

A Novel Approach for the Automation in the Field of Security and Safety for Better Human Life

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Abstract

In the current circumstance, robotization has transformed into an imperative bit of our life. Each and every one is completely dependent on motorization whether it be splendid packaging or home robotization. Directly bringing home automation into thought, everyone nowadays need an anomalous state security and our assignment on home robotization features, such kind of high security features at a totally reasonable expense with the objective that it could be overseen by anyone. By and by pondering intrusion area structure there are some included core interests. An Intrusion Detection System (IDS) is a structure that screens for suspicious action and issues cautions when such improvement is found. While peculiarity acknowledgment and uncovering is the basic limit, some interference disclosure structures are fit for taking exercises when poisonous development or bizarre activity is recognized. Nowadays, where everything will be modified and sensor and controller based it is the need of extraordinary significance to make any intrusion recognizable proof system to act normally sufficient in taking exercises and playing out the entire fundamental errand. Electronic security relates to using improvement in monitored holding by imagining unapproved access to individuals and property.

Keywords: Artificial Intelligence, Automated Security Systems, Big Data Analysis, Home automation, IoT, Smart Automation.

INTRODUCTION

RFID technology has many applications in extend on the far side the retail sector. RFID tags square measure embedded in passports for security and private identification in ID cards to regulate access to buildings. Tags square measure used for electronic payment for facility and alternative payment systems, for instance credit cards and good cards. It is many medical uses together with trailing of recent born babies in hospital, storing info of surgical patients, procedures, and trailing medical instrumentality.

Aim of the Study

School buses transfer countless children daily in a variety of regions. While there are many problems that might disturb the

mother and father concerning the travel safety of children, this study promises to consider presenting access safety according of faculty buses through bus tracking system that can help the school children's transportation inside a secure and safer way. The supervision from the regularity of scholars throughout their exit and entry in the bus is tough to become controlled by motorists, which brought to endangering child safety.

Significance of the Problem

The phenomenon of failing to remember kids around the bus is among the problems endured through the children that has elevated considerably recently. It has frequently brought towards the dying of numerous students due to suffocation

because of the insufficient attention of drivers. This project, through exit and entry tracks, aims to produce an appropriate atmosphere by using certain group of criteria of safety and security for college bus that have a positive effect on a student as well as their family.

Problem Statement

Radio Frequency Identification (RFID) equipment uses electric current to operate and radiates energy when seeking tags of exchanging data, so it is important that all RFID equipment is operated safely, in line with health and safety regulations and without any adverse impact on the surrounding environment. To ensure that our installed system is safe, we need to make sure that:

- All hardware is installed and operated in accordance with manufacturer's specifications.
- Hardware using electrical current is grounded.
- You follow safety requirements of the location.

Solution is given in below experimental setup.

Literature Review

RFID systems used in toll collection, transport payments and logistics management systems by using conventional RFID system. When the capability of RF communication is accurately analyzed, it can be seen that there are more possibilities beyond that. After considering the characteristics and behaviors of RF communication, it is possible to design some new applications that improve the safety, security, comfortability, and productivity in eco-friendly manner [3]. Automated Vehicle Identification (AVI) process determines the identity of vehicle. At the toll gate there is limited number of gates facilities.

So it creates many problems. In this AVI system, barcodes are fixed in each vehicle which is read by objective tag on toll booth. This system is closely related to Vehicle Classification System. The Vehicle Classification System used for different types of vehicles had different charge rate at passing through toll facilities but it is limited users, more variety of sensors used to provide the presence of vehicle. Violation Enforcement System used for reducing unpaid toll or used to determine toll violators. In this system, number plate reorganization is done in form of image [4].

Project Description: As follows

Our project contains six major components which are as follows:

- 1) ARDUINO (UNO)
- 2) Piezoelectric-Transducer Sensor
- 3) RFID
- 4) GSM
- 5) Buzzer
- 6) LCD

ARDUINO (UNO): The microcontroller board depends on ATmega328P (datasheet). There are 14 transmitted data / yield pins (6 of which can be used as PWM yield), 6 essential data sources, a 16 MHz quartz pearl, a USB connection, a power jack, an ICSP header and a reset Catch. This includes everything needed to help the microcontroller; basically complete it with a USB Association for a PC or power it with an AC-to-DC connector or battery to start it. Long time, logically designed for current discharge, before the Uno board of Arduino Software (IDE) and structure 1.0, Arduino's reference changes were made. The UNO is the best board of hardware and coding in any case. UNO is the most widely used and recorded driving issue of the entire Arduino family.



