Smart Door System Using GSM based Module

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ABSTRACT

Security is one of the most critical concerns in daily life. In this paper, a novel human-machine interface is being integrated into a security system. The system applies the action of knocking as the input interface to unlock a door without using keys. First, the unlock areas on the door are set. When a user knocks on the door, the system obtains knocking information from vibration sensors in the door. A pattern-recognition algorithm subsequently identifies the knocking pattern of the user, including the knocking areas and the knocking sequence. According to the simulation results, the accuracy of identifying the correct knocking areas is between 85% and 90%. This system is best suitable for corporate offices, ATMs, and home security. A knock based security system (KBSS) system using a Piezo sensor and ARDUINO

KEYWORDS

- PIR: - passive infrared sensor
- Security
- RFID: -radio frequency identification
- Arduino
- Piezo sensor
- Home security system, human-computer interface, knock, lock, pattern recognition

INTRODUCTION

Security is a major concern in our day to day life, and digital locks have become an important part of these security systems. There are many types of security systems available to secure our place. Some examples are [PIR based Security System](#), [RFID Based Security System](#), [Digital Lock System](#), bio-matrix systems, Electronics Code lock. In this post, let us build a **Secret Knock Detecting Door Lock using Arduino** which can detect the pattern of your knocks at the door and will only open the lock if the knocking pattern matches with the correct pattern.

Numerous studies have investigated human-computer interactions, based on the design of systems that allow for a more intuitive communication between users and machines or computers. The actions (e.g., touching, clicking, and tapping) generate vibration signals; some researchers have designed novel human-computer interactions by analyzing seismic-vibration information particularly for security systems. Home or business premises security is undeniably important. Whether you are away or inside your property, the common question is, is your property safe?

The security matter is not regulated to homeowners; it is widely emphasis in order to protect your property against potential break-in. The time has been changed drastically in the recent years, home and business security is important. Those simple locks which have been on the market traditionally are no longer used as the time pass on, in order to keep you secure you only need a proper system which cannot be tampered easily.

A simple ARDUINO based knock-based security system is the solution for twenty-four seven monitoring, all needed is a simple technology then the rest you live up to it. In this study, seismic vibration information was analyzed to develop a home-security system. Initially, users defined their personal unlock locations on the door and the corresponding knocking sequence. When they knocked on the door to unlock it, the home-security system detected and analyzed the vibration signals, and the pattern-recognition algorithm identified the knocking locations. If the knocking locations and sequence were consistent with the predefined unlock pattern, the door opened.

AIM:

The main purpose of this project is to produce a working design which is reliable and effective security system based on microcontrollers. This project aims to discover many possibilities of enhancing home and business security and a broad research undertaken from existing designs, though the main focus is features of the system that can be adapted which is user-friendly. The research of many doors in the market that performs different tasks at an affordable cost is to be carried. The delivery of quality at a relatively cheaper cost should be the motivating strength of this design project.

Objectives

- The key objective of this project is to design an ARDUINO based security system, which restricts intruders. The
- microcontroller performs as the significant part of the design.
- This security system represents a major improvement in protection for home and property.
- The system operates under microprocessor control and the software has been preprogrammed to suit the
- majority of applications.
- The system can be operated remotely

Components:

1. Arduino Uno
2. Push Button
3. Buzzer
4. Two Resistors
5. Power
6. Connecting wires
7. Box
8. Servo Motor

COMPONENT EXPLANATION

1. The **Arduino UNO** is a widely used open-source microcontroller board based on the ATmega328P microcontroller. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board features 14 Digital pins and 6 Analog pins.

2. PUSH BUTTON: -A push-button (also spelled pushbutton) or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, although many un-biased buttons (due to their physical nature) still require a spring to return to their un-pushed state.

3. A **sensor** that utilizes the piezoelectric effect, to measure changes in acceleration, strain, pressure, and force by converting them into the electrical charge is called as a **piezoelectric sensor.** This generated piezoelectricity is proportional to the pressure applied to the solid piezoelectric crystal materials. In this article, we will discuss one of the most frequently used piezoelectric sensor applications, that is piezo sensor switch.

4. A **resistor** is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat, may be used as part of motor controls, in power distribution systems, or as test loads for generators.

CIRCUIT BOARD EXPLANATION
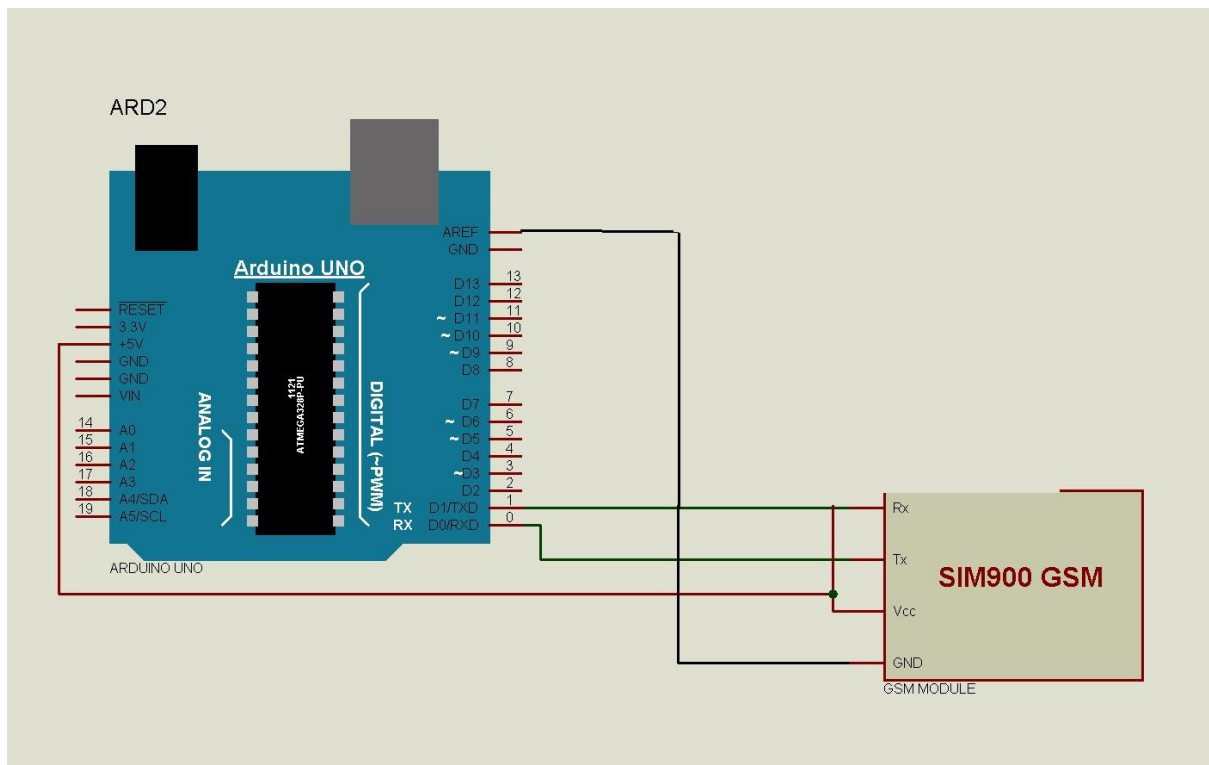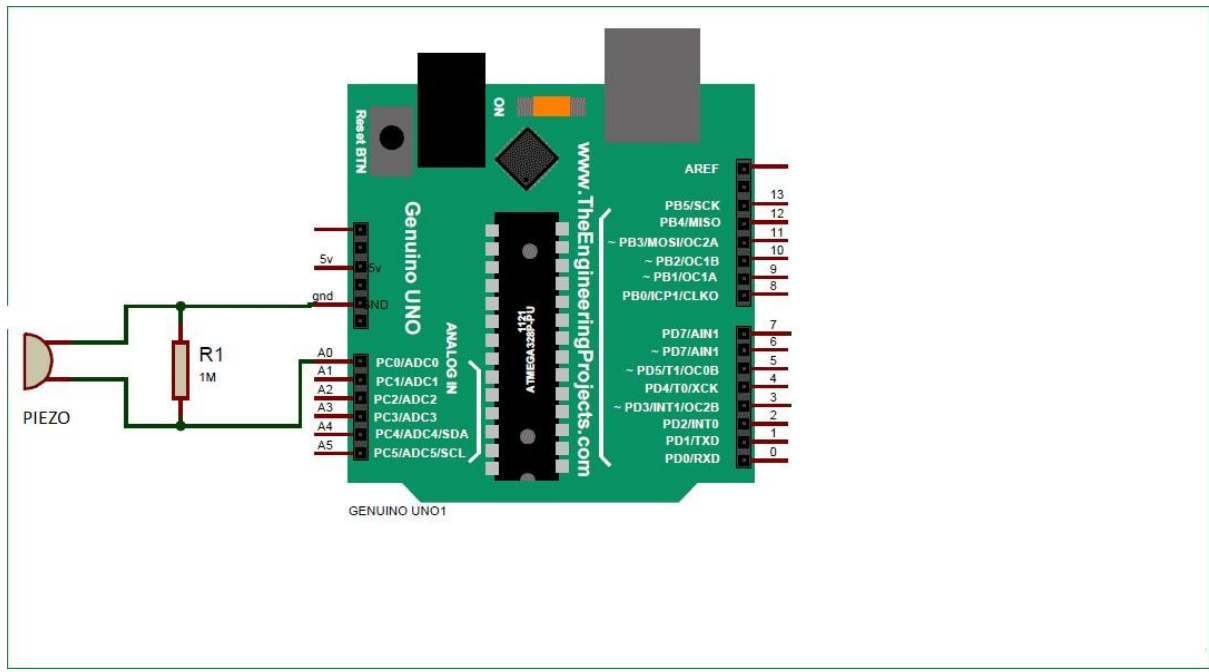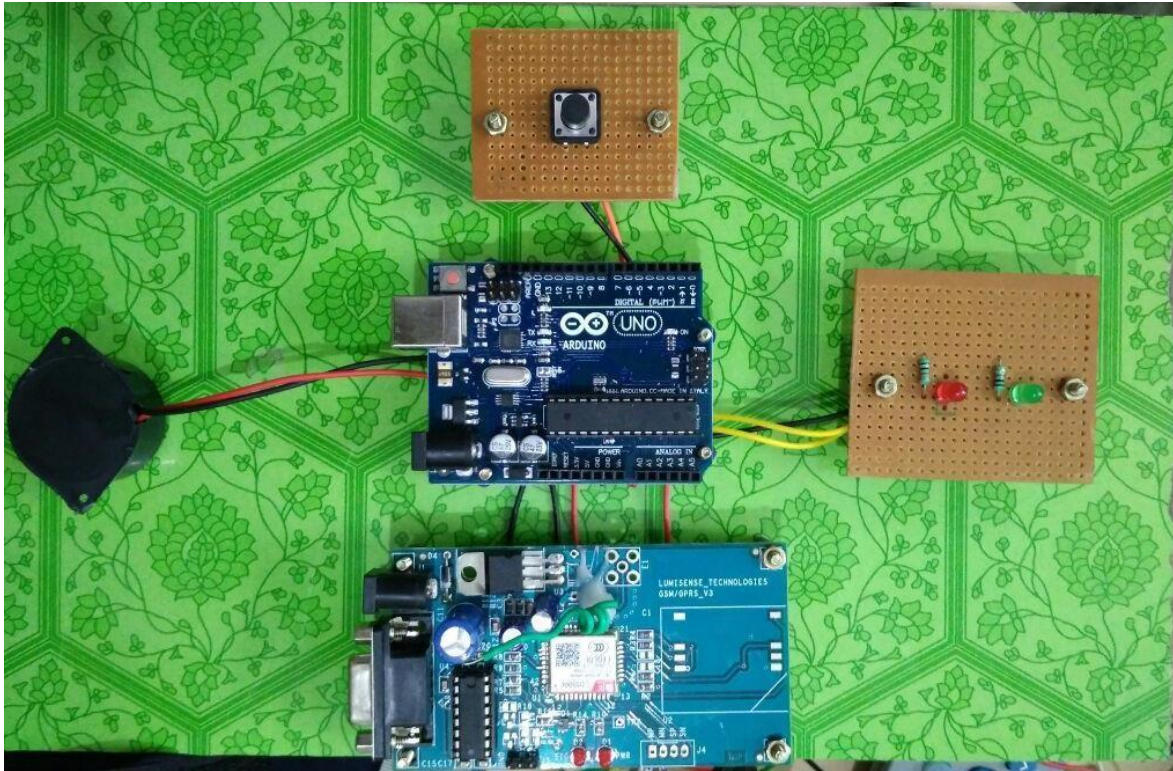
1. The Circuit Diagram of this **Knocking Pattern Detector** is very simple which contains Arduino for controlling whole the process of the project, push button, buzzer. Arduino controls the complete processes like taking password form **PIEZO** Sensor, comparing patterns and save the pattern to Arduino and comparing them and finalizing if it is correct or not.
2. In this circuit, we have used **Buzzer or Piezo Sensor** to take knock input pattern in the system. Here we are using a push button to allow to take input from the sensor and save that into the Arduino.
3. To take input we knock over the piezo sensor after pressing push button. Here we have knocked by keeping a time period in mind that is 500ms. This 500ms is because we have fixed it in code and the input pattern is depending upon it. This 500ms time period will define the input was 1 or 0.
4. When we knock it, Arduino starts monitoring the time of the first knock to second knock and put that in an array. Here in this system, we are taking 6 knocks. It means we will get 5 time periods.
5. Now we check the time period one by one. First, we check time period between first knock and second knock if the time difference between these less than 500ms then it will be 0 and if greater than 500ms it will be 1 and it will be saved into a variable. Now after it, we check time period between second knock and third knock and so on. Finally, we will get 5-digit output in 0 and 1 format (binary).

WORKING EXPLANATION

Working on **Knock based Smart Lock Project** is simple. First, we have to save a pattern in the system. So, we have to press and hold push button until we knock 6 times. Here in this project, I have used 6 knocks, but the user may change it as they want. After six times knock, Arduino, find the knock pattern and save that in EEPROM. Now after saving the input pattern, press and immediately released the push button for taking input from the sensor to Arduino to open the lock. Now we have to knock 6 times. After it, Arduino decodes it and compares with saved pattern. If a match occurs, then the GSM module sends a message to the customer whether it is "accepted" or "rejected".

Note: when we press or press and hold the push button Arduino start a 10 seconds timer to take all 6 knocks. Means user needs to knock within this 10 seconds time.

SCOPE OF RESEARCH

The technology is a never-ending process and these technologies will tend to improve the quality of any product. To be able to design a product using the current technology which is beneficial to the lives of others is a huge contribution to the society. The scope of this research has been narrowed by the problem definition to understand the usefulness of the Arduino in making the creative artworks and factors influencing the produced artwork. The concept behind the creativity is wide; it depends on the field and nature of the project chosen. In this research we are addressing the problems of security systems specifically for door lock security system, it comprises of Arduino. Home security is a critical concern for most people in daily life. Many security systems have been designed for door locking but the scope of this project is on a new concept knock using knock the locking and unlocking of the door can do eliminating the disadvantages of existing traditional available door security system.

RELATED WORK:

Indeed, we are not the first to observe the flaws and limitations of the present-day security systems. Several researchers have described potential vulnerabilities indoor security systems.

The traditional security systems as priced low, but they merely act as an alarm system and are no match to the well-equipped thief. Many security systems have been proposed over the years. There are some factors must be considered when designing a smart home system. These factors to be used in various applications.

Nowadays smart home system playing a major task with high and low price, less and more security, less and more efficient. This system enters into a smart home technology by using some controlling mechanisms like Bluetooth, Short Message Service, Internet, and using some microchips. In [3] the author uses a piezo sensor on which user knock and if the intensity is matched to set value the door is opened In [5] the proposed work is to send a signal to door from a Tablet or mobile devices by using a wireless system.

This allows the user to lock and unlock a door from inside or outside a house with a Wi-Fi range available. In [4] a novel human-machine interface was integrated into a home security system. The developed system applies the action of knocking as the input interface to unlock a door without using keys.In [1] Microcontroller based Home Security System with Remote Monitoring", proposes the construction of a micro-controller based automated Home Security System. The door lock is password protected with a LED-based resistive screen input panel which operates by detecting a difference in light intensity captured by the photodiode which is emitted by surrounding red LEDs and reflected by the finger.

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