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Thalavapalayam, Karur – 639 113.

VIRUS PROTECTED AUTOMATIC DOORBELL

A MINOR PROJECT - IV REPORT

Submitted by

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BACHELOR OF ENGINEERING

in

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

M.KUMARASAMY COLLEGE OF ENGINEERING

(Autonomous)

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BONAFIDE CERTIFICATE

Certified that this **18ECP106L-Minor Project IV** report "**VIRUS PROTECTED AUTOMATIC DOORBELL"** is the bonafide work of "**DEEPIKA M (927621BEC029), DHARSHANA M (927621BEC041), HARSELA S (927621BEC063), INDHUJA V (927621BEC064)"** who carried out the project work under my supervision in the academic year **2023-2024 – EVEN SEMESTER**.

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This Minor project-IV report has been submitted for the **18ECP106L – Minor Project-IV** Review held at M.Kumarasamy College of Engineering, Karur on _____.

PROJECT COORDINATOR

INSTITUTION VISION AND MISSION

Vision

To emerge as a leader among the top institutions in the field of technical education.

Mission

M1: Produce smart technocrats with empirical knowledge who can surmount the global challenges.

M2: Create a diverse, fully -engaged, learner -centric campus environment to provide quality education to the students.

M3: Maintain mutually beneficial partnerships with our alumni, industry and professional associations

DEPARTMENT VISION, MISSION, PEO, PO AND PSO

Vision

To empower the Electronics and Communication Engineering students with emerging technologies, professionalism, innovative research and social responsibility.

Mission

M1: Attain the academic excellence through innovative teaching learning process, research areas & laboratories and Consultancy projects.

M2: Inculcate the students in problem solving and lifelong learning ability.

M3: Provide entrepreneurial skills and leadership qualities.

M4: Render the technical knowledge and skills of faculty members.

Program Educational Objectives

PEO1: Core Competence: Graduates will have a successful career in academia or industry associated with Electronics and Communication Engineering.

PEO2: Professionalism: Graduates will provide feasible solutions for the challenging problems through comprehensive research and innovation in the allied areas of Electronics and Communication Engineering.

PEO3: Lifelong Learning: Graduates will contribute to the social needs through lifelong learning, practicing professional ethics and leadership quality.

Program Outcomes

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1: Applying knowledge in various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of Engineering application.

PSO2: Able to solve complex problems in Electronics and Communication Engineering with analytical and managerial skills either independently or in team using latest hardware and software tools to fulfil the industrial expectations.

Abstract	Matching with POs, PSOs
Arduino UNO, RF Receiver Module, Buzzer	**PO1, PO2, PO3, PO4, PO5, PO6,PO7, PO8, PO9, PO10, PO11, PO12, PSO1, PSO2**

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ABSTRACT

Doorbells are usual signaling devices used to alert the person inside the building to open the door as someone has arrived. Classic doorbells can be seen in every house nowadays which uses simple button and when the button is pressed the bell rings. The doorbell which we are going to make is different from that. We will make a doorbell which is automatic. i.e it will detect someone in front of it and then it will ring. We will be using a very simple circuit to implement this project. This project can be really beneficial because it's not always the case that a person can reach the doorbell, so it would be nice if it rings automatically after detecting the person. Also, there is a flexibility that you can adjust the distance according to you by doing some changes in the code you are using to drive the doorbell. We will be using ultrasonic sensor to detect the person and then give the alert using a buzzer. As we know that ultrasonic sensors are used for distance measurement without physical contact for small distances. So it's the best thing to use ultrasonic sensor for detecting object.

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LIST OF ABBREVIATIONS

GPL	-	General Public License
USB	-	Universal Serial Bus
IDE	-	Integrated Development Environment
PCB	-	Printed Circuit Board
TTL	-	Transistor -Transistor Logic

CHAPTER 1

INTRODUCTION

1.1 DEFINING ARDUINO UNO

An Arduino is actually a microcontroller based kit which can be either used directly by purchasing from the vendor or can be made at home using the components, owing to its open source hardware feature. It is basically used in communications and in controlling or operating many devices.

1 Digital pins: 14 (These pins have only 2 states i.e. high or low or in simple words either 5 V or 0 V no in between values. These pins are mostly used to sense the voltage presence when switch is open or close)

2 Analog pins: 6 (A0 to A5 and they come up with a resolution of 10 bits and they provide flexibility of connecting any external device via these pins. These pins are configured from 0 V to 5 V but they can be configured to high range by using AREF pin or analog Reference () function. ADC (analog to digital convertor) is used to sample these pins. These pins take analog signal and by using ADC convertor they convert this analog signal to number between 0 – 1023)16 MHz crystal oscillator Out of 14 digital pins, 6 can be used for PWM (pulse width modulation) USB port TX and RX pins (for serial communication).

