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SOUND BASED DOOR LOCKING SYSTEM USING ARDUINO

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Abstract: One of the most pressing issues of everyday life is security. A novel human–machine interface is being implemented into a protection framework in this project. To open a door without using keys, the machine uses the motion of knocking as the input interface. The unlock areas on the door must first be placed. When a person taps on the threshold, sound sensors in the door provide input to the device. Following that, a pattern-recognition algorithm determines the user's knocking pattern, including the knocking areas and series. The precision of determining the right knocking areas is between 85 and 90 percent, according to simulation data. Corporate facilities, ATMs, and home surveillance are the perfect applications for this device. A Piezo sensor and an ARDUINO are used in a Knock Based Security Scheme (KBSS). The machine is managed by the ARDUINO Leonardo. Due to synchronization, a continuous picture is transmitted to the mail.

Keywords: ARDUINO, Algorithm, Door Lock and GSM

1. INTRODUCTION

The Knock Unlock has special buttons and lights that help the user learn how to do it and how it reacts to the user. To begin, there is a button on the door's top that enables the user to enter. ‘Recording mode' is a term used to describe a mode in which audio is the consumer should record the "secret" Knock sequence that will be the only way to open the door in this mode. There are two lights under the switch as well. When the user clicks the switch, the red light illuminates, signaling that the user is in ‘recording mode.' When a knock is heard, the other one, a green light, pulses. Create and install an alarm device that sounds an alarm and sends a text message to the owner if the house is unlocked or if an effort is made to open it unlawfully. The device will also have two modes of activation/deactivation which will unlock or shut the door for the user automatically. The benefits of this house-mobile protection system (HMSS) include its high degree of security, robustness, low cost, and ease of use (uncomplicated), as well as the fact that it has no touch distance restriction. To prevent the issue of false alerts sent from other alarm detection devices to "Alarm Receiving Centers" or police stations, the device combines multiple sensors through a microcontroller, which serves as the system's brain. The HMSS may be used in a variety of settings, including residences, small enterprises, offices, and warehouses. the notion The GPRS-based door locking and unlocking mechanism opens and closes the door. Furthermore, defense would be improved. To address the threat of vulnerability of life and property, protective initiatives have been implemented. This is accomplished by utilising traditional and automated locks, discrete activation codes, and biometric methods such as finger prints, thumb prints, iris, and facial recognition to avoid unwanted entry into buildings via entrance doors. A prototype door protection framework is being developed to enable a privileged user to gain access to a protected keyless door with legitimate smart card authentication. The model consists of a hardware module and software that allows the door to be operated by smart card authentication by the microcontroller device.

It requires the consumer to program a "hidden" knock sequence that would be the only way to open the door. It's a unique and entertaining way for the consumer to open the entrance, and it makes the operation more engaging. The door is unlocked and the consumer will open it until the hidden knock is heard. In the event of illegal entry, GSM would be used. The primary goal of this project is to provide protection in residences, offices, and other locations. When the device detects a predefined notification from the consumer, it immediately locks the door. The customer must first create an account. His details would be saved in a folder. Whenever a message for the registered number is sent, the controller will send an instruction to the DC motor. After that, the DC motor would either lock or unlock the door. In the event of

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unauthorized entry, the IR sensor can detect it and send a warning message through GSM to the registered customer. Home appliances are wired to a slave node in this internet-based wireless versatile solution. The slave nodes interact with the master node via RF, while the master node connects to the PC server via a serial RS232 link. The nodes are built on the PIC 16F877c microcontroller. A user interface portion, a directory, and a web server component make up a PC server. On a Web site, an Internet page has been set up. A backend data base server is attached to the user interface and the Internet front end. Device control is created, and their status is tracked over the Internet.

