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REMARKS

Air Conditioner On/Off using Arduino

Abstract

This Air conditioner on/off project using an Arduino describes an Arduino-based system that is used to control an air conditioner operations as a remote operator does. Using Arduino microcontroller and an IR (Infrared) transmitter, users can easily turn the air conditioner on or off via the user's computer. The Arduino decodes the IR signals got from the IR receiver at primary stage and sends the appropriate commands to the air conditioner. This low-cost, efficient solution enhances comfort and energy savings by providing convenient remote control over air conditioning units.

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Chapter 1: Introduction

1. Definition:

This project is about turning the Air Conditioner on and off by using the Arduino-UNO. Here we tried to make a remote control of the Air Conditioner from our computer. It will work just as the remote of the AC where we will give command from PC's Serial Monitor in Arduino IDE software. Suppose you are working on your PC when the AC is turned on, now you are feeling cold and you aren't able to find the remote. In this type of situation this project can be useful. Not just for Air Conditioner, it also can be used for other remote controlled objects as Television those objects receives IR signals.

2. Scope:

The main scope of this project is to controlling the Air Conditioner without any physical remote control. This Air Conditioner on/off project is a really useful project for those peoples who are busy with their PC and always gets into it. Because the Air Conditioner can be controlled by PC or laptop with the help of IR sensors. With the help of this a person didn't need to search for the remote control in between busy schedule. Though it's made for only turning on and off the Air Conditioner, but it is possible to extend it features.

3. Importance:

Using an Arduino to control the on/off function of an air conditioner can have several benefits, depending on the context and application. Here are some key reasons why this can be important and also if we extend some features what benefit we can have:

3.1. Energy Efficiency:

i. This project can be an Energy efficient work as it is controlled by the PC. That means if a person feel that the room is in lower temperature and much cooler he can turn it off while working in the computer.

ii. Sometimes we forget to turn off the AC that make energy loss. But if it is connected to our PC via Arduino, we can turn it off while we stop working and go outside the room.

iii. This project is not based on automatic Air Conditioner control, but with the help of Arduino and some given temperature range, it can prevent overcooling or overheating the room space. That also improve the energy efficiency.

3.2. Comfort and Convenience:

i. By this system, we can control our air conditioner by the help of the PC as remote control. This allows us to turn on or off the Air Conditioner and ensuring a comfortable environment when sitting in the room. A person just need to use the IR transmitter towards the Air Conditioner straight enough to send the Infrared signal properly to execute the command.

ii. We also can make a programmed schedule for the system by which the Arduino can turn on/off the Air Conditioner automatically at specific times.

3.3. AC Protection:

This remote operation from Arduino can protect the Air Conditioner in case of Overheating and other internal issue. Sometimes our Air Conditioner can have various problems in its inner system because of continuously being used. We can turn off the AC in this type of situation. By watching the Serial Monitor whenever the temperature show irregular activity, we can turn off the Air Conditioner.

Chapter 2: Design

1. List of Equipment's:

For this Air Conditioner on and off project, we need some basic equipment's. Here we are doing two different and small circuits.

1.1. Value Receiving Equipment's:

One is for receiving some values from the Air Conditioner Remote that will help up to have the specific value for which the AC is turned on and off. Here we are using:

i. IR Receiver(3 pin) - 1
ii. Arduino UNO - 1
iii. Bread Board - 1

1.2. Signal Transmitter Equipment's:

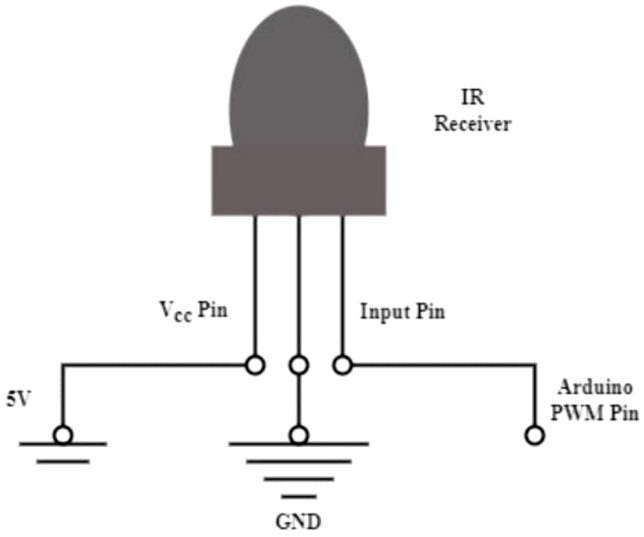
In between two circuit, the other circuit is for IR signal transmission. The value signals gained from the receiver will transmit through this circuit and work as remote. For this circuit, equipment's we used:

i. IR Transmitter(2 pin) - 1
ii. Resistor (470 ohm's) - 1
iii. Arduino UNO - 1
iv. Breadboard - 1

2. Circuit Diagram:

For this project we used two different Circuits. One for value receiving and one for value transmitting.

2.1. Data Receiving Circuit:



"Fig 2.1: IR Receiving Circuit"

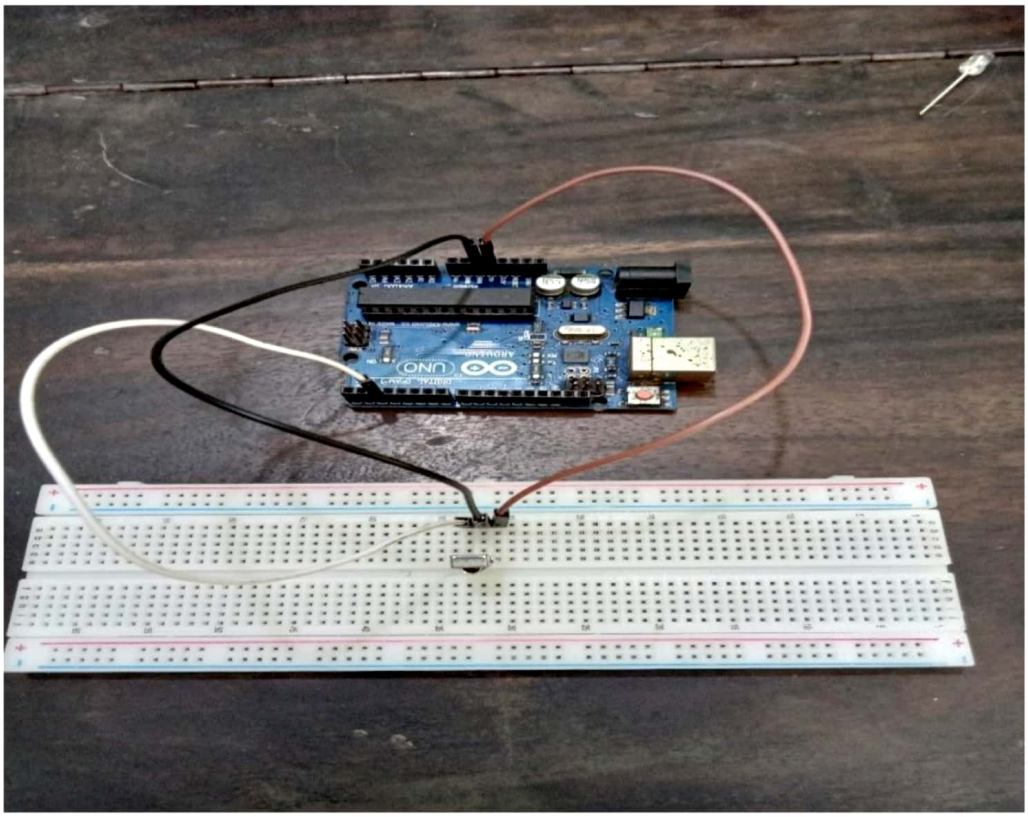


Fig 2.2: IR receiving circuit implementation.

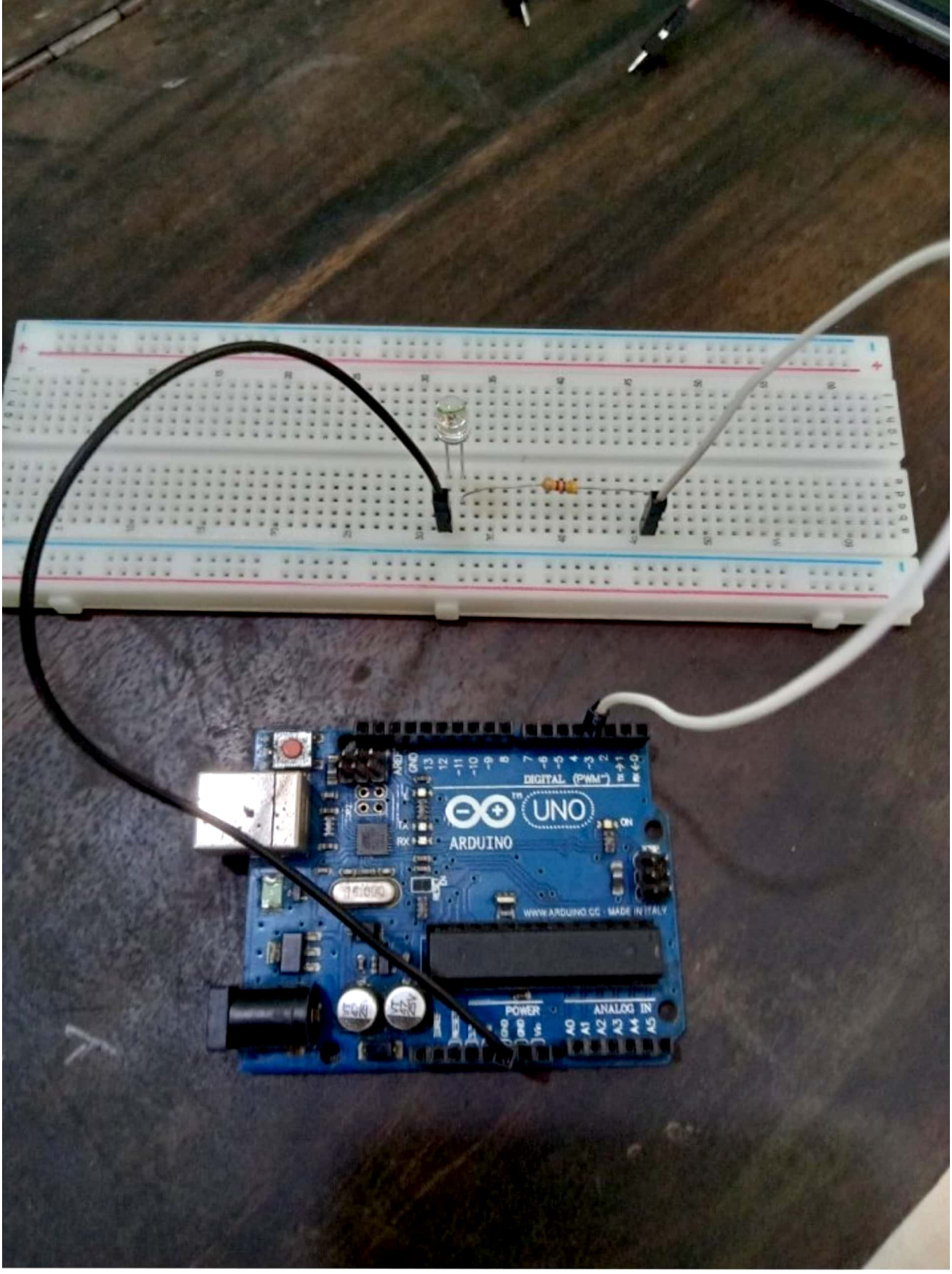


Fig 2.4: IR Transmitting Circuit Implemation

3. Flowcharts:

This project carries two process flows. Here we will show the flowcharts for both data receiving and transmitting circuit.

3.1. Data Receiving Circuit Flowchart:

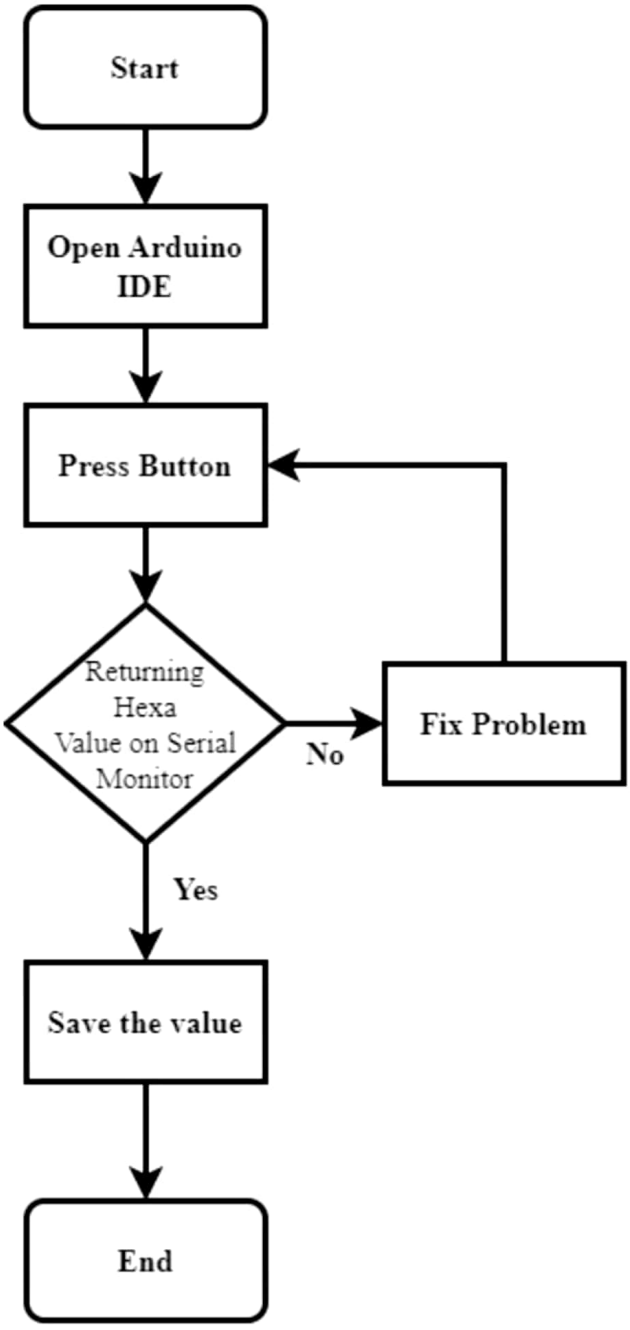


Fig 2.5: Flowchart for data receiving circuit

3.2. Data Transmitting Circuit Flowchart:

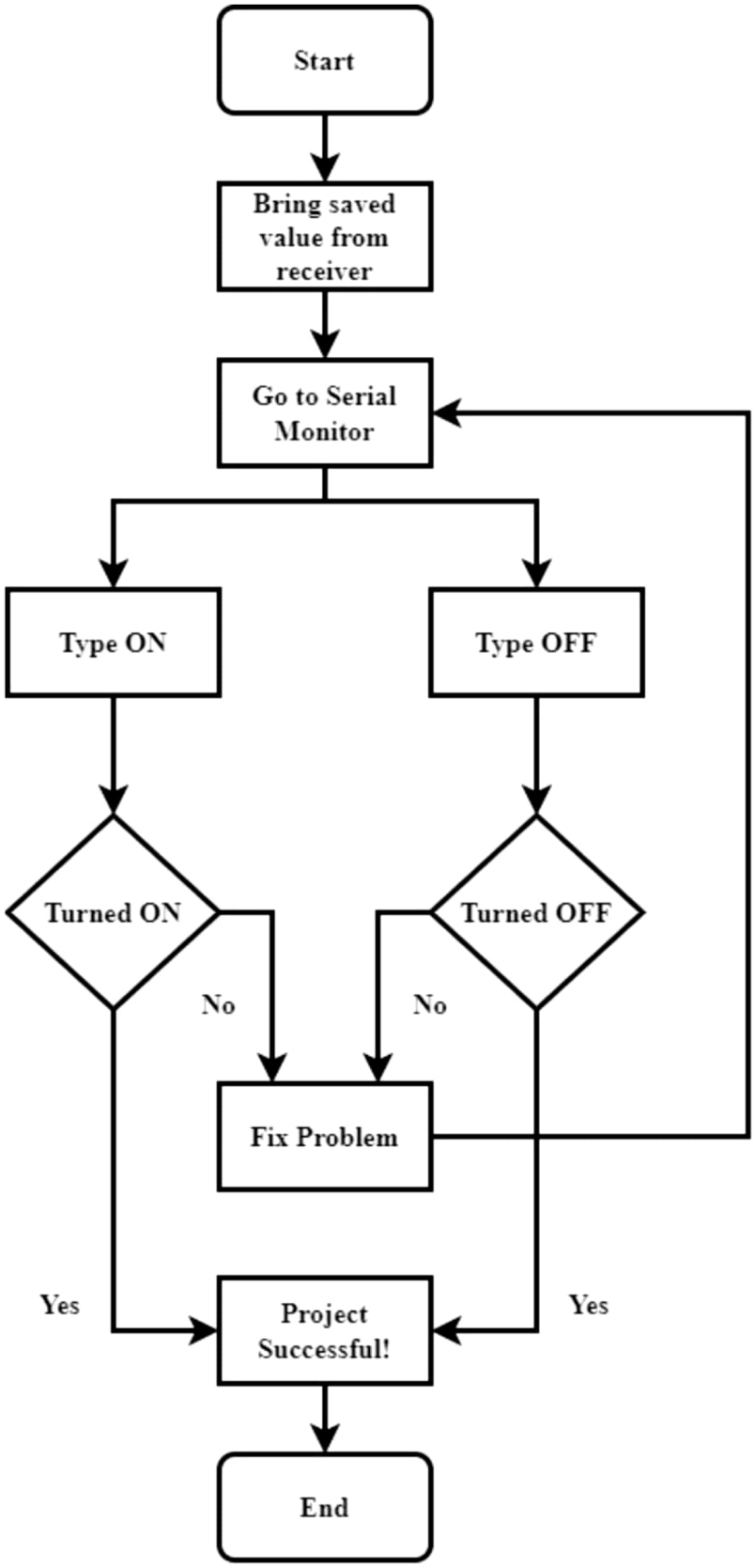


Fig 2.6: Flowchart for data transmitting circuit.

Chapter 3: Results

1. Testing/Result:

The outputs we get to see in this project are as follows:

1.1. Data Receiving Procedure:

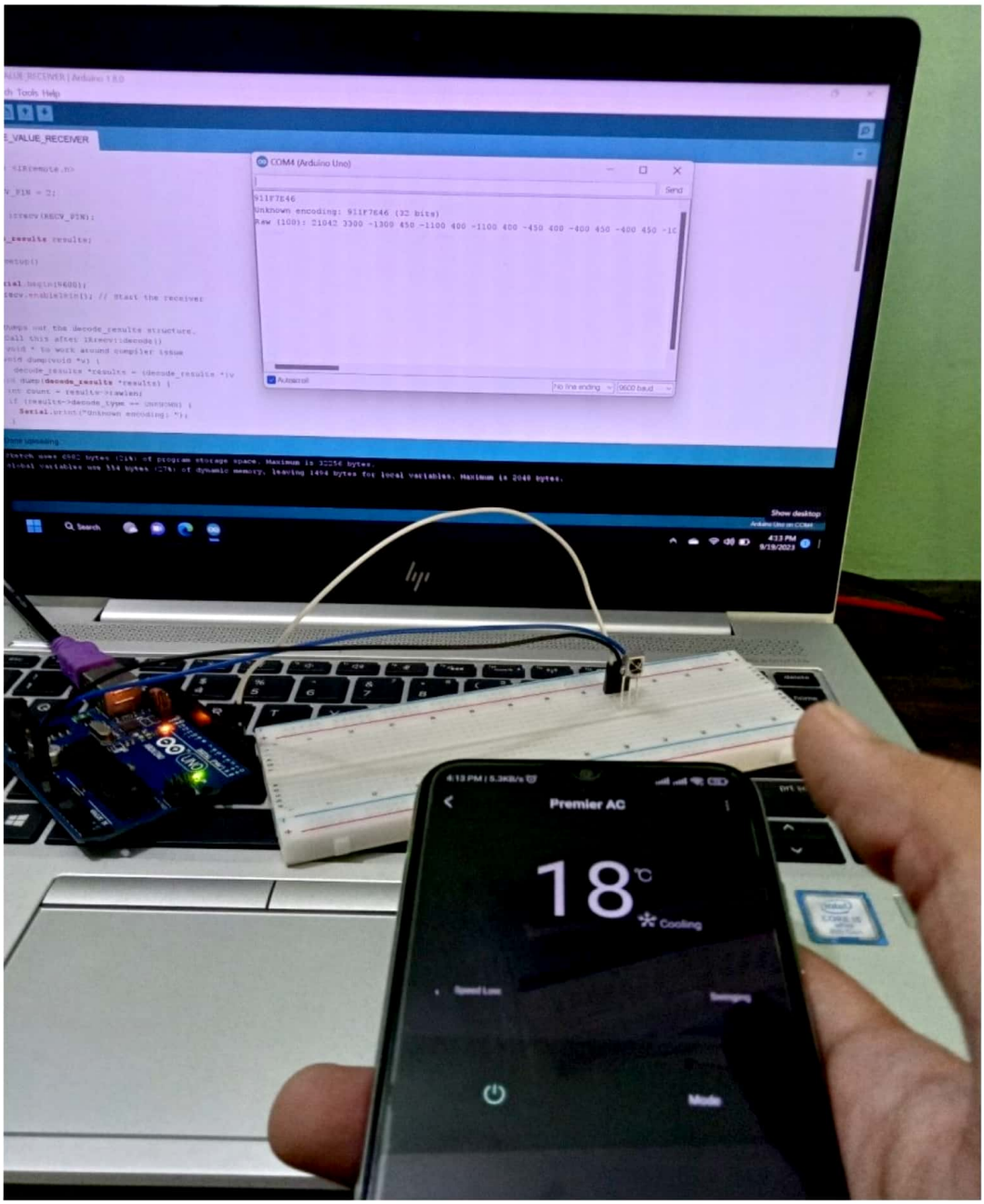


Fig 3.1: turn on value receiving from mobile remote

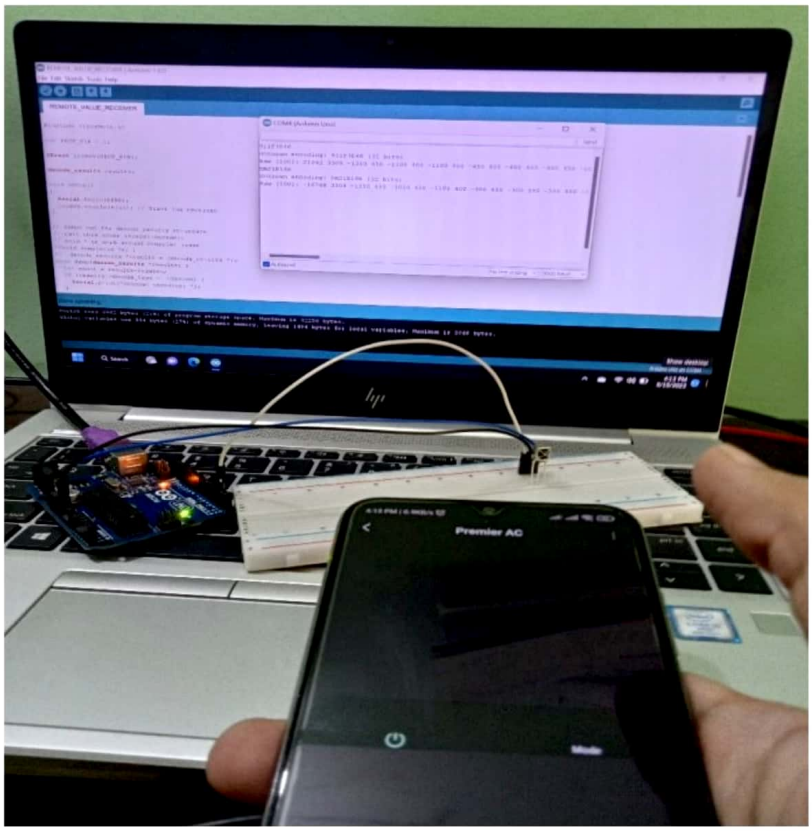


Fig 3.2: turn off value receiving from mobile remote

1.2. Data Receiving Output:

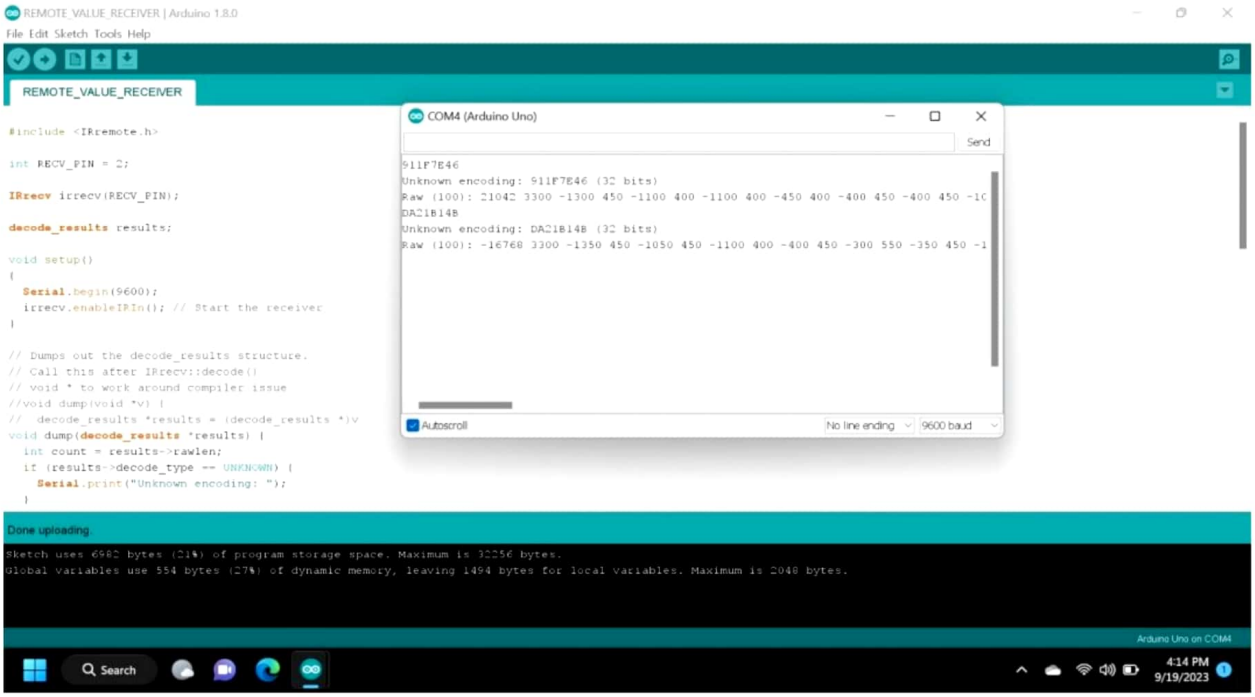


Fig 3.3: turn on and off values in serial monitor (Hexa and Bit value)

1.3. Data Transmitting Procedure:

