

IOT BASED HELMET AND FUEL ANTI THEFT SYSTEM IN RENTAL SCOOTERS

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Abstract: Internet of things is linking Machine to machine, machine to the infrastructure, machine to the environment, the Internet of Everything, the Internet of the Intelligent Things, intelligent systems—call it what you want, but it's happening, and its outcome is huge.

Metro cities are seeing the growth of many rental bike startups. These startups are suffering additional expense due to theft of helmets and fuel already installed with the vehicle. This stealing can be prevented by using RFID tag in the helmets which will make sure that the trip will not be completed until helmet is in vehicle. Fuel is also being stolen off from the vehicles which is necessary to be controlled. This can be implemented when there is a sudden decrease in fuel level then it will send signal to application which can be further interpreted as not to end the ride. It will reduce the theft of helmets and fuel in the vehicle and make a way to proper technology to come in use for the sincere users that face the problem of fuel and lack of helmets in the rental scooters.

Index Terms— Internet of Things, RFID, Float Sensor, Arduino

1. INTRODUCTION

IoT (Internet of Things) is establishing the wireless connection between devices of all kind. The world is shifting to the cloud-based services. Every device is able to communicate with each other through IoT. The Internet of Things (IoT) is a system of interconnected to the computing devices, mechanical and digital machines, objects, people that are provided with unique identifiers (UIDs) and the ability to send data over a network without requiring human-to-human or human-to-computer interaction. RFID is often seen as a prerequisite for the IoT. Radio frequency identification system (RFID) is an automatic technology and aids machines or computers with radio waves it identifies an object, record the data or control single target. Connecting RFID reader to the terminal of Internet, the readers identifies, track and monitor the objects which are attached to the tags globally,

automatically, and in real time, if needed. This is the called Internet of Things (IoT).

Rental bike startups in India that offer the services of giving bikes and scooters along with helmets. Since these startups are in growing stage currently, they require to operate at low cost and make maximum profit. Due to this they have hired as much less personnel as possible and removed the middleman responsible for taking care of bikes and scooters. These startups are completely based on Automatic technology. The only human involved in complete process is the customer booking the vehicle. In general, these startups use IoT and Bluetooth technology for locking and unlocking the vehicle which has been accepted as a very easy way to handle the operations of vehicle whether it be payment related, locating the vehicle or registering any complaint. Alike all the automation technologies these also have drawbacks. People with unethical values or due to some reasons either damage the vehicle or steal the things associated with vehicle. Of all these drawbacks, stealing the helmet and fuel off the vehicle are most prominent one. Since there is no individual from startups involved while starting or ending ride, there is no control over these stealing. There has to be some efficient and inexpensive monitoring system that can control all this and avoid the extra cost being spent by the company on vehicle's accessories.

Steps can be taken in removing the drawbacks of present bike rental system and aiding the companies to make the ongoing technology the more efficient one. This project has basically two purpose. First is to avoid the helmets being stolen away from the vehicle. Second is to keep a check on the fuel level of the vehicle and ultimately prevent it from getting sucked away off the vehicle. Thus, this project can help to overcome the stealing problem. As an overview first purpose can be fulfilled by enabling the mobile application to not end the ride if helmets are not in the vehicle and for the second objective a sensor can be used to detect the sudden fall in fuel level and prevent the ride to end.

Technologies that is IoT and RFID (Radio Frequency Identification). RFID system is composed of tag and a reader.

The tag is a microchip which is attach with an antenna that is fixed to an object as the identifier of the object. By using Radio waves, the RFID reader communicates with the RFID tag. The main advantage of RFID technology is the automated identification and data capture which promises the wholesale changes across a broad spectrum of business activities. Also, aims to reduce the cost of the already used systems such as bar codes. Since the RFID technology was discovered some time ago, it has advanced and evolved only during the last decade since the main limitation in the implementations was the cost.