2. EXISTING METHOD

In our day-to-day lives, safety is paramount. All desires to feel as safe as possible. A door access control system is a critical component in a protection chain. The microcontroller-based Door locker is an access control device that only enables approved individuals to enter restricted areas. The machine is fully managed by the AT89C2051, an 8-bit microcontroller with 2Kbytes of ROM for programmed memory. We can update the password at any time since it is saved in the EPROM. The device has a keypad that can be used to type the password. When the password entered matches the password stored in the memory, the relay is enabled, and the door is unlocked. If we type a wrong password three times in a row, the alarm is enabled. When we return from inside and the microcontroller detects a human using the Laser light, the microcontroller will unlock the door for you automatically. A physical protection mechanism that ensures the security of a room or building by restricting entry to that room or building to certain persons and maintaining track of such accesses is known as door-access control. To restrict access to particular users, it employs an individual-authentication process. Smart cards are the most widely used identification tool for such schemes. Only those with a smart card assigned to them are allowed entry to the space. However, in the case of smartcard schemes, there is often the inconvenience in processing stolen keys, on top of the difficulties of stopping any individual from obtaining and utilizing a valid person's card. Meanwhile, the realistic deployment of door-access-control systems is growing in tandem with the continued advancement of fingerprints as the primary biometrics tool for human authentication. Biometric data is also being used. Biometric identification utilizes details unique to an individual's body to provide a high degree of protection that makes it impossible for someone else to impersonate that person. While there are many forms of biometrics authentication methods, the one discussed here - finger-vein authentication - is the most appropriate for managing large-scale door entry.

The current protection scheme is ineffective since smart larceners will quickly fake it if they get their hands on the keys or passwords. In addition, keeping track of locker events is a difficult task for bank administration since no committed employee is assigned to this task. To resolve these problems, a bank protection device such as this one is needed, which does not need the officer's manual presence. Customers would have less time to idle as a result of this. Any new customer who wishes to open a bank locker is required to get an iris scan and a vein identification scan performed. They are then granted a special password, and any recorded evidence, such as a driver's license number, passport number, voter id number, or any other government-issued proof, may be used as a password. They can also include solutions to any of the aforementioned samples so that they can be used to gain entry to the lockers in the event of an accident. The motion detector, which works at night, often aims to keep the locker room secure from vandalism.

