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Automatic Door Locking System Based On Iot

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ABSTRACT: Our main objective is to utilize the different electronic parts available in the market & build an integrated home security system by using Bluetooth device & Microcontroller technology. This system gives service at low cost compared to the cost of available security system. We want to make a system that will give 24/7 service by using registered password in this system we can unlock the door by which it increases the security level to prevent an unauthorized unlocking. If the user forgets the combination of password this system gives the flexibility to the user to change or reset the password. Security measures are very high as provided in two ways. First, we have to enter password for Bluetooth connection & second is for unlocking the door in application. Both passwords can be changed as & when required. This automatic password-based lock system will give user more secure move and low-cost way of locking-unlocking system.

KEYWORDS: ARDUINO UNO, Bluetooth, WIFI Module, Motor Module, Vibration sensor, Buzzer Module

I.INTRODUCTION

In this project we are providing enough security to satisfy the user's needs. The user will be prompted to enter a password to unlock the door. On successful password entry, the door unlocks for a specified amount of time enabling him/her to store or restore his/her valuables. On the other hand, if the user enters an invalid password then corresponding equivalent message will be displayed. This project "Arduino based password protected locking system" can be used to provide enough security in various places like bank lockers, security doors, BIOS locking in computer etc. This project uses an ARDUINO kit that consists of ATMEGA 328 which is one of the most popular microcontrollers that consists of 14 digital pins and 6 analog general purpose pins, EEPROM of capacity 1KB and a ram of 2KB.

It increases the security level to prevent an unauthorized unlocking done by attacker. In case the user forgets the both passwords, this system gives the flexibility to the user to change or reset the password.

This automatic password-based lock system will give user more secure way of locking-unlocking system. First the user combination will be compared with pre-recorded password which are stored in the system memory. User can go for certain number of wrong combinations before the system will be temporarily disabled.

The door will be unlocked if user combination matches with the password. The same password can be used to lock the door as well. This system will give the user an opportunity to reset his own password if he wants.

In day to day, life security of any object or place password-based system plays a major role. This project has considered about this and created a secure access for a door which needs a password to unlock the door. Using our mobile or pc. we can enter a password to the system and if entered password is correct then door is open by motor which is used to rotate the handle of the door lock. When it is entered incorrectly at the first time it will give three attempts to enter the password. Some extra features like adding new users and changing old password are configured by the app or in the website as usual. We will get notifications regarding its from the app or from the website. Now a day's most of the systems are automated in order to face new challenges to achieve good results. These systems have less manual.

Automatic entrance/exit door control is widely used in public places such as grocery stores, businesses, transportation stations, airports, and wholesale department stores to eliminate the need of manually opening and closing actions. Contemporary sensor-based automatic door control technologies include infrared, ultrasonic/radio, or other wireless sensing methods. The first can be further divided into active and passive approaches. The active



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process emits infrared signals from the controller and captures the reflected signals to determine if there is any object close to the door. This approach is accurate and capable of identifying the position and the speed of the object but its high cost has made it less popular. The passive approach detects the infrared signals radiated by people and is the most widely used for being simple, effective, and low cost.

II.PROPOSED SYSTEM

Many automated advanced doors locking system has been developed and its popularly used in many places like commercial buildings and organization. Some of these automated doors locking system are based on RFID (Radio- frequency identification).

The system works using keypad to enter a password to the system. If entered password is correct then door is open by motor which is used to rotate the handle of the door lock. System also includes extra features like adding new users and changing old password etc [1]. We surveyed many smart doors locking system. We found that these products are very expensive. Some of the implementation mentioned in the literature survey is very cost effective in implementation but do not provide multi user or multi-level functionalities. We identified these requirements and thought to develop a system which is cost effective in implementation and having more advanced features like multi user and multilevel. These features are the need of time and such functionalities will make the system more useful.

In this project we are providing enough security to satisfy the user's needs. This project "Automatic door locking system based on IoT" can be used to provide enough security in various places like bank lockers, security doors, BIOS locking in computer etc. The main aim for providing locks for our home, school, office, and building is for security of our lives and property.

Arduino

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students,hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.



Arduino

Vibration Sensor

This Vibration Sensor use the SW-18015P from MEC to measure the vibration. It can trigger from any angle, and often used for flex, touch, vibration and shock measurements. There is an on-board potentiometer to adjust the threshold of vibration. It outputs logic LOW when this module not triggered while logic HIGH when triggered.



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Vibration Sensor

Bluetooth Module

The HC-05 has two operating modes, one is the Data mode in which it can send and receive data from other Bluetooth devices and the other is the AT Command mode where the default device settings can be changed. We can operate the device in either of these two modes by using the key pin as explained in the pin description.