Figure 1: ARDUINO UNO REV3 (ATmega328P)[1]

Piezoelectric Transducer Sensor: It is a device that uses the piezoelectric effect, changes in electrical charges, and measures changes in pressure, acceleration, temperature, stress or force. Piezoelectric sensors are versatile tools for measuring various processes as: -

- 1) Sensing Touch
- 2) Aroma in the Air
- 3) Measuring Pressure/- Force--
- 4) Measuring Speed
- 5) Measuring impact
- 6) Realizing Direction and position.

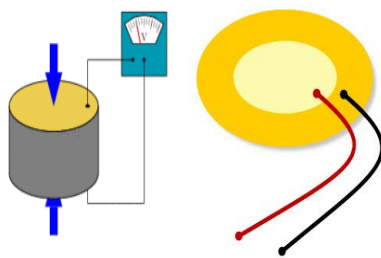


Figure 2: Representation of a simple Piezoelectric Transducer

Working Principle

The power connected with a nonpartisan pivot (y) dislodges the accuse of course, is opposite to the line of power. The measure of charge (C_x) depends on the geometrical elements of the particular

piezoelectric component. At the point when measurements A, B, C are connected.

$$C_x = (d_{xy} F_y b) / a$$

Where $-x$ dimension in line with neutral axis;

B:-y line with the charging generating axis;

D:-piezoelectric coefficient

A piezoelectric transducer has surprisingly high DC yield impedance and it can be displayed as a relative voltage source and channel arrangement. The voltage at the source is clearly related to strength, weight, or stress related. The yield banner is related to this mechanical strength as it had experienced indistinguishable circuits.

For use as a sensor, the dimension area of the repeat response plot is commonly used between the high-pass cut-off and the resonant Apex. Store and spillage restrictions should be sufficiently tremendous that the low frequencies of interest are not lost. An adjusted indirect circuit model can be used in the form of fig.3, in which C_s addresses the capacitance of the surface with the constraint of the flat panel to be constrained by the standard position.

It can be done in a way that is shown in the form of a defect in parallel to the source capacitance, with respect to the respective power in charge with direct.

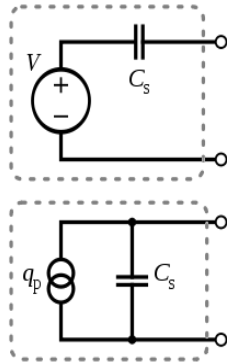


Figure 3: Sensor as a voltage source in series with the sensor's capacitance

Radio Frequency Identification (RFID)

After joining RFID objects, they usually use electromagnetic fields and see that

the impression is set electronically away from the data. Passive impressions collect criticality from neighboring RFIDs against the customer's grilling radio waves. Dynamic names contain an area control source (battery) and can work different meters per RFID per customer. Not in any way, like regulated tags, per customer per customer should not be within the identifiable route, so it can be presented on demand after the article. RFID is a system for automatic identification and data capture (AIDC). A movement was organized on standard specifics keeping an eye on these burdens' confirmation and security issues. Uses ISO / IEC 18000 and ISO / IEC 29167 on-chip cryptography systems without identification, tag and per-customer confirmation, and over-the-air confirmation.

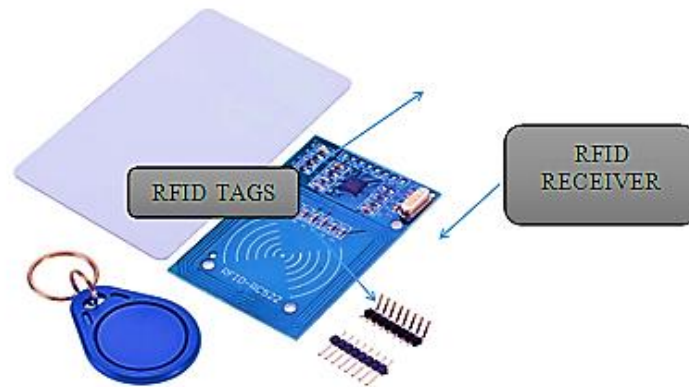


Figure 4: RFID Module used in our Project [2]