2. TERMINOLOGY

An Introduction to RFID Technology

Basic principle of RFID technology and different types of RFID technology were covered. RFID tags are basically of two types that are Active tag and Passive tag. Active tag has their own power source while passive uses signal power from RFID reader. These tags are cheap and easy in availability.

Internet of Things

Internet of things helps to build smart cities and establishes an inter-network between devices. The internet of things (IoT), is a system of interconnected computing devices, digital machines or physical objects, animals or even humans that are provided with unique identifiers (UIDs). IOT has the ability to send data over a network without having human to human or human to computer connection.

Bluetooth in Wireless communication

Most of the wireless communication done in the world is using the infamous technology Bluetooth. A wireless technology which is used to exchange data between fixed and mobile devices which are remote over a short range over short wavelength UHF radio waves. Bluetooth is used in the industrial, scientific and medical radio bands from 2.400 to

2.485 GHz and even building personal area networks (PANs).

Fuel Level Indication and Mileage Calculator Using IoT

Float sensor is a very convenient technology to keep the fuel level in ant tank in check. It has a great advantage if we want to detect sudden drop in the level of fuel. The switch can be used as an indicator, or to control a pump, or as an alarm, or to control other gadgets. Mercury switch is used in one of the

float switches inside a pivot float. One of the float raise a rod to activate a micro switch. A reed switch fitted on a tube are used in one pattern.

Accelerometer Sensor

The function of ADXL335 Accelerometer is to perform an

AC amplification, demodulation unit, and output amp. The Arduino serves as signal amplification, analog to digital converter, low pass filter, isolator and SPI. The LCD displays the angle at which the bike is tilting as well as the angle measurement which is important for the usage of the scooter. The accuracy shown in results in around 80%.

3. PROPOSED SYSTEM

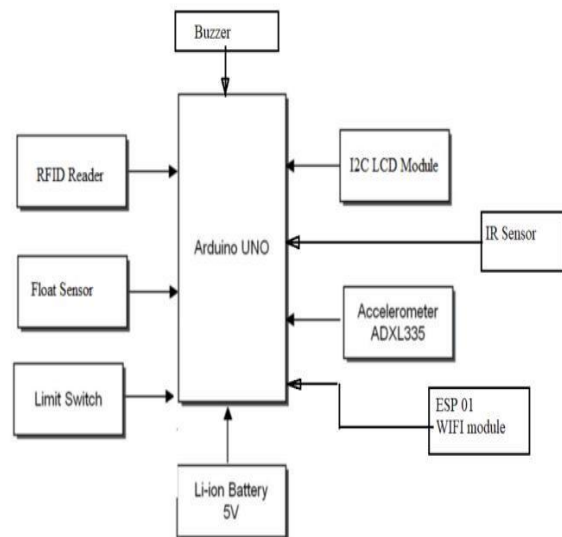


Fig. 3.1. Block Diagram

The power supply to the microcontroller is given through a switch instead of direct connection which is used to power on and off the entire system. This is to turn on and off the system easily with one click and once the vehicle starts the user is asked for an pin to enter. if the user pin which is set matches the system starts if not gives us three trails to enter. If the user fails to enter the correct keypad there is an alarm alert saying unauthorized access. The vehicles are implemented with embedded systems. We build a system which calculates the speed of the vehicle and sends it to mobile application. The speed

can be continuously monitored. RFID Readers are used to read data from different RFID cards which signifies different sign boards say U-turn, Signal and etc.

4. ARCHITECTURE DESIGN

4.1 LCD

Crystal Display which consists of 16 columns and 2 rows used in our project is JHD 1602A. Pin 1 is VSS. Pin 2 is VDD 5V input. Pin 3 is VL to help LCD with 10K potentiometer to adjust its contrast. If VL is low means light contrast and VL is high means dark contrast. Pin 4 is RS for register select. For high RS, Data Register is used and for low RS, instruction register is used. Pin 5 is R/W signal which means for read/write. Read operation when R/W bit is high and write operation when R/W is low. Pin 6 is Clock Enable- Edge triggering. Bit 0 to Bit 7 are represented by Pin 7 to Pin14. Pin 15 and Pin 16 is the back-light Anode and back-light cathode respectively.