It is very easy to pair the HC-05 module with microcontrollers because it operates using the Serial Port Protocol (SPP). Simply power the module with +5V and connect the Rx pin of the module to the Tx of MCU and Tx pin of module to Rx of MCU.

HC-05 Bluetooth Module Circuit Connections, during power up the key pin can be grounded to enter into Command mode, if left free it will by default enter into the data mode. As soon as the module is powered you should be able to discover the Bluetooth device as "HC-05" then connect with it using the default password 1234 and start communicating with it. The name password and other default parameters can be changed by entering into the applications are Wireless communication between two microcontrollers, Communicate with Laptop, Desktops and mobile phones, Data Logging application, Consumer applications, Wireless Robots and Home Automation.



Bluetooth Module



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WIFI Module

The ESP-12 Lua Nodemcu WIFI Dev Board Internet of Things with ESP8266 is an all-in-one microcontroller + Wi-Fi platform that is very easy to use to create projects with WIFI and IoT (Internet of Things) applications. The board is based on the highly popular ESP8266 WIFI Module chip with the ESP-12 SMD footprint. This WIFI development board already embeds in its board all the necessary components for the ESP8266 (ESP-12E) to program and uploaded code. It has a built-in USB to serial chip upload codes, 3.3V regulator, and logic level converter circuit so you can immediately upload codes and connect your circuits. This board contains the ESP- 12E chip with a 4MB! a flash memory so no worries for your long project codes. This microcontroller board can easily be programmed using the Arduino IDE programming software.

WIFI Module



Buzzer Module

This is a small buzzer module which operates around the audible 2 kHz frequency range. It is an active buzzer, which means that it produces sound by itself, without needing an external frequency generator. It can easily be used with microcontroller boards, like Arduino, without needing a dedicated PWM channel.



Buzzer Module



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Motor Drive Module

This module is a medium power motor driver perfect for driving DC motors and Stepper motors. It uses the popular L293D H-bridge motor driver IC. It can drive 4 DC motors in one direction, or drive 2 DC motors in both the directions with speed control. The driver greatly simplifies and increases the ease with which you may control motors, relays, etc from microcontrollers. It can drive motors up to 12 V with a total DC current of up to 600mA. This board has a feature of onboard 5V regulator 7805.



Motor Drive Module

SMPS

This switching mode power supply (SMPS) for the isolation industrial-grade built-in power supply module, with temperature protection, over current protection and short circuit full protection, AC110 ~ 240V wide voltage input, high and low voltage isolation, DC12V/1000mA and DC5V/500mA dual isolated output voltage, with input and output EMI filter circuit, with mounting holes. This SMPS is especially designed to interface directly with Arduino and sensors.



SMPS

1. Hardware Implementation

The Android app based door Security System consists of an android app that can be installed on android phones The android app was designed using android studio (A complete development environment Android Studio was installed which is then used to design the application with the help of java development kit (JDK) and software



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development kit (SDK)). The Android platform includes support for the Bluetooth network stack, which allows a device to wirelessly exchange data with other Bluetooth devices. The application framework provides access to the Bluetooth functionality through the Android Bluetooth Application Program Interface (API). These APIs let applications connect wirelessly to other Bluetooth devices, enabling point-to-point and multipoint wireless features. All of the Bluetooth APIs is available in the Android Bluetooth package, which can be installed on any android phone. The app displays the first menu where the correct password has to be entered before the second menu can appear for the connection to the Bluetooth module of the door. The Bluetooth module used in this project is HC-05. The Bluetooth module (HC-05) pops up in the smartphone waiting for a pairing process to establish communication between the smartphone and the HC-05. When the android app has connected to the HC-05, the displays to either open or close the door becomes active. The app uses the Bluetooth of the android phone to send a serial command of either open or close message to the external Bluetooth module (HC-05) that is connected to the Arduino Uno that controls the locking or unlocking operation of the door. The opening or closing of the door forms the hardware of the security door locking system. If the right password is entered the menu for opening and closing will not pop up. The entire operation of the hardware section of the project is centred on the Arduino Uno that has been programmed. When the open-door button on the



menu is pressed, the phone sends strings command to the HC- 05 Bluetooth which sends the command to automatically open the door. If the button is pressed the phone sends strings command to the HC-05 Bluetooth which sends the command to automatically close the door. The servomotor is a high-quality geared DC motor fitted with an electronic circuit for controlling the direction and position of the DC motor rotation. A standard servo is capable of rotating somewhere around 120- 180 degrees in the clockwise and counter clockwise directions. The servomotor is used for the opening and closing of the door while relay is used for the locking and unlocking of the door. The program for the Arduino Uno microcontroller was written in C language and was then compiled into an executable file using the Arduino IDE.

HARDWARE IMAGES

Arduino Programming Software

The software used by the Arduino is Arduino IDE. The Arduino IDE is a cross-platform application written in Java and C++. That is derived from the IDE for the language and the Wiring project. It is designed to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features such as syntax highlighting, matching and automatic indentation and is also capable of compiling and uploading programs to the board with a single click. There is typically no need to edit and make files or run programs on command. Although building on command-line is possible if required with some third-party tools such as Info. The Arduino IDE comes with a C/C++ library called "Wiring", which makes many common input/output operations much easier. The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring



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[4] The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures.

User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution.

The Arduino IDE employs the program argued to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware Arduino programs are written in C/C++, although users only need define two functions to make a runnable program:

- \Box Setup() a function run once at the start of aprogram that can initialize settings
- \Box loop() a function called repeatedly until the board powers

Internet of Things

The Internet of Things (IoT) has provided a promising opportunity to build powerful industrial systems and applications by leveraging the growing ubiquity of Radio Frequency Identification (RFID) and wireless sensors devices. Benefiting from RFID and sensor network technology, common physical objects can be connected and are able to be monitored and managed by a single system. Such a network brings a series of challenges for data storage and processing in a cloud platform.

IoT data can be generated quite rapidly the volume of data can be huge and the data can be various. In order to address these potential problems, this project proposes a data storage framework not only enabling efficient storing of massive IoT data, but also integrating both structured and unstructured data. This data storage framework is able to combine and extend multiple databases and Hadoop to store and manage diverse types of data collected by sensors and RFID readers. In addition, some components are developed to extend the Hadoop to realize a distributed file repository, which is able to process massive unstructured files efficiently. A prototype system based on the proposed framework is also developed to illustrate the framework's effectiveness.

The Internet Of Things (IoT) technology has obtained great development over the last few years and is increasingly influencing various industrial development. The IoT refers to uniquely identifiable objects and their virtual representations in an Internet-like structure. The term "Internet of Things" was first used by Kevin Ashton in 1999 and became popular through the Auto-ID Centre and related market analysis publications. Radio Frequency Identification (RFID) tags, sensors, actuators and mobile phones are often seen as prerequisites for the IoT.

The flowchart, which is the step-by-step approach that was followed in writing of the automated door security program, which enables the execution of command from the android application.

III.EXPERIMENTAL RESULTS

The results of the test series show the minimum system of the Arduino microcontroller (Atmega 328p) circuit system has a minimum value 9600 Bits per second, with 8 data bits and 1 Stop Bits. The whole system in this project operates in the power of 12 volts. A function of this IC is to make the input voltage 220 volts of electricity into the main 12-volt DC, so it is safe and does not damage the circuit. Testing was conducted to determine the changes or differences in voltage. Further testing is to examine the connectivity between Bluetooth on android Smartphone with Bluetooth module series HC-05 and the connection between keypad with Microcontroller. All of these tests show that all goes according to design connections. Final testing is testing the connection System to lock/unlock the door automatically. The goal of this thesis is to propose asystem that can help disabled people to open a door wireless using any android smartphone. The range and security aspects were considered through the use of Bluetooth technology that is embedded in the mobile device. The system was able to actuate a pin to lock or unlock the door from a short distance away by pressing a button on a smartphone. The status of the door has also been created to make the system complete. In future, the Lock It door apps should offer assistance in controlling doors, windows and basic home electronic appliances.



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IV.CONCLUSION

This project is effective in providing enough security as long as the password is not shared. In future this "Automatic Door Locking System Based on IoT" can be provided maximum security by the above enhancements in order to completely satisfy user's needs.

Hence, a common man can afford to purchase such locking system in minimal cost to keep his valuables safely without any worries. This microcontroller is based on the AT mega 328. There are total of 20 pins (0-19) out of which 6 are analog inputs which can also be used as general-purpose pins, a ceramic resonator of frequency 16MHz, an USB connection, a power jack and a reset button. It contains everything needed to support a microcontroller

In this current situation, the degree of security is feeble. So there is a lot of robbery, theft going on in and around the world. So, people fear to keep any of their valuables in their homes. Henceforth, many people prefer to keep it in banks. However, in this insecure world even banks are not too safe enough to satisfy people needs. A common man feels his valuables are secured if there is efficiency in security. Hence this project can give effective security in minimal cost.

In conclusion, it was discovered that the project performed according to specification and can be implemented or set up in various places such as home, offices and industrial areas. The Automated door lock system can provide added security to institution or organizations that use the system. It can thus be concluded that the initial objectives which we set out to achieve as stated in this report has being successfully attained which were: 1. To design password GUI in an android phone. Develop mobile phone application that can be installed in any android operated phone. 3. To design a hardware Bluetooth locking system 4. To interface the Android phone to the hardware locking system by writing a C program

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