Specifications of RFID RC522

-MF RC522 used the transferable change and the demodulation thought that 13.56 MHz of inert contact strategies and a wide range of shows have been completely resolved. 14443A Reinforce Lossless Transponder Signals

The MFRC522 introduces the Milfare series with high speed non-contact correspondence, two-way information exchange rates as 424kbit or s in Table 2.2. Chips, MF RC522 MF RC500 and MF

RC530 have a highly organized 13.56 MHz card Piusar, there are different similarities, but there are different highlights and contrast. The module uses 3.3V voltage through the SPI interface direct pairs of lines can be clearly added with the client. Any CPU board correspondence module can ensure forecasts and dependable functions.

GSM (Global System for Mobile Communications)

It is a standard developed by the European

Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks used by mobile devices such as mobile phones and tablets. It was first deployed in Finland in December 1991. By the mid-2010s, it became a global standard for mobile communications achieving over 90% market share, and operating in over 193 countries and territories.

Buzzer (Audio Signaling Device)

A ringer or beeper essentially like a sound hailing gadget, which might be mechanical, electromechanical, or piezoelectric as appeared in Fig. 5, ordinary occupations of signs and beepers solidify prepared gadgets, timekeepers, and confirmation of client information, for example, a mouse snap or keystroke.

The working part in most fit for being heard sound transducers is a slender plate of piezoelectric ended annexed to an also forlorn metal stomach. Right when a voltage is related with the earth plate, the circle deforms, making the metal stomach turn. Right when a dull voltage is related the ended/metal bowing portion vibrates at the rehash of the related voltage, and produces a prepared for being heard sound. On the off chance that the mechanical resounding rehash of the mud/metal portion and the rehash of the related electrical flag are formed, the ampleness of the vibrations will be most perceptible, and sound yield will be generally conspicuous. (The resounding rehash of the stoneware part alone is too high to even consider

evening think evening consider making qualified for being heard sound, as such the essential for the metal stomach.)

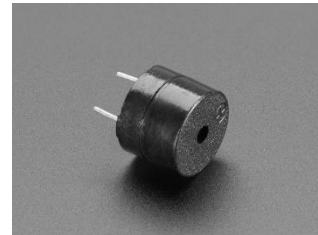


Figure 5: Piezoelectric Buzzer (5v)

LCD (Liquid Crystal Display):

LCD is a measurement board show up or other electronically changed optical contraption that utilizes the light-controlling properties of fluid profitable stones. Fluid gems don't radiate light unequivocally, rather utilizing a setting illumination or reflector to make pictures in shading or monochrome. LCDs are available to show passionate pictures (as in an overall significant PC show up) or fixed pictures with confused substance, which can be seemed covered, for example, preset words, digits, and seven-partition shows up, as in an electronic clock. They utilize a similar fundamental improvement, obviously, extremely discretionary pictures are included unlimited pixels, while differing highlights have larger parts.

As appeared in Fig. 6, the LCD utilized is a 16x2 Alphanumeric Display with yellow monochromatic Backlight. It is commonly utilized for 8051, AVR, Arduino, PIC, ARM, and so forth.

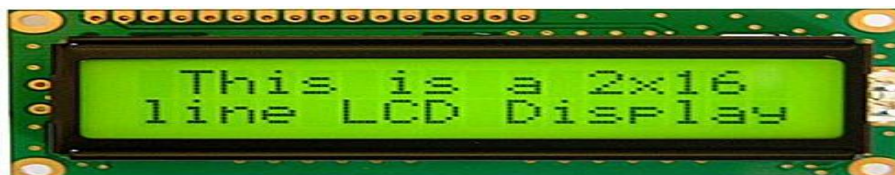


Figure 6: LCD (16x2 Alphanumeric Display)

PROJECT IMPLEMENTATION

The Project Implementation of IDS can be explored in basic two sections:

1. Hardware Design and Circuitry.
2. Software Design and Programming

Hardware Design and Circuitry

The IDS Module in our Project can be divided into three main Circuit Connections:

1. Arduino To Piezoelectric Sensor Array
2. Arduino To RFID
3. Arduino To LCD

Arduino to Piezoelectric Sensor Array

As per our requirement to get the input of intrusion from the piezoelectric sensor, by sensing the pressure induced from the foot of the intruder, we have connected the Piezo sensors in a calculated fashion as shown in Fig. 7 and thus making an array of Sensors.

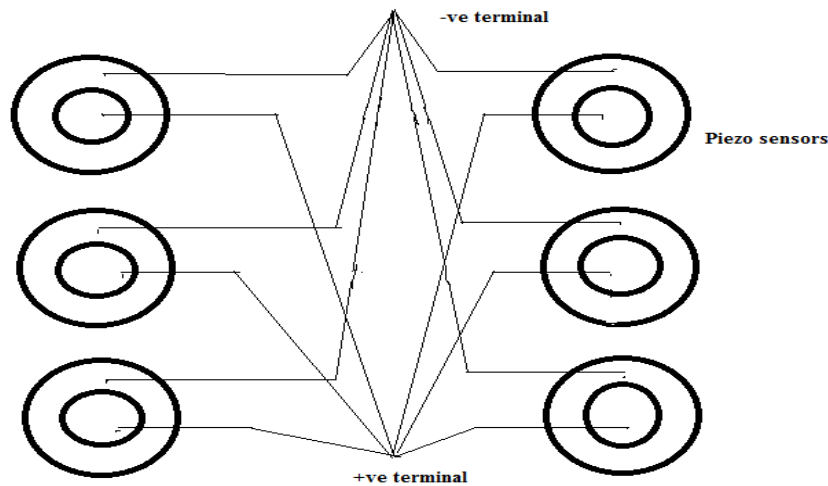


Figure 7: Parallel Connection of Piezoelectric Sensor

Thus 6-8 piezoelectric sensors are connected in parallel to increase the current.

Voltage of 1 sensor = 2.14v (normal pressure)

Voltage of Array = 2.14v

Current of 1 sensor = 0.5 mA

Current of Array = 4mA (All Pressed

Properly)

Arduino to RFID

As we needed to tackle the problem of false triggering of buzzer due to foot pressure induced by the authorized person, we deployed a RFID for the same purpose as in Fig. 8.

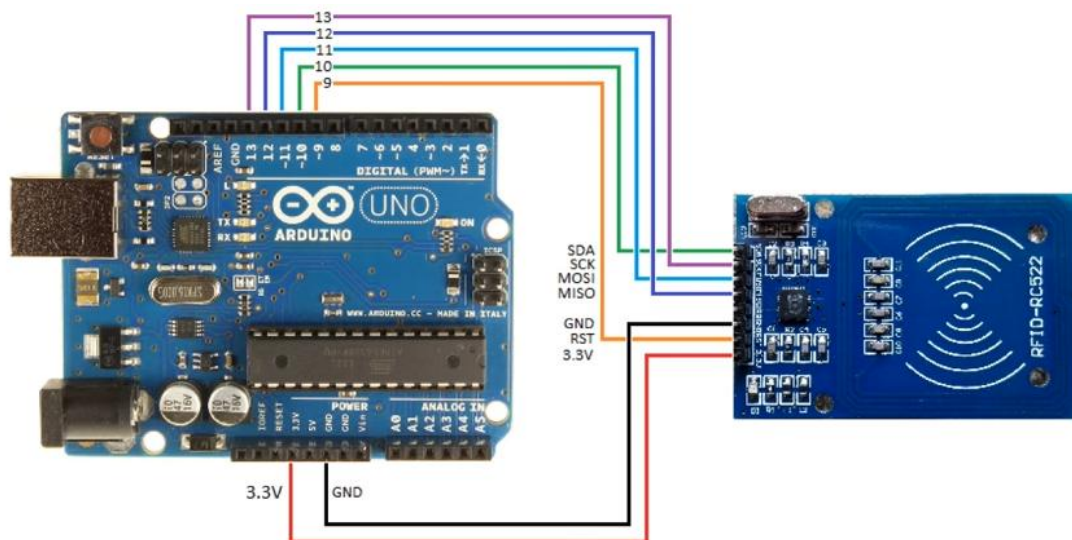


Figure 8: Circuit Connection of Arduino with RFID

Arduino to LCD

As in any project or in any device the most important thing which is needed to be there is its User interfacing and its user friendly nature. Thus LCD is doing

the same purpose here as shown in Figure 3.3; it is not only giving directions to the user but also making it easy for user to use the IDS more efficiently.