3. PROPOSED METHOD

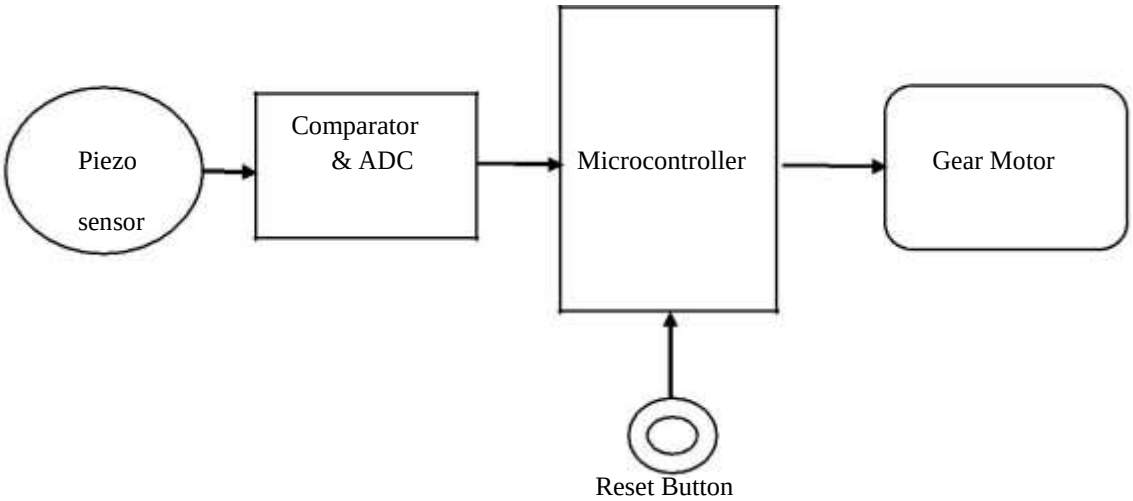

Fig.1 Knock based door lock

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A number of experts have identified possible flaws in door protection systems. Traditional surveillance devices are inexpensive, but they only serve as a warning device and are ineffective against a well-equipped intruder. Over the years, several surveillance systems have been proposed. When planning a smart home device, there are a few things to keep in mind. These variables can be used in a variety of implementations. Smart home systems are now playing a major role in society, with high and low prices, less and more protection, and less and more performance. This device incorporates smart home technologies by using various control mechanisms such as Bluetooth, SMS, the Internet, and microchips. The piezo sensor on which the consumer knocks is used in this experiment, and if the force matches the fixed amount, the door is opened. The planned work is to transmit a signal to the door using a wireless method from a Tablet or mobile computer. With a Wi-Fi spectrum open, the consumer can lock and unlock a door from within or outside the home. In a home-security framework, a novel human–machine interface was integrated. To open a door without using keys, the built framework uses the action of knocking as the input interface. Home Security Using Microcontrollers

System with Remote Monitoring" suggests the development of an integrated home protection system built on a microcontroller. With an LED-based resistive screen input panel, the door lock is password safe. It works by sensing differences in light intensity detected by the photo diode, which is emitted by nearby red LEDs and replicated by the finger. It's a rundown of what happens when a knock is made on the piezo sensor through the door, and how the analogue signals are transformed to digital utilizing ADC to have the required threshold to force the door open. The diagram above illustrates the internal hardware interconnection and how the components are linked to establish a human-machine interface. The device design is described by the hardware interconnection. A webcam is a small digital camera that you can attach to your device to broadcast live video pictures (as they happen). A tiny grid of microscopic light-detectors mounted into an image-sensing microchip (either a charge-coupled system (CCD) or, more possibly these days, a CMOS image sensor) catches light through a narrow lens at the front, much like a digital camera. The image sensor and its circuitry transform the image in front of the camera into digital format—a series of zeros and ones that a machine can understand—as we'll see in a second. A webcam, unlike a digital camera, does not have a built-in memory chip or flash memory card: it is programmed to record and transfer images to a device automatically, because it does not need to "know" them. It's for this purpose that webcams have USB ports on the rear. The USB cord connects the camera to the device and transports the visual data collected by the webcam's image sensor back to the computer, where it is sent to the Internet.

This Microsoft LifeCam VX-800 has a default focus, unlike the webcam above, which you can focus by rotating the lens. The control indicator light (top left, not actually lit) and the microphone can be seen if you look closely (top right). The stand may be used to comfortably sit on a table or to fold up and snap on to the top of your desktop. A webcam intentionally takes even lower quality (more distorted, grainy, and "pixilated" photographs, while a proper digital camera is equipped to take high-resolution photos. A webcam produces picture files that are around a tenth of the scale of a digital camera. As a result, webcam snapshots can be transmitted even faster over the Internet than big digital files. Modern HD (high-definition) webcams provide higher-resolution videos than older webcams, but they also use far smaller files than a truly excellent digital camera. There are two primary explanations why you might like to submit photos in this manner. You may want to post a regularly modified still picture of a certain location on the Internet for everyone to see. A zoo, for example, might stream live video from its zebra or giraffe enclosure. You might also use an instant messaging service like Skype or Live Messenger to video chat with a buddy. The Global System for Mobile Communication (GSM) is an acronym for Global System for Mobile Communication. It is a wireless cellular technology that allows mobile voice and data networks to be transmitted. GSM is the most commonly adopted telecommunications protocol, and it is used all over the world. GSM has a global share of more than 70% of all wireless cellular subscribers in the country.

The narrowband Time Division Multiple Access (TDMA) strategy is used by GSM to relay signals. GSM was created with the help of new media. It can handle data speeds ranging from 64 kbps to 120 Mbps. GSM now serves over one billion Smartphone users in over 210 countries around the globe. GSM offers simple to specialized voice and data services, as well as roaming. The right to use the GSM phone number on another GSM network is known as roaming. Email is a type of correspondence and information technology. It employs technologies to send a multimedia message through the Internet. Users utilize email in various ways depending on how they see it. To submit and receive data, there are a variety of software platforms available. Gmail, Hotmail, Yahoo! Mail, Outlook, and other popular email systems are only a few examples. Email was originally sent over the ARPANET as extensions to the File Transfer Protocol (FTP), although it is now handled by the Simple Mail Transfer Protocol (SMTP), which was first released as Internet standard 10 (RFC 821) in 1982. SMTP uses a communication envelope distinct from the message (header and body) to convey transmission specifications when transmitting email messages within systems. Locally saved messages load quicker than those stored on an email server. The body of an email message is not downloaded before it is invoked (for example, by clicking on it in Thunderbird's message list). Thunderbird must first retrieve the message body from the email server before it can be shown. Thunderbird will experience a transient performance lag when it needs to retrieve a large number of messages from the email server. This is triggered in part by the update procedure, but also by the indexing process. After the download and indexing processes are completed, output returns to usual. The synchronization state is seen in Thunderbird's bottom left corner.

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Non-digital external signals, such as electrical voltage, music or voice, temperature, pressures, and a variety of other analogue signals, are encountered by many embedded device applications. These details cannot be understood by a modern machine until they are translated to digital formats. The analogue to digital converter (ADC) is in charge of transforming analogue values to binary digits. The DAC is in charge of producing analogue signals for automation controls including DC motor and HVDC furnace power. Sensors, Display modules such as LCD or Touch screen displays, Debug ports, and networking peripherals such as I2C, SPI, Ethernet, CAN, and USB for high-speed data transfer can also be used in an embedded device. Various sensors are already playing an increasingly significant role in the construction of real-time embedded systems. Temperature sensors, light sensors, PIR sensors, and gas sensors are all popular in application-specific circuitry. The shaft of a servo will rotate in a certain range. It's an angle of 180 degrees on most servos. A servo is made up of three wires. The Vcc supply is usually the middle cable, and the ground is always the brown or black wire. If the colors shift, the specifics will be mentioned in the servo's datasheet. The PWM signal is sent to the servo from the other cable. Each PWM corresponds to a fixed location on the servo. The signal is converted to a reference voltage by the control circuit. The control circuit then examines the input from the potentiometer to determine the resistance value. The reference voltage is then compared to the voltage around the resistor. While the voltage is stronger, the shaft of the motor rotates in one direction, and when the voltage is smaller, it rotates in the opposite direction. The motor is rotated until the voltage between the potentiometer and the reference voltage are identical. One of the reasons the servo may not shift after providing a signal may be that the reference voltage value and the cross the potentiometer match. The majority of servos need a supply voltage of 4.8v to 6v DC.

The servo signal is a PWM, as previously said. The three parameters of a PWM signal are duration, pulse distance, and frequency. For tiny servos, the amplitude must be between 3 and 5 volts. (Refer to the datasheet once more.) The signal frequency for the analogue servo is in the 30Hz to 50Hz range. A piezoelectric sensor is a system that converts changes in friction, acceleration, strain, or force to an electrical charge using the piezoelectric effect. Piezoelectric sensors have proved to be robust measuring instruments for a wide range of processes. The need for a door locking mechanism that responds to knocks was first found. An external power supply or a USB link may be used to power the Arduino. The power source is immediately chosen. An AC-to-DC adapter (wall-wart) or a battery may provide external (non-USB) control. A 2.1mm center-positive connector may be plugged into the board's power socket to attach the adapter. Battery leads may be threaded into the POWER connector's Ground and Vin pin headers. The board may be driven from a 6 to 20 volt external supply. If less than 7V is supplied, the 5V pin can supply less than five volts, making the board unstable. The voltage regulator can overheat and harm the board if more than 12V is used. The voltage range suggested is 7 to 12 volts.

