"Peripheral Safety System for Motorcycles: An Innovation Keyless Ignition System KEAS"

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ABSTRACT:

This project i.e. KEAS- "THE KEYLESS IGNITION SYSTEM" involves the possibilities of developing a device for secured ignition system for motorcycle. This device will have potential to beat common human errors and prevents from being stolen. This device transforms the traditional keyed ignition system into a secured ignition system which controlling bike ignition through Android Mobile. It consists of android application on mobile which wirelessly connects a Wi-Fi module followed by an Aurdino system. The Aurdino system is connected to a relay which is further connected to ignition system and self-start button. This device allows the user to operate the switch on/off the ignition of bike via mobile application by going through 2-step verification i.e. NFC enables card detection which detects the RFID and IMEI number of User Mobile & fingerprint detection which unlocks the Android Mobile. To ensure system's security of the device only the correct fingerprint, IMEI & RFID numbered Android device can access the ignition system of the motorcycle.

1.   INTRODUCTION:

Every mobile device has a unique IMEI number and every person has a unique fingerprint which can be an important authentication source for creating a keyless ignition system for motorcycles. This may solve the problem regarding motorcycle being stolen as well as forgetting key in motorcycle. THE KEYLESS IGNITION SYSTEM – KEAS enables the motorcycle to start only when it detects the correct IMEI numbered phone and fingerprint assign to the mobile device .The existing lock system of motorcycle are not having any security, they only controls handled lock and traditional ignition switch lock. By creating the device KEAS, it ameliorates the security level of the motorcycle. There are many devices available to protect motorcycle to prevent the theft but many of the solutions are available to few international brands and the installation is costly when it comes to third party. Using an open source hardware and software with some knowledge of automobile allows to design little but reliable security system [1]. The purpose of carrying keys will be totally eliminated. No more forgetting your keys. The android application is developed by using the open-source web browsing called MIT APP INVENTOR 2.

Objectives of Project:

This project will ensure-

- Innovating product for market.
- A relief from traditional lock and key system.
- Keyless ignition System provides better security.
- PUC sensors will ensure control over pollution.
- Using of NFC (Near Field Communication) and WIFI an emerging technology.

2. PROBLEM SOLVING:

Keyless ignition is next innovation in the motor-bike segment which provides better security and purpose. The Said System will solve the problem of forgetting your keys every time you leave your home or office. It will ensure your motor-bike doesn't get stolen all while informing important numbers via SMS, GPS tracking and smart biking solutions such as PUC sensors.

3. LITERATURE REVIEW

Previous Works Review

- **BIOMETRIC AUTOMOBILE IGNITION LOCKING SYSTEM [1]**
  The paper introduce a **biometric automobile ignition locking system** using open source hardware and software tools. It consist of fingerprint module & Arduino hardware. This fingerprint module can be replaced by the fingerprint sensor of an android device and used as an authentication source for this project.

- **AUXILIARY SAFETY SYSTEMS FOR TWO WHEELERS [2]**
  The paper introduces Side stand retriever, smart helmet, PUC sensors to monitor the pollution caused by motorcycle.

- **NEAR FIELD COMMUNICATION (NFC) MODEL FOR ARDUINO UNO BASED SECURITY SYSTEMS OFFICE SYSTEM [3]**
  The paper presents the office security system for offices using near field communication (nfc) model which also can be used as a authentication source in keyless ignition system.

Wi-Fi Module:

The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability.
The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your **Wi-Fi** network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.
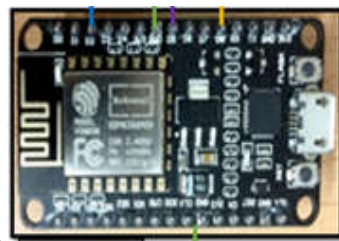

Fig 1. Wi-Fi Module

Aurdino:

Aurdino is an open-source physical computing platform based on a simple I/O board and a development environment that implements the Processing/Wiring language.[4] This project is mainly controlled by the Aurdino UNO R3 which equipped with the ATMEGA328p processor. It contains everything needed to support the microcontroller. It is also cheap and easily available.
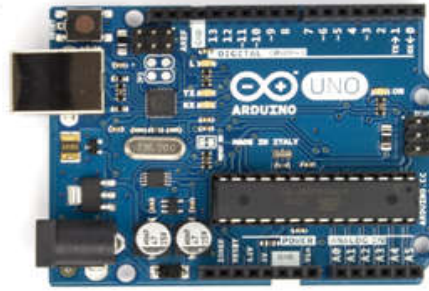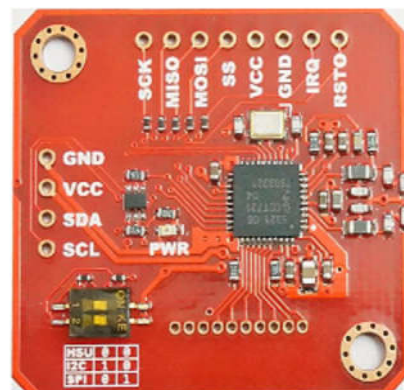
Fig 2. Aurdino UNO Board [4]

