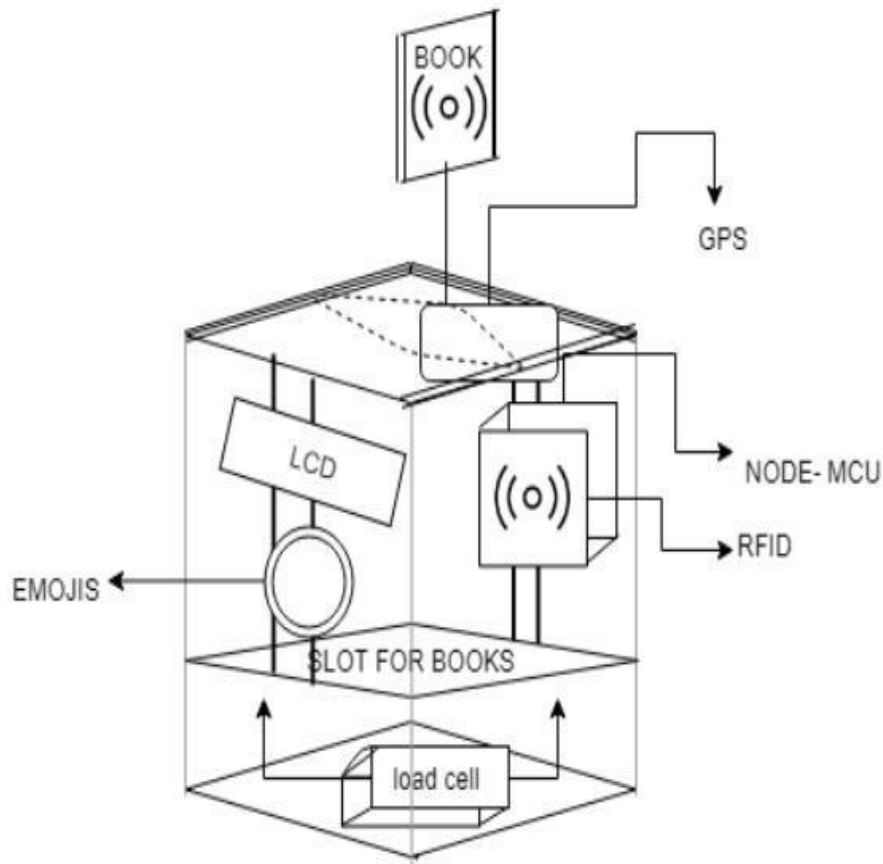


Fig1: Block Diagram of Smart Bag

Now, we are working on the next version of this bag, which will provide the many extraordinary features to this bag. It provides the Anti-Theft Protection to the user, where the user does not have to be worried about the stolen or theft. We will add some entertaining things like Emoji Screen which is controlled according to Kids.

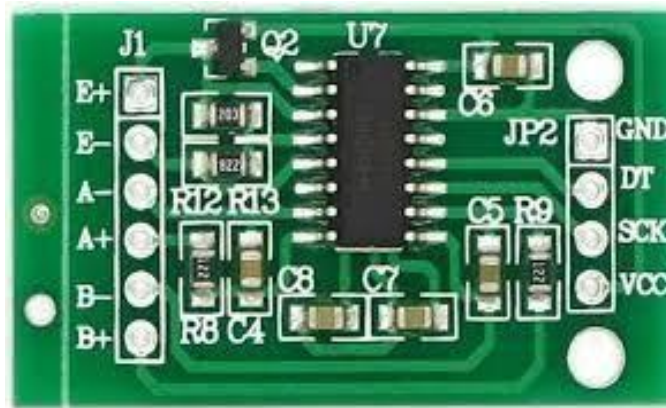
2.1 NodeMCU (ESP8266)

This is the major component of this project. NodeMCU is an open source IoT platform. It includes the firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module.



2.2 HX711

The HX711 Load Cell is basically used to compute the weight of the bag. A load cell is a type of transducer which converts any type of force into an electrical signal. That can be measured and standardized. If we increase the force that is applied on load cell it also increases the electrical signal. There are different types of load cell that are used so commonly in real life applications [5]. For example: - hydraulic, pneumatic and strain gauge.



2.3 Mathematical calculation

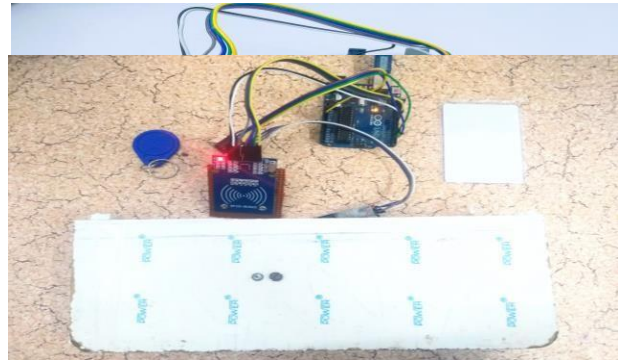
- y is the actual weight in whatever units you want (g, kg, lbs, etc.)
- x is the value from that is available by HX711.
- m = slope (multiplier)
- b is intersection (offset)

3 Working representation

In this project, the bottom of the bag from inside the bag, The HX711 Load cell sensor will be replaced which tells the weight of the bag [6]. The smart bag also has a RFID reader with NodeMCU to check if the number of books matches with the schedule for the day. We can also identify by using RFID if any book / item is missing or if there is an extra book inside the bag. There will be a notification or alert send to the user for a missing book / item or extra book / item, which is not required in the schedule. Lastly, the GPS tracking system tracks the real-time location of your Kids and by using GEO Fencing Technology the parents or guardians will be notified if the kid is crossed the area which is not covered in GEO Fencing [7].

4 Results

We completed many of the features mentioned. The Load Cell works perfectly, and the initially RFID schedule management system is working.



5 Conclusion

The design of Smart Bag based on Internet of Things and RFID Technology for identifying books / items smartly. The Radio Frequency Identification sensor uses a reader to get information about the item from a tag attached to it. When the books / items are placed inside the bag, the RFID receiver reads the RFID Tag and sends the Books / items in the bag to the NodeMCU. The NodeMCU compares it with the schedule list. If any book / item is missing then the NodeMCU generates an alert of missing books / item. The smart bag has GPS functional also, which sends the Real-time Location of a Bag or a Kid to the Guardian or Parents. Initially, this project is for those small kids who regularly go to school. The Smart Bag measures the weight of the Bag with items and NodeMCU tells the no. of books and items are placed in the bag.

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