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# The Intelligent Suitcase

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***Abstract: In generation where time is the greatest deciding factor, air travel is the most preferred means of transport. Airports and airlines are the emerging global companies providing air services. The loss and mixing of luggage is the most awful experience faced by hundreds of passengers every day. Not much is done in this field to help out the passengers with the problems of suitcase mixing and loss. To help the travellers we have developed the concept of an intelligent suitcase. The suitcase works on the Bluetooth technology interfaced with a controlling unit GPS/GSM modules, RFID cards, ultrasonic sensors, power unit, load cell etc. The suitcase can be easily tracked for its location by the help of GPS technology and the RFID cards help for unique identification of the suitcase. It is controlled by the smart phone of the passenger and the Bluetooth technology helps in digital locking, location tracking and identifications along with many other specially designed features.***

***Keywords: Baggage; Bluetooth control; GPS tracking RFID Card; IR sensor; Ultrasonic sensor; Load cell.***

## I. INTRODUCTION

A suitcase is a general term for a distinguishable form of luggage. It is often a somewhat flat, rectangular-shaped bag with rounded/square corners, either metal, hard plastic or made of cloth, vinyl or leather that more or less retains its shape. It has a carrying handle on one side and is used mainly for transporting clothes and other possessions during trips. It opens on hinges for a door. Suitcase lock with keys or a combination. One of the biggest benefits of a smart suitcase is the interior battery and the ability to charge a mobile device from the exterior USB port on the luggage. Bluesmart has a remote locking feature so that the person can lock or unlock your bag from the app. They can even set the app to always leave your bag unlocked when you're nearby, and automatically lock when you're separated. The previously made luggage bag did not have any of the technology used that we plan to make. The bag was just used to carry clothes or some items or some important files. Also, some of the technologies that were used to make such bag were single application based like one bag had a feature like mobile charging. One other bag had a feature of detecting GPS location. So in this bag, we brought few such features and some add on together in a single bag thus increasing its applications and efficiency as well as reducing the cost of purchasing multiple bags. There are two main types of spinner suitcases, both are very durable and come in a variety of sizes. Soft shell spinners are very popular and are usually made up of polyester or ballistic nylon. They are also available in leather but these can be significantly more expensive. Hard shell spinner is also very popular and is available in a range of bright colours. Some companies even offer lifetime warranty on their luggage that they won't break.

## II. LITERATURE SURVEY.

The first commercially successful rolling suitcases was invented in1970, when Bernard D. Sadow applied for a patent that was granted in1972 as united states patent 3,653,474 for" Rolling Luggage". Sadow applied for a US patent in 1970, and in 1972, he was granted the first successful patent on wheeled suitcases. Macy's sold the first suitcases in October 1970.

The Rollaboard was invented in1987 by Robert Plath, a Northwest Airlines 747 pilot and avid home workshop tinkerer, who affixed two wheels and a long handle to suitcases that rolled upright, rather than being towed flat like Mr. Sadow's four-wheeled models.

Originally suitcases are made of wool or linen. Leather also become a popular material for suitcases. It was used to cover wood suitcases or just on its own for collapsible suitcases. It is difficult to document all the materials suitcases have been made out of. Like all produced consumer goods, the materials chosen to construct suitcases are a product of their time. Wool, wood, leather, metal, plastic, fibre composite- even recycled materials are all common suitcase materials. The theme of suitcases becoming less cumbersome over time could be directly related to the advancement of better transportation.

As transportation changed, soft sided suitcases manufactured from polyester prevailed.

The original 'Halliburton' aluminum travel cases were handmade for Erle P. Halliburton's personal use in 1938. In 1950 Rimowa introduced the mass market aluminum suitcase based on the Junkers Ju 52 airplane shortly followed by Zero Halliburton. Nylon suitcases prevailed afterwards. Bernard Sadow, first patented wheeled

luggage in 1974. In the mid 1980s, Andiamo was the first company to incorporate ballistic nylon into luggage.

Now in the 21st century, the first suitcases were made of polycarbonate in 2000 by the german luggage maker Rimowa. Moat luggage manufacturers have made some suitcases from the material. There are many grades of polycarbonate. Both acrylonitrile butadiene styrene(ABS) which was a cheaper than polycarbonate, polypropylene which was lighter than polycarbonate were introduced shortly after polycarbonate. Spinner style wheeled suitcases were introduced in 2004.