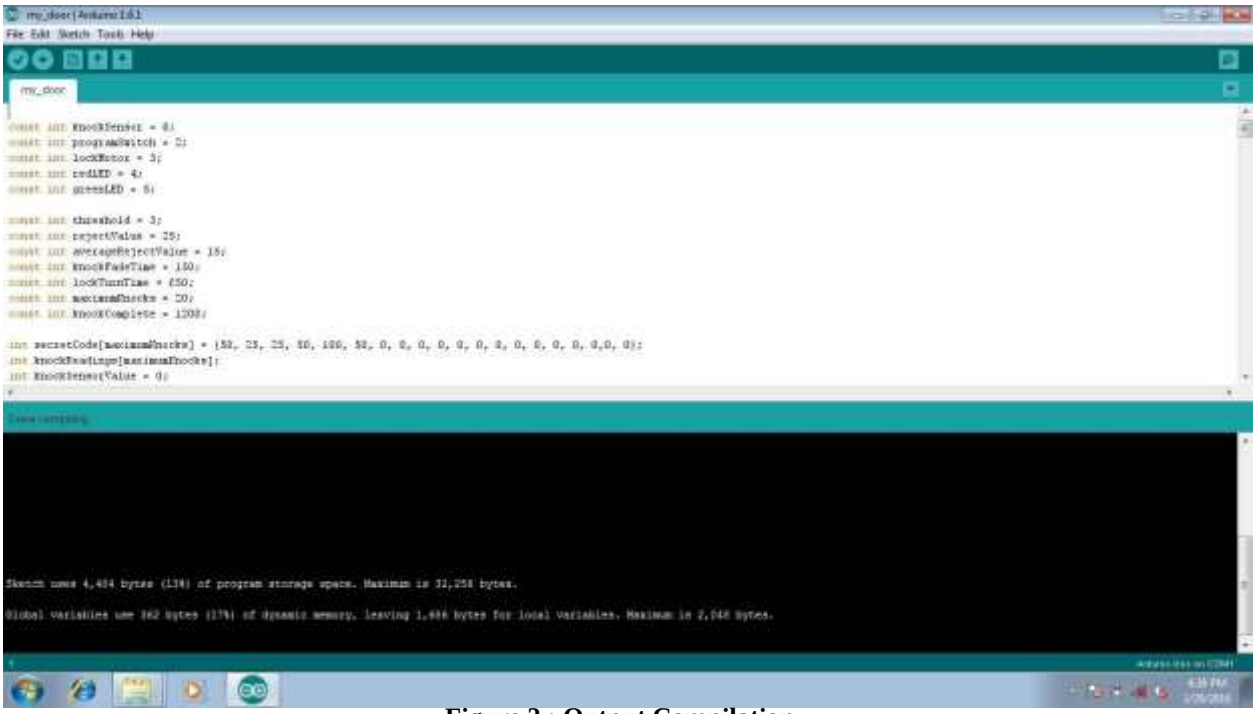

Figure.2 : Output Compilation

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The picture of the door knocking individuals is captured using an internet protocol web camera, which uses the IP address for image capture and constantly transfers the image over the internet. It's a system that converts changes in friction, acceleration, temperature, strain, or force to an electrical charge using the piezoelectric effect. It's an audio signaling system that may be electronic, electromechanical, or piezoelectric in nature. Alarm sensors are popular applications for buzzers and beepers. A servomotor is a rotary or linear actuator that allows for precise angular or linear direction velocity and acceleration power. Although the term servo motor is sometimes used to refer to a motor suitable for usage in a closed loop control device, it is not a particular type of motor. The first module of the home-security framework, according to the suggested solution, consists of a setting stage and a consumption stage. The consumer identifies unlock areas on the door during the setting point (knocking locations). The user is asked to knock on the unlock areas in order during the use stage. Three stages make up the setting period.

Figure.3.: Front view of door lock set-up

The consumer determines the unlock areas on the door in the first step. The unlock areas are one part of the password that must be entered to open the door. The consumer determines the order in which the unlock areas are knocked on after identifying the unlock areas. The password's second feature is the knocking command. Vibration controls, which are piezo, are mounted on the door as part of the home protection device. The vibration sensors sense the vibration signal as the consumer knocks on the entrance. The ARDUINO receives the analogue signals from the sensors and uses an analogue to digital converter (ADC) to control the actuator to open the panel.