4.2 Membrane Keypad

Membrane keypad is 16 button keypad with 4x4 matrix. It provides user interface component for Arduino project. It is programmed using the library. Some of the following features are Easy interface to Arduino, ultra-thin design, cheap and economical.

4.3 RFID

The RFID Proximity Reader NSK125 series consists of an inbuilt antenna in a minimized form factor. It was basically designed to work on the industry standard carrier frequency of 125 kHz.

This LF reader module with an internal or an external antenna simplifies the communication with Read-Only transponders type via the air interface. The tagged data is sent to the host systems via the wired communication interface with a protocol selected from both the module TTL and Wiegand Protocol.

4.4 Float sensor

Float switch is one of the level sensors. It is used to detect the amount of the liquid in a tank. The switch can be used as an indicator, or to control a pump, or as an alarm, or to control other gadgets.

Mercury switch is used in one of the float switch inside a pivot float. One of the float raise a rod to activate a micro switch. A reed switch mounted on a tube are used by one pattern. A float, containing a magnet, surrounds the tube and is controlled by it. When the magnet is raised to the reed switch by the float, it gets closed. Several reeds can be

mounted in the tube for different level indications in one assembly.

5. IMPLEMENTATION DETAILS

When we remove the helmet from the trunk, the removal of the helmet will be sensed by the RFID tag. Additionally, we have an IR sensor, which will sense the presence of helmet. IR sensor will give input to the Arduino controller. Once the helmet is removed, the tag is swiped away from the RFID reader and IR sensor senses 0, that is there is no helmet present. The bike has started.

Once the bike stops the rider has to place the helmet in the trunk in a defined period of time. The RFID reader will be waiting to read the tag for a particular period of time. If the reader is unable to read the tag and IR sensor does not detect 1, then immediately a buzzer connected to the Arduino will be turned on and will start to beep. Now, ESP 01 which is the internet module will send information to the cloud about the helmet theft through internet. There will be a cloud named ThingSpeak, which will store the data and the management people will get to know about the theft. Apart from this, the data will be displayed in the I2C LCD for the rider to know the information.

A Float Sensor will be placed in the fuel tank. If there is a sudden decrease of fuel in the tank, the float sensor will immediately send an alert to Arduino controller. Arduino controller will send the indication to the ESP 01 internet module and through ThingSpeak, management will get to know about the fuel theft.

The ADXL335 accelerometer is used to sense the rough usage of the bike. If rider is riding roughly or taking instantaneous turns or doing wheely kinds of things then accelerometer will detect it. The accelerometer Z value is kept as 40 degrees as the threshold value. If the value is going above 40 degree while riding that is tilting towards the ground while taking left or right turn, or taking rough turns, then the information is sent to management through ESP 01 module.

6. CONCLUSION

The proposed IOT based Helmet and Fuel Anti-Theft system hits a perfect stability between usability, usefulness and cost. The system was not designed to serve as a fancy accessory. Perhaps was designed to fit into the user's daily routine by being unnoticeable and yet makes a great difference in rider's life. The system was designed to ideally provide significantly more data to the user with minimal additional cost. And this system makes the rental company to safeguard their assets.

This project can be advanced to give exact value levels of petrol by coding the float level sensor to notice the amount of petrol stolen off and its scope can be extended to large vehicles such as cars and heavy motor vehicles like truck and buses. The same accelerometer sensor that is used in this project to measure the deviation of vehicle respective to the horizontal and vertical plane can be used to give information to the traffic guarding authorities to prevent accidents. The helmet protection part of the project can be extended to any essential commodity in vehicle which can be safeguarded.

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