3 Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or asdo-it-yourself (DIY) kits.

1.2 LITERATURE REVIEW

The Arduino project was started at the Interaction Design Institute Ivrea (IDII) in Ivrea, Italy. At that time, the students used a BASIC Stamp microcontroller at a cost of $50, a considerable expense for many students. In 2003 Hernando Barragán created the development platform wiring as a Master's thesis project at IDII, under the supervision of Massimo Banzi and Casey Reas. Casey Reas is known for co-creating, with Ben Fry, the Processing development platform. The project goal was to create simple, low cost tools for creating digital projects by non-engineers. The Wiring platform consisted of a printed circuit board (PCB) with an ATmega168 microcontroller, an IDE based on Processing and library functions to easily program the microcontroller. In 2005, Massimo Banzi, with David Mellis, another IDII student, and David Cuartielles, added support for the cheaper ATmega8 microcontroller to Wiring. But instead of continuing the work on Wiring, they forked the project and renamed it Arduino. The initial Arduino core team consisted of Massimo Banzi, David Cuartielles, Tom Igoe, Gianluca Martino, and David Mellis, but Barragán was not invited to participate. Following the completion of the Wiring platform, lighter and less expensive versions were distributed in the open-source community. It was estimated in mid-2011 that over 300,000 official Arduinos had been commercially produced, and in 2013 that 700,000 official boards were in users' hands.

In October 2016, Federico Musto, Arduino's former CEO, secured a 50% ownership of the company. In April 2017, Wired reported that Musto had

"fabricated his academic record On his company's website, personal LinkedIn accounts, and even on Italian business documents, Musto was until recently listed as holding a PhD from the Massachusetts Institute of Technology. In some cases, his biography also claimed an MBA from New York University." Wired reported that neither university had any recordof Musto's attendance, and Musto later admitted in an interview with Wired that he had never earned those degrees. Around that same time, Massimo Banzi announced that the Arduino Foundation would be "a new beginning for Arduino. But a year later, the Foundation still hasn't been established, and thestate of the project remains unclear.

The controversy surrounding Musto continued when, in July 2017, he reportedly pulled many Open source licenses, schematics, and code from theArduino website, prompting scrutiny and outcry. In October 2017, Arduino announced its partnership with ARM Holdings (ARM). The announcement said, in part, "ARM recognized independence as a core value of Arduino ... without any lock-in with the ARM architecture." Arduino intends to continueto work with all technology vendors and architectures.

1.3 HARDWARE

Arduino is open-source hardware. The hardware reference designs are distributed under a Creative Commons Attribution Share-Alike 2.5 license and are available on the Arduino website. Layout and production files for some versions of the hardware are also available. Although the hardware and software designs are freely available under copy left licenses, the developers have requested the name Arduino to be exclusive to the official product and not be used for derived works without permission. The official policy. Document on use of the Arduino name emphasizes that the project is open to incorporating work by others into the official product. Several Arduino- compatible products commercially released have avoided the project name by using various names ending in duino.

These pins are on the top of the board, via female 0.1-inch (2.54 mm) headers. Several plug-in application shields are also commercially available. The Arduino Nano, and Arduino-compatible Bare Bones Board and arduino boards may provide male header pins on the underside of the board that can plug into solder less breadboards.

Arduino Board	**Processor**	**Memory**	**Digital I/O**	**Analogue I/O**
Arduino Uno	16Mhz ATmega328	2KB SRAM, 32KB flash	14	6 input, 0 output
Arduino Due	84MHz AT91SAM3X8E	96KB SRAM, 512KB flash	54	12 input, 2 output
ArduiNo Mega	16MHz ATmega2560	8KB SRAM, 256KB flash	54	16 input, 0 output
Arduino Leonardo	16MHz ATmega32u4	2.5KB SRAM, 32KB flash	20	12 input, 0 output

Table.1.1 Features of arduino boards

CHAPTER 2
HARDWARE DESCRIPTION

2.1 ARDUINO UNO

The Uno is a huge option for your initial Arduino. It consists of 14-digital I/O pins, where 6-pins can be usedas PWM (pulse width modulation outputs), 6-analog inputs, a reset button, a power jack, a USB connection and more. It includes everything required to hold up the microcontroller; simply attach it to a PC with the help of a USB cable and give the supply to get started witha AC-to-DC adapter or battery.