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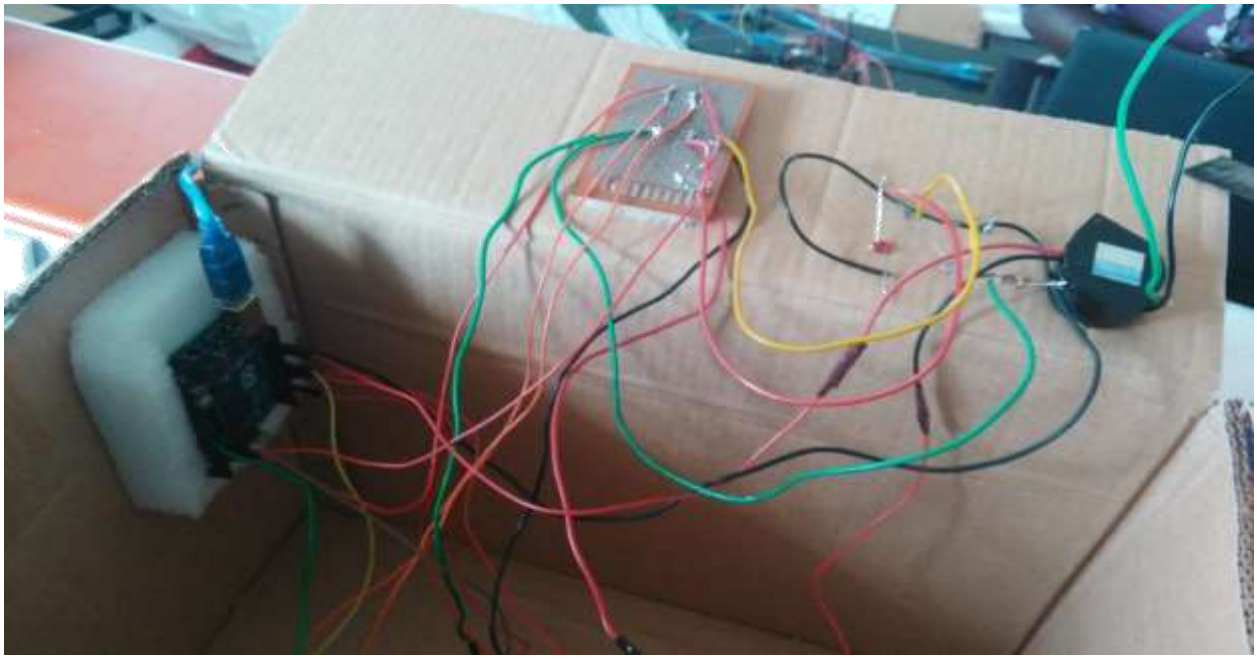

Figure 4.: Top view of door lock set-up

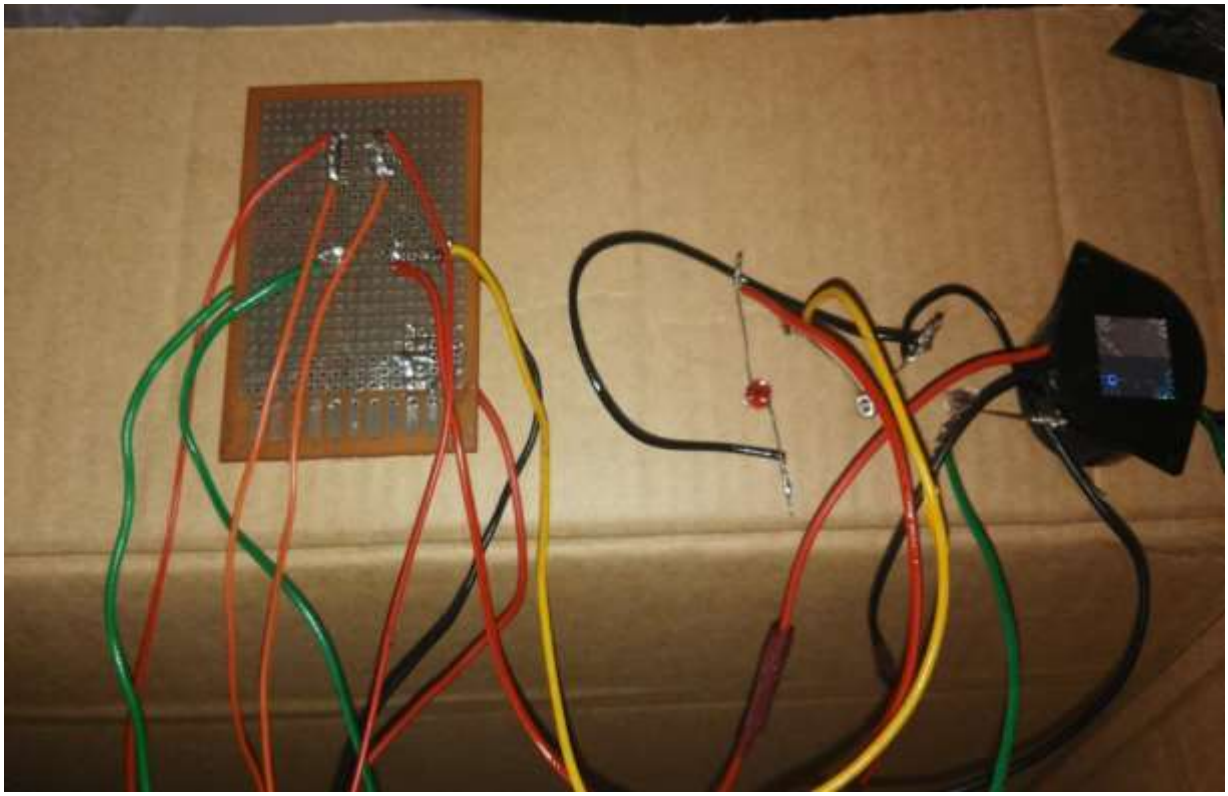

Figure.5.: 74Buzzer and its Circuit Wiring

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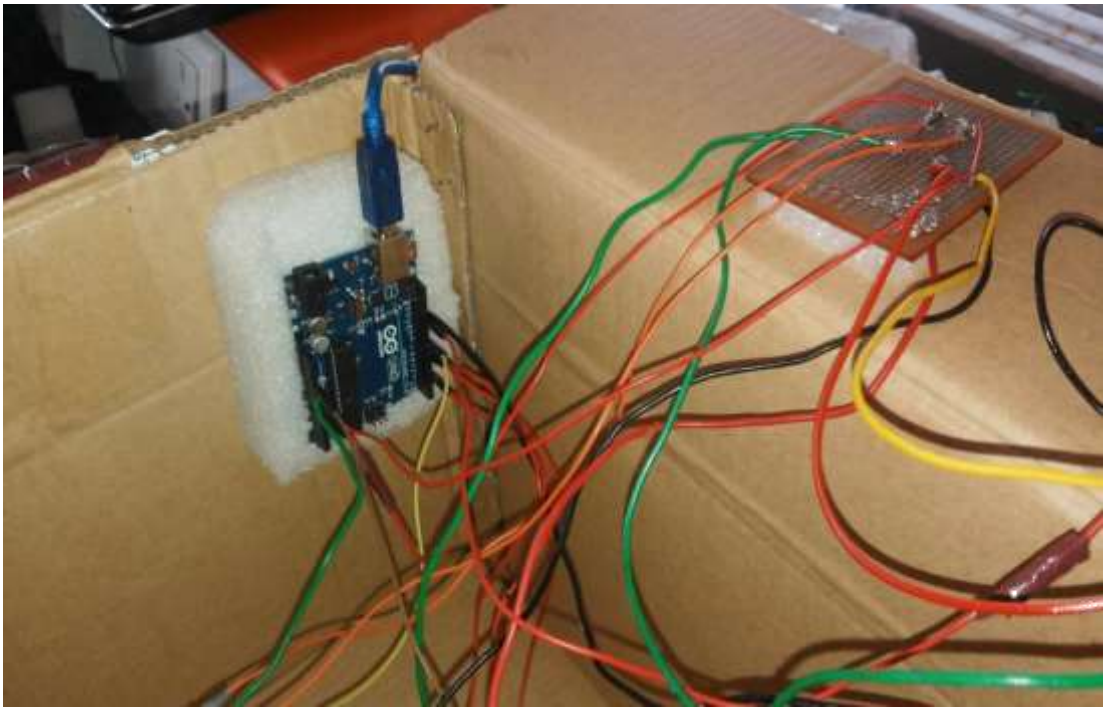