NFC Module:

Fig 3. PN532 NFC RFID Module

PN532 NFC RFID module V3. PN532 NFC RFID module V3 is built around NXP**PN532**. Near field communication (**NFC**) is a set of standards for smartphones and similar devices to establish radio communication each other by touching them together or bringing them into close proximity, usually no more than a few centimeters.

For electronics geeks, we also want to use NFC technology to make our own things. So we build this NFC RFID module. This module is built around NXP PN532. NXP PN532 is very popular in NFC area. [3]

Ignition System:

In case of Internal Combustion (IC) engines, combustion of air and fuel takes place inside the engine cylinder and the products of combustion expand to produce reciprocating motion of the piston. This reciprocating motion of the piston is in turn converted into rotary motion of the crank shaft through connecting rod and crank.

Basically Convectional Ignition systems are of 2 types:

(a) Battery or Coil Ignition System.
(b) Magneto Ignition System.

TYPES OF ELECTRONIC IGNITION SYSTEM:

(a) Capacitance Discharge Ignition system
(b) Transistorized system
(c) Piezo-electric Ignition system
(d) The Texaco Ignition system

ADVANTAGES OF ELECTRONIC IGNITION SYSTEM:

 (a) Moving parts are absent-so no maintenance.
 (b) Spark plug life increases by 50% and they can be used for about 60000 km without any problem.
(c) Better combustion in combustion chamber, about 90-95% of air fuel mixture is burnt compared with 70-75%   with conventional ignition system.

(d) More power output and fuel efficiency.

Generally, the electronic ignition system used in modern vehicles is Capacitance Discharge Ignition system.
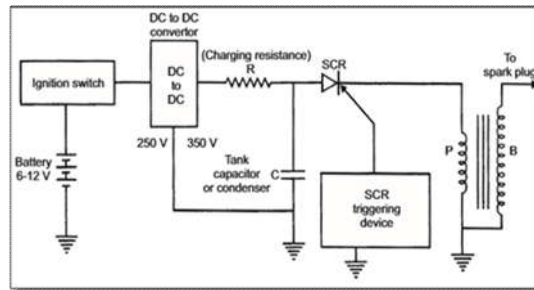

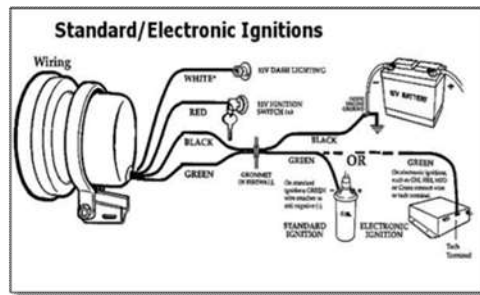Fig 4. Capacitance Discharge Ignition System

Fig 5. Standard 4-wire Electronics Ignition System

KEAS APP:

The app will be designed such that for unlocking it, the fingerprint will be required. After unlocking the app the NFC reader will directly read the IMEI number and it will be verified by the Aurdino board, after which the ignition will be started.
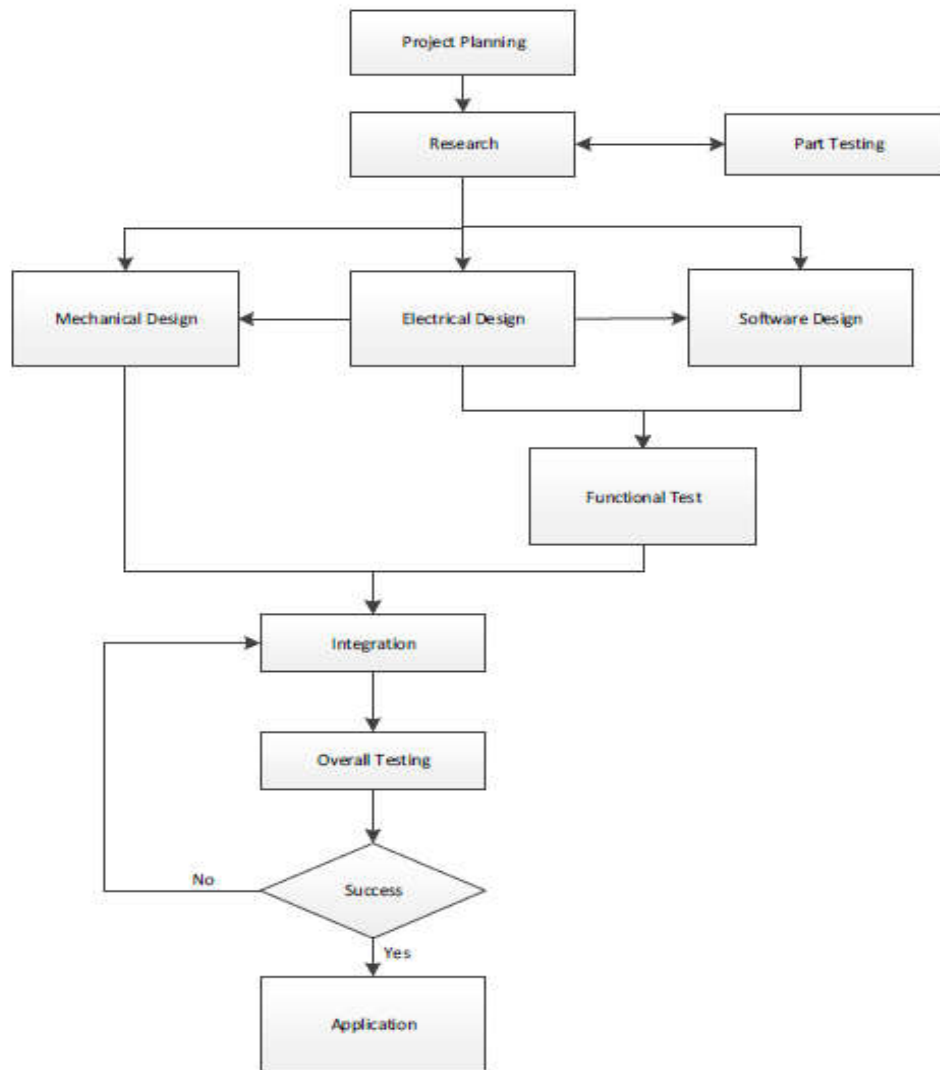

Fig 6. KEAS Logo

4. METHODOLOGY:

Fig 7. Hardware Programming Research Methods [2]

4.1. *Mechanical System Design (Mechanical Design)*
In hardware design, mechanical design is an important thing to consider. In general, the Application needs to mechanical design, among others:
1. Part design of KEAS cellphone holding Device.
2. The shape and size of Aurdino UNO.
3. Flexibility to the environment
4. Placement of electronic modules
5. Testing of mechanical systems that have been designed.
6. Design the size of interface system.

4.2. *Mechanical System Design (Mechanical Design)*
In the design of electrical and mechanical systems there are several things that must be considered, among others:
1. Power supply and power division for each component
2. Voltage and current requirements for microcontroller, sensor and actuator
3. Design of circuit sequence

4.3. *Software Design*
The design of the software used in this research is using Catia, AutoCAD, Aurdino IDE, MS office, Android Studio.

4.4. *Functional Test (Function Test)*

Functional tests include system functional testing that has been integrated between electrical design and software design.
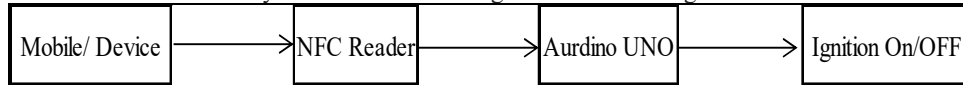
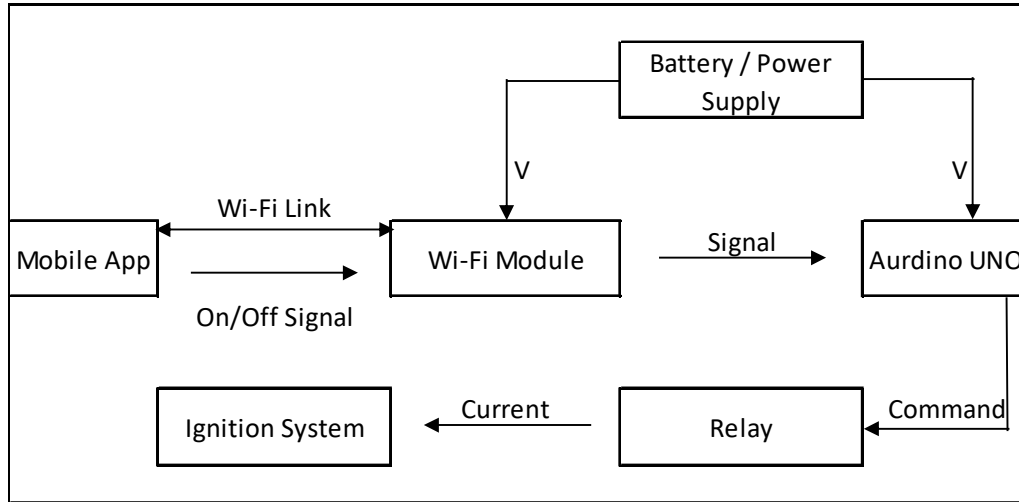| Mobile/ Device	→	NFC Reader	→	Aurdino UNO	→	Ignition On/OFF