Fig 2.1 Aurduino Board

2.2 LILY PAD ARDUINO BOARD

The Lily Pad Arduino board is a wearable e-textile technology expandedby Leah "Buechley" and considerately designed by "Leah and Spark Fun". Each board was imaginatively designed with huge connecting pads & a smooth back to let them to be sewn into clothing using conductive thread. This Arduino also comprises of I/O, power, and also sensor boards which are built. Especially for e-textiles. These are even washable!

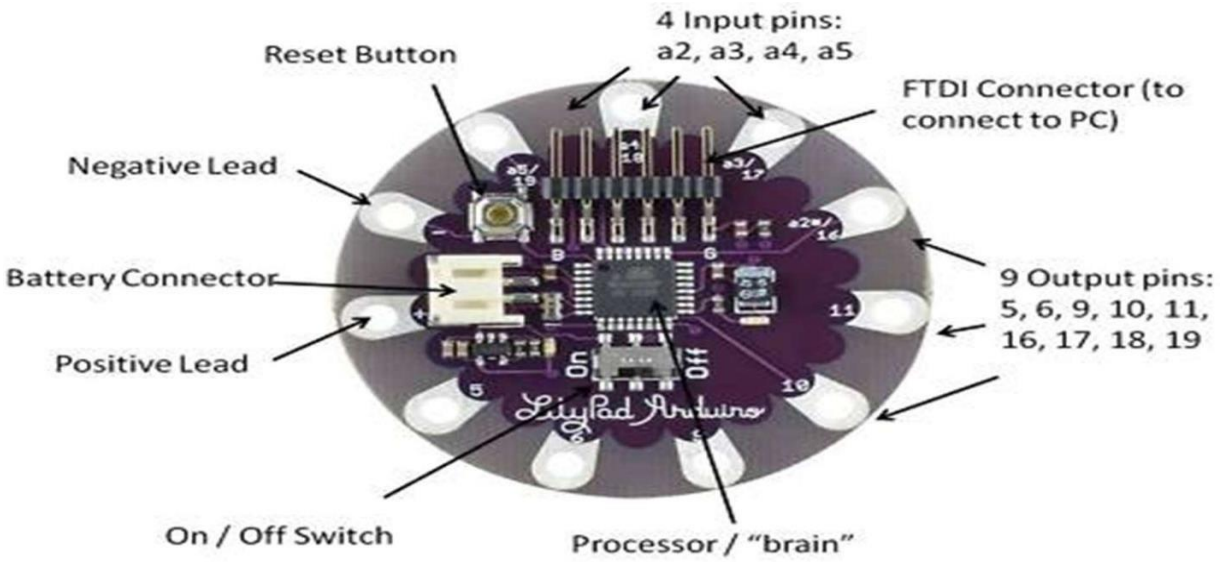


Fig 2.2 Lily Pad Arduino Board

2.3 ARDUINO MEGA (R3) BOARD

The Arduino Mega is similar to the UNO's big brother. It includes lots of digital I/O pins (from that, 14-pins can be used as PWM o/ps), 6-analog inputs, a reset button, a power jack, a USB connection and a reset button. It includes everything required to hold up the microcontroller; simply attach it to a PC with the help of a USB cable and give the supply to get started witha AC-to-DC adapter or battery. The huge number of pins make this Arduino board very helpful for designing the projects that need a bunch of digital i/ps or o/ps like lots buttons.

2.4 ARDUINO LEONARDO BOARD

The first development board of an Arduino is the Leonardo board. This boarduses one microcontroller along with the USB. That means, it can be very simple and cheap also. Because this board handles USB directly, program libraries are obtainable which let the Arduino board to follow a keyboard of the computer, mouse,etc.

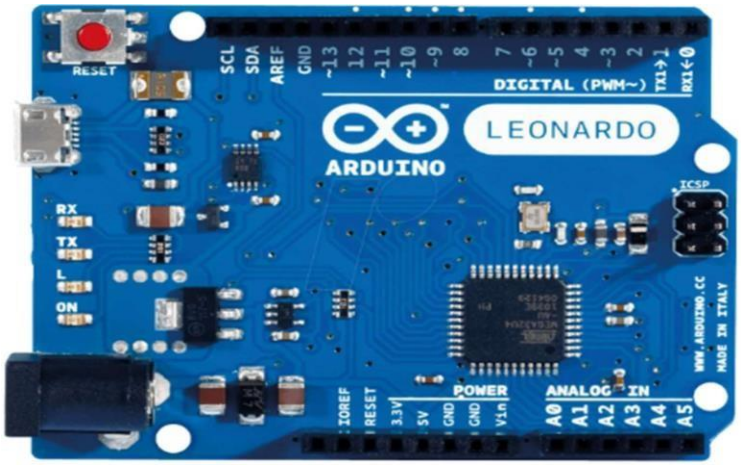


Fig 2.4 Arduino Leonardo Board

So after connecting everything together and uploading the code to arduino it takes us to the final step of this project and it is testing the doorbell so whenever you press the switch at transmitter end the BUZZER on the receiver end will start making sound. So finally our doorbell is ready up and running and you can make a PCB of this project and put it in a enclosure box and put iton your door.

2.5 COMPONENTS REQUIRED

For Transmitter

1. 434 MHz RF Transmitter Module
2. HT – 12E Encoder IC
3. 750 KΩ Resistor
4. Push Button
5. Power Supply
6. Connecting Wires
7. Prototyping Board (Breadboard)

For Receiver

1. Arduino UNO
2. 434 MHz RF Receiver Module
3. HT – 12D Decoder IC
4. 33 KΩ Resistor
5. Small Buzzer
6. Power Supply
7. Connecting Wires
8. Prototyping Board (Breadboard)

ARDUINO UNO

The Arduino Uno is an open-source micro controller based on the MicrochipATmega328P microcontroller and developed by Arduino. 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 Arduino Uno is an open-source micro controller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc The boardis equipped with sets of digital and analog input/output (I/O) pins that maybe interfaced to various expansion boards (shields) and other circuits.

BREAD BOARD

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals intothe holes and then making connections through wires where appropriate.

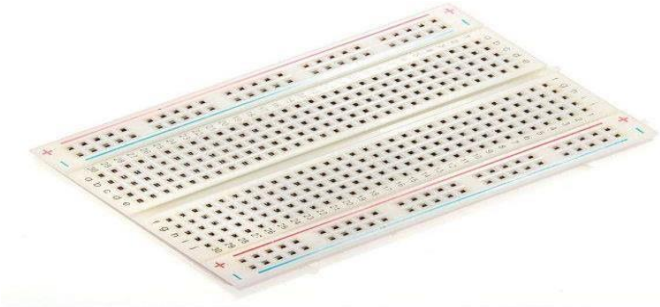


Fig 2.5.2 Bread Board

RF TRANSMITTER – RECEIVER MODULE

The wireless communication in this project is implemented using RF Transmitter – Receiver pair. A 434 MHz RF Transmitter – Receiver Moduleis used in this project. Up to 500 feet or 150 meters of distance can be possiblewith this module.

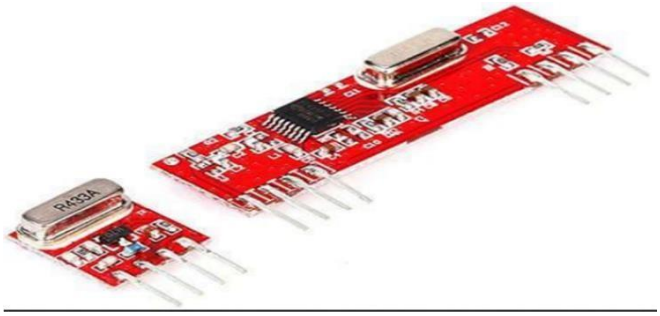


Fig 2.5.3 RF Transmitter

BUZZER

A **buzzer** or beeper is an audio signaling device, which may be mechanical, electromechanical, orpiezoelectric (piezo for short).

Fig 2.5.4 Buzzer

HT – 12E ENCODER IC

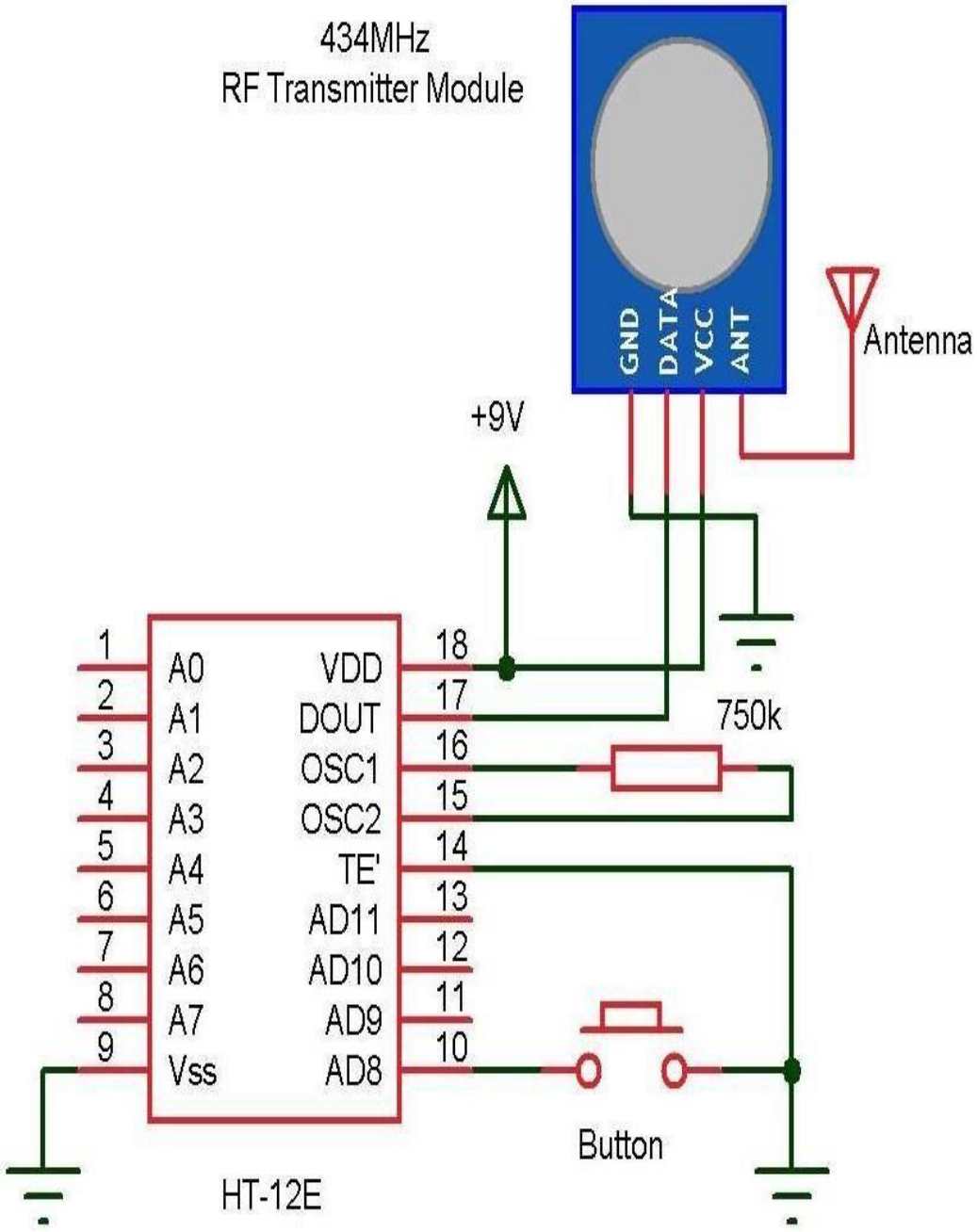
HT – 12E Encoder IC is often used with the RF Transmitter Module.The Encoder IC converts the parallel data from its input to serial data for the RFTransmitter module to transmit.

Fig 2.5.5 HT-12E Encoder IC

HT – 12D DECODER IC

HT – 12D Decoder IC is the counter part of the Encoder IC. It is often used with RF Receiver Module. The RF Receiver receives the serial data from the RF Transmitter. The Decoder IC takes this serial data and converts it back tothe parallel data.

CIRCUIT DIAGRAM



CHAPTER 3

DESIGN METHODOLOGY

DESIGN OF TRANSMITTER CIRCUIT

The transmitter consists of a 434 MHz RF Transmitter Module, HT – 12E Encoder IC, 750 KΩ Resistor and a push button. The design of the transmitter circuit is very simple. Pins 18 and 9 are connected to supply and ground terminals respectively. The data out pin (Pin 17) of HT – 12E is connected to data pin of the RF Transmitter Module. A 750 KΩ is connected between the oscillator pins (Pins 15 and 16) of the HT – 12E. The transmission enable pin (Pin 14) is connected to ground. A push button is connected between AD8 (Pin 10) and ground. Other connections are shown in the circuit diagram.