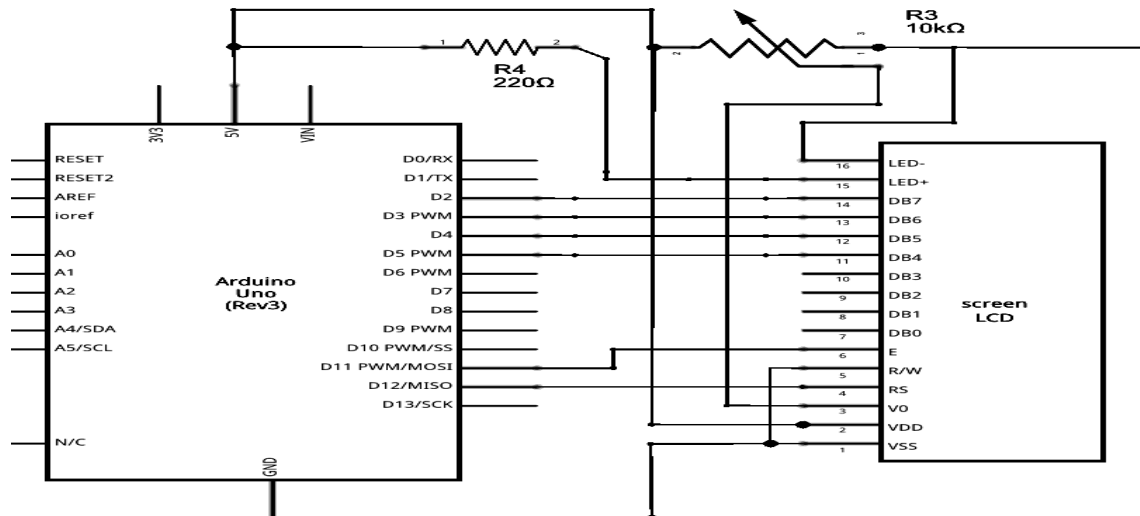


Figure 9: Circuit Connection of Arduino with RFID

Software Design and Programming

For accomplishing the need to integrate LCD, RFID, Buzzer and Arduino through Software, we required 4 different libraries as follows:-

- 1) RFID Read Library
- 2) RFID Function Library
- 3) Piezo Knock Sensor Library
- 4) LCD Read/Write Library



Figure 10: Arduino Program for the IDS Module

Future Scope

From the time immemorial it has been our prime rationale to improve the manners in which that can facilitate the human endeavors, and furthermore make security a genuine cakewalk.

Out of numerous methods for giving continuous security through sensor, control and robotization, we conveyed the most appropriate Intrusion Detection System and the most ideal method for security in a few viewpoints. Our Project utilizes two of the spearheading advances in their individual fields and furthermore guarantees of an enormous future prospect of IDS. Consolidating RFID with the current Piezo-based IDS ended up being another involvement in the field of security frameworks. The module planned by us was another idea in itself as the extent of this kind of framework can be interminable.

The future viewpoints which can be seen rising through this module are excesses of extending from:

1. RFID controlled GSM
2. Security for deaf and blind
3. Watt-less Security system or self-powered IDS
4. Automatic car parking system
5. Child safety and parental control systems.
6. Piezo-triggered security camera and other features.
7. Security for small children and women living in home alone.

Limitations

The exchange of RFID data by radio transmission could be subject to unauthorized interception of the transmission and capture of the data being exchanged. While this would require sophisticated equipment and techniques, it must still be guarded against. Even encrypted data can be intercepted. Whether this encrypted data could be decrypted and misused, we could depend

on the encryption difficulty and hacker's sophistication.

Data Interception problems:

- Data replication – used for counterfeiting of products
- Data theft and identity theft – used for financial theft, personal gain or to damage person's private life or business
- Data change – re-pricing products, changing identification of products, changing expiration dates on drugs, changing audit data (if housed on the tag).

CONCLUSION

In the entire procedure of making such a security framework we have found out about RFID, Piezo sensors, LCD, Zero PCB associations, Arduino and its programming has helped us to comprehend the domain of IDS and its segments. The working of IDS is actually according to the necessities set by us by means of programming and henceforth it tends to be in all respects gladly finished up by us that the undertaking on IDS worked precisely according to the decision and in this way denoting the heavenly end of this venture session.

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Bibliographical Notes

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