Fig 8. NFC verification Module

Fig 9.Wi-Fi Module Block Diagram.

5. FUTURE SCOPE:

Fingerprint Sensor of Android Mobile –

Through this the system will achieve the 2-step verification process which will enhance the security of the device KEAS.

Automatic PUC Detection System:

Vehicles have become an integral part of everyone's life. Every vehicle is having emission but the problem occurs when it is beyond the standardized level. This emission from vehicles cannot be completely avoided but, it definitely controlled. As a solution to the above problems an automated control system for air pollution detection in vehicles is provided. This emission of hazards gases can be control by the evolvement of semi-conductor sensor system. Sensors in the system detect the level of pollution gases along with level of CO & CO2.Transportation is main source for generating carbon monoxide that contributes 72% of total pollution in the metropolitan cities like Calcutta, Mumbai, and Delhi. In order to control air pollution, Pollution under Control (PUC) certificate for every three months is mandatory for all group vehicles from the date of registration.

Sensors Used: MQ3 sensor, MQ7 sensor.[4]

6. CONCLUSION:

In this project, the model of utilization of near field communication (NFC) verification for security systems in Aurdino based file. The system uses Aurdino UNO, NFC shield, Relay, Wireless module, smartphone holding device and smartphone. Input system using the latest technology that is near field communication (NFC) on android smartphone. The smartphone has KEAS application that verifies the RFID and IMEI number of the android device. The system output is switching on the ignition along with the self- start button and the motorcycle is ready to start.

7. REFRENCES

[1] R.M.Vithlani, Sagar Shingala, Dr. H.N.Pandya**, BIOMETRIC AUTOMOBILE IGNITION LOCKING SYSTEM,** *International Journal of Electronics and Communication Engineering and Technology (IJECET**)**, Volume 7, Issue 5, September-October 2016, pp. 28–37, Article ID: IJECET_07_05_004, ISSN Print: 0976-6464 and ISSN Online: 0976-6472.*

[2] *Mr. Nidal Ahmed Aftab Ahmed Pawne, Mr. Gaurav Mohan Deo, Mr. Armash Qutbuddin Farid, Mr. Irfaan Ahmed Mohmed Yusuf Nishandar**, AUXILIARY SAFETY SYSTEMS FOR TWO WHEELERS,** 2017 IJNRD | Volume 2, Issue 6 June 2017 |ISSN: 2456-4184.*

[3]*A Chairunnas and I Abdurrasyid,* **NEAR FIELD COMMUNICATION (NFC) MODEL FOR ARDUINO UNO BASED SECURITY SYSTEMS OFFICE SYSTEM,** *IOP Conf. Series: Materials Science and Engineering 332 (2018) 012006,doi:10.1088/1757-899X/332/1/012006.*

[4] *Venkatesh Neelapala, Dr. S. Malarvizhi ,* **ENVIRONMENT MONITORING SYSTEM BASED ON WIRELESS SENSOR NETWORKS USING OPEN SOURCE HARDWARE,** *IJERSS, Volume 2 | Issue 4 , April 2015*

[5] *B. P. Kulkarni , Dhanashree Vishwas Patil , Shivani Parashuram Jadhav , Tejaswini Rajaram Patil,* **AUTOMATIC PUC DETECTION SYSTEM**,*IJIRCCE Vol. 6, Issue 3, March 2018*

[6] *Leo Louis**, WORKING PRINCIPLE OF AURDINO AND USING AS A TOOL FOR STUDY A RESEARCH***, *IJCACS, 2016.1203 vol. 1 no. 2*

[7] *Ramagiri Rushikesh, Chandra Mohan Reddy Sivappagari,* **DEVELOPMENT OF IOT BASED VEHICULAR POLLUTION MONITORING SYSTEM,** *2015 International Conference on Green Computing and Internet of Things (ICGCIoT), DOI: 10.1109/ICGCIoT.2015.7380568.*

[8] **INTRODUCTION TO IGNITION SYSTEMS**, *http://www.ignou.ac.in/upload/unit%25204.pdf*