DESIGN OF RECEIVER CIRCUIT

The receiver part of the project consists of 434 MHz RF Receiver Module, HT – 12D Decoder IC, 33 KΩ Resistor, Arduino UNO and a small buzzer. Pins 18 and 9 i.e. VDD and Vss pins are connected to supply and ground terminals respectively. The data in pin (Pin 14) of the decoder IC is connected to the data pin of the RF Receiver Module. A 33 KΩ Resistor is connected between the oscillator pins (Pins 15 and16) of the decoder. The D8 pin (Pin 10) is connected to Pin 2 (or any digital I/O pin) of Arduino UNO. A small buzzer is connected between pin 11 of Arduino and ground.

CHAPETR 4

WORKING PRINCIPLE

The aim of this project is to design a simple wireless doorbell. The working of the project is explained here. For explaining the working of the project, all the connections are made as per the circuit diagram. Make sure that the Transmitter Part of the Project is switchedon before the Receiver Part. This is to ensurethat the RF Transmitter and Receiver Modules are properly paired. In order to ring the bell (or buzzer in this case), we need to push the button on the transmitterside of thecircuit. When the button is pushed on the transmitter side, a logic '0' will be detected by the Encoder IC. The Encoder IC will transmit this data serially through the RF Transmitter Module. The transmitted data will be received by the RF Receiver Module and is given to the Decoder IC. The Decoder IC, then decodes the serial data to parallel data and transmits the Logic '0' to Arduino. In the Arduino UNO's, it is programmed such that, whenever a Logic '0' is detected by the Arduino, the buzzer is turned on. Hence, whenever the button ispressed, the buzzer is turned on wirelessly.

CHAPTER 5

RESULT AND CONCLUSION

We conclude that this automatic wireless doorbell is used for security purpose. It can be used not only in house hold but also in public places. This project can be really beneficial because it's not always the case that a person can reach the doorbell, so it would be nice if it rings automatically after detecting the person. As we know that ultrasonic sensors are used for distance measurement without physical contact for small distances. So it's the best thing to use ultrasonic sensor for detecting object.

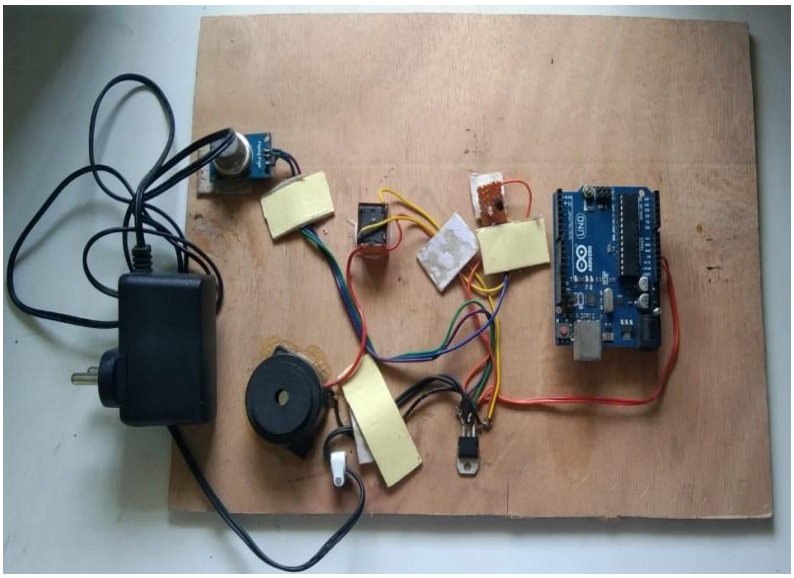


Figure 5.1: Virus Protected Automatic Doorbell

CHAPTER 6

CONCLUSION AND FUTURE WORK

In conclusion, the development of a virus-protected automatic doorbell system represents a significant step forward in ensuring public health and safety, particularly in the context of the ongoing challenges posed by contagious diseases.

Through rigorous testing and validation, we have demonstrated the effectiveness of our design in minimizing the risk of viral spread while maintaining convenience and functionality for users. In future,Implement remote monitoring and management capabilities would enable users to track the status of the doorbell system and receive alerts or notifications, enhancing convenience and peace of mind. Continued vigilance and adaptability will be essential to address evolving threats posed by new viruses and pathogens. Future iterations of the system should be designed with flexibility in mind to accommodate emerging challenges.

CHAPTER 6

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