## III. PROPOSED METHOD.

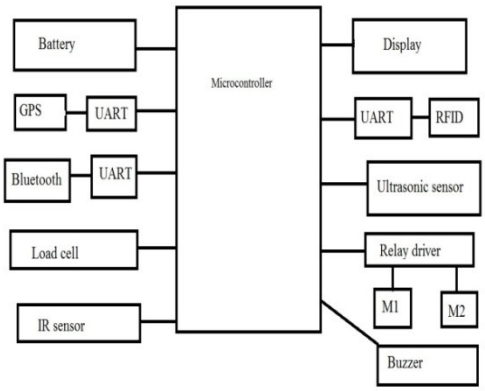


Fig 1. Block diagram of intelligent suitcase

The proposed method (shown in figure 2.1) presents the design and Development of Smart Luggage Based on Android System. This is a suitcase that connects wirelessly to our smart phone so that user can remotely lock it, and weigh the luggage. After decades, there is no innovation in the luggage industry, a technology where the suitcase that able to solve all the problems of the modern traveller and lead to no more luggage nightmares problem that can spoil our trips. By using this luggage, traveller can travel smarter and be the coolest kid in the airport. Forget about checking the bag, this luggage has a built-in digital scale so user can easily find out its weight and whether it's approved by the airline. Just pull the handle and the application will tell either it pass or not to bring it to airport. Nothing can ruin a trip like losing our luggage and its contents. Put our mind at ease knowing that user can lock the suitcase via their smart phone. Access can be shared with people that can be trusted. After having trips ruined because of problems with the luggage and looked at the feature of the suitcases and realized that they haven't developed in decades. Set out to re-imagine how a suitcase should be in this day and age, and have harnessed the latest available technologies to solve all the problems of the modern traveller. Through deep integration with the mobile phone as a partner services, the aim is to improve every aspect of your travel experience from packing to arrival. With this smart luggage, I have created an entirely new product category. In doing so, I had to create new manufacturing processes to achieve the tight integration between traditional luggage and cutting edge technology that is required to deliver a seamless travel experience.

## IV. TECHNICAL DESCRIPTION

### *A. Arduino UNO*

Arduino Uno (shown in figure 3.1) is a single board microcontroller based on the Atmega328. It is open source hardware- software used for development of electronic devices and it interfacing. Arduino uses SRAM memory with flash and EEPROM storage technology. It is a 14 pin device operating at 5 volts supply.

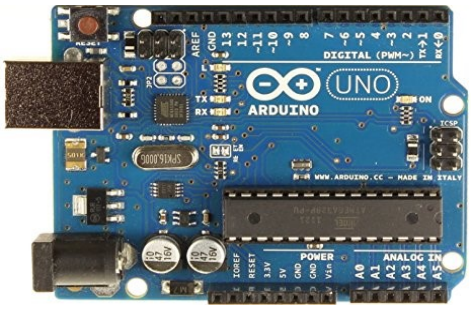


Fig 2. Arduino Uno

### *B. Bluetooth Module*

A HC-06 wireless Bluetooth (shown in figure 3.2) transceiver RF main module serial data wirelessly over the phone. This module is used for establishing wireless Bluetooth connection between two devices.

Fig 3. Bluetooth module

### *C. GSM/GPS Module*

Global positioning system(GPS)(shown in figure 3.3) is used for tracking the location of a device. It is a satellite based navigation system used to track and tell the position/location of a device. GSM module is used for text messaging over a mobile data network. It is used along with GPS module to text messages the location displayed by the GPS module to the receiver.

Fig 4. GPS module

### D. Driver Motor

L293D motor (shown in figure 3.4) driver is used to driver the suitcase powered with Arduino uno in conjunction.

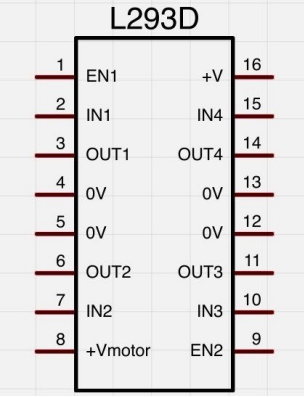


Fig 5. Pin diagram of L293D

### E. RFID Cards

Radio-frequency identification RFID( shown in figure 3.5) uses electromagnetic field to identify and track objects. RFID is method of Automatic Identification and Image Capture.

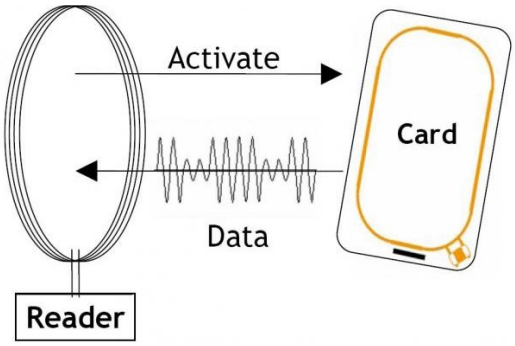


Fig 6. Working process of RFID cards.

### F. Load Cell

It is a type of transducer which converts applied force into electrical energy indicating weight of the object. The various types of load cells are hydraulic load cell(shown in figure 3.6), strain guage load cell(shown in figure 3.7) etc.

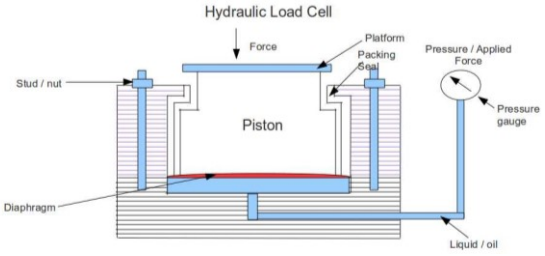


Fig 7. Hydraulic load cell

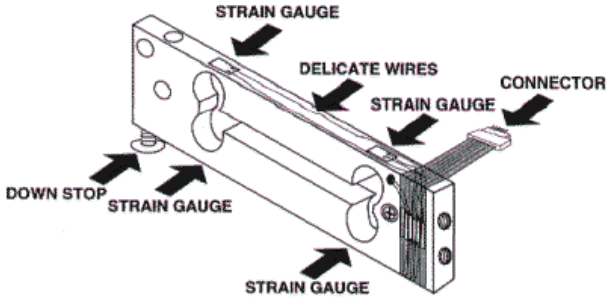


Fig 8. Strain gauge load cell.

### G. Ultrasonic Sensor

Ultrasonic sensors(shown in figure 3.8) are based on the ultrasonic sound waves measurements which are above the human audible frequency range. Time of flight, Doppler effect and attenuation of sound waves are the basic principles of ultrasonic sensors.


Fig 9. Ultrasonic sensor

## V. METHODOLOGY

The intelligent suitcase is designed to access serial data from the smart phone and it to Arduino uno. The Bluetooth signal helps the suitcase to follow the smart phone. The ultrasonic sensor maps the path to be travelled and avoids obstacles. The suitcase is digitally locked through the Bluetooth and smart phone.

The GPS module helps in tracking the location of the suitcase from anywhere in the world and the gsm modules sends the text message of the location to the owner's mobile phone. The unique rfid cards interfaced with phone helps in the easy identification of the suitcase/luggage removing the possibility of mixing of bags.

The inbuilt power unit helps to charge an electronic device through the battery stored. The load cell used helps to display the weight of the bag which is proportional to the force applied by the suitcase on the load cell. This technology when applied to the suitcase can make travelling more convenient and secure.

There are some hardware and software components used for this model which are as follows.

### A. Hardware Components

- Arm Microcontroller
- Power Supply Unit
- RFID Reader

- RFID Tags
- IR sensor
- LCD Display Unit
- GPS
- Bluetooth
- Load Cell
- Ultrasonic Sensor
- Relay Driver
- Motor
- Buzzer

*B. Software Requirements*

- Keil Version 4
- Embedded C
- Flash Magic
- Express PCB(Printed Circuit Board).

## VI. ADVANTAGES

- Digital locking System through smart phone for security against theft.
- GPS tracking system along with the location notifications.
- It can be used to charge any electronic device.
- Weight of the suitcase can be easily displayed.
- Unique id for each suitcase can be displayed.
- The suitcase is designed to follow the owner on its own without the need of dragging it.

## VII. APPLICATIONS

- It is used by travellers as it provides theft prevention.
- The buzzer can also help in identifying the smart bag if it gets misplaced.

## VIII. EXPECTED RESULT

- It will help in digital locking system for security against theft.
- It will help to avoid mixing of luggage by using unique ID.
- It will help us to know the location of the suitcase if it is misplaced.

## IX. CONCLUSION AND FUTURE SCOPE.

The major aim of the project is to study the complete design and operation of smart luggage bag from the engineering perspective and to create an enhanced working model of luggage bag integrated with sensors which makes the design very unique. Our main objective was to obstruct a Bluetooth enabled luggage bag with Arduino technology which can be used for travelling, anti-theft protection, mobile phone charging. In future feature like digital lock which can be used to lock/unlock the bag also we can GPS module to track the precisely in case bag is lost.


Fig 10. Expected output of the suitcase

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