Figure.6.: Microcontroller circuit wiring

4. CONCLUSION

A home surveillance framework has been implemented with human–machine interaction. To test the vibration signals of knocking on a fence, the machine used a vibration sensor piezo and an Arduino microcontroller. The vibration data was then analyzed, and the users were able to open the door using a special knocking pattern. The next module is GSM, which sends a text message warning to an authorized user in the event of an assault. When an unfamiliar individual knocks on the threshold, the circuit would immediately give the person a slight shock. In both stages, there may be an improvement in human-machine contact.

REFERENCES

[1].A.O. Oke, O.M. Olaniyi, O.T. Arulogun, and O.M. Olaniyan (2009) works in the title of "Development of a Microcontroller-Controlled Security Door System"

[2]**.** Randy Murdock doing the project(2010) in the title of "Knock Unlock"

[3]. Ashraf Elfasakhany, Jorge Hernandez, Juan Carlos Garcia, Mario Reyes, Francisco Martell(2011) working in the project as "Design and Development of a House-Mobile Security System"

[4]. Rupinder Singh Brar done the project in the name of "ARDUINO Based industrial security system using piezo electric sensor",(2012).

[5]. Nikhil Agarwal(2011) working in the project as "Microcontroller based Home Security System with Remote Monitoring" .

[6]. Osadciw, L., P. Varshney, and K. Veeramachaneni (2002)do the project in "Improving Personal Identification Accuracy Using Multi sensor Fusion for Building Access Control Application".

[7]. Fournier, J., H. Li, S.W. Moore, R.D. Mullins, and G.S. Taylor(2003) for the project of "Security Evaluation of Asynchronous Circuits".

[8]. Osadciw, L., P. Varshney, and K. Veeramachaneni(2002) works on the project as "Improving Personal Identification Accuracy Using Multi sensor Fusion for Building Access Control Application".

[9]. Fournier, J., H. Li, S.W. Moore, R.D. Mullins, and G.S. Taylor(2003) proposed the method of "Security Evaluation of Asynchronous Circuits".

[10]. Mohammad Amanullah (2013) proposed the method Microcontroller Based Reprogrammable Digital Door Lock Security System by Using Keypad & GSM/CDMA,e-ISSN: 2278-1676 Volume 4, Issue 6, PP 38-42

[11] S.Kannadhasan and R.Ragavendra, Multithreading Real Time Applications on Embedded System using Fuzzy Controlled Braking System Based on CAN and RTOS. Journal of Environmental Science, Computer Science, Engineering and Technology, Vol.3, Issue 01, PP.292-296, February 2014, ISSN: 2278-179X.

[12] Technology Intelligent Home(2012) SMS Based Home Security System with Immediate Feedback International of Advance Research in Science and Engineering http://www.ijarse.com, Vol. No.2, Issue No.5, ISSN-2319-8354

[13] Mazidi, Muhammad ali, (2007) The 8051 Microcontroller and Embedded Systems, Second Edition, Prentice Hall.

[14] Mohammad dulah(2011) Students proposed the method of Design and Implementation of Piezo electric Infrared Sensor Based Security System Using Microcontroller, Proceeding of the,. Volume-2, Special Issue-1,139–142 ISSN:2250-3676.

[15] C.Jisha Chandra, L.suganya, J.Manjushreekumari, R.Nagarajan and S.Kannadhasan, Effective Implementation of Efficient Data Collection in WSN, International Research Journal of Engineering and Technology, Volume 8, Issue 3, March 2021, ISSN: 2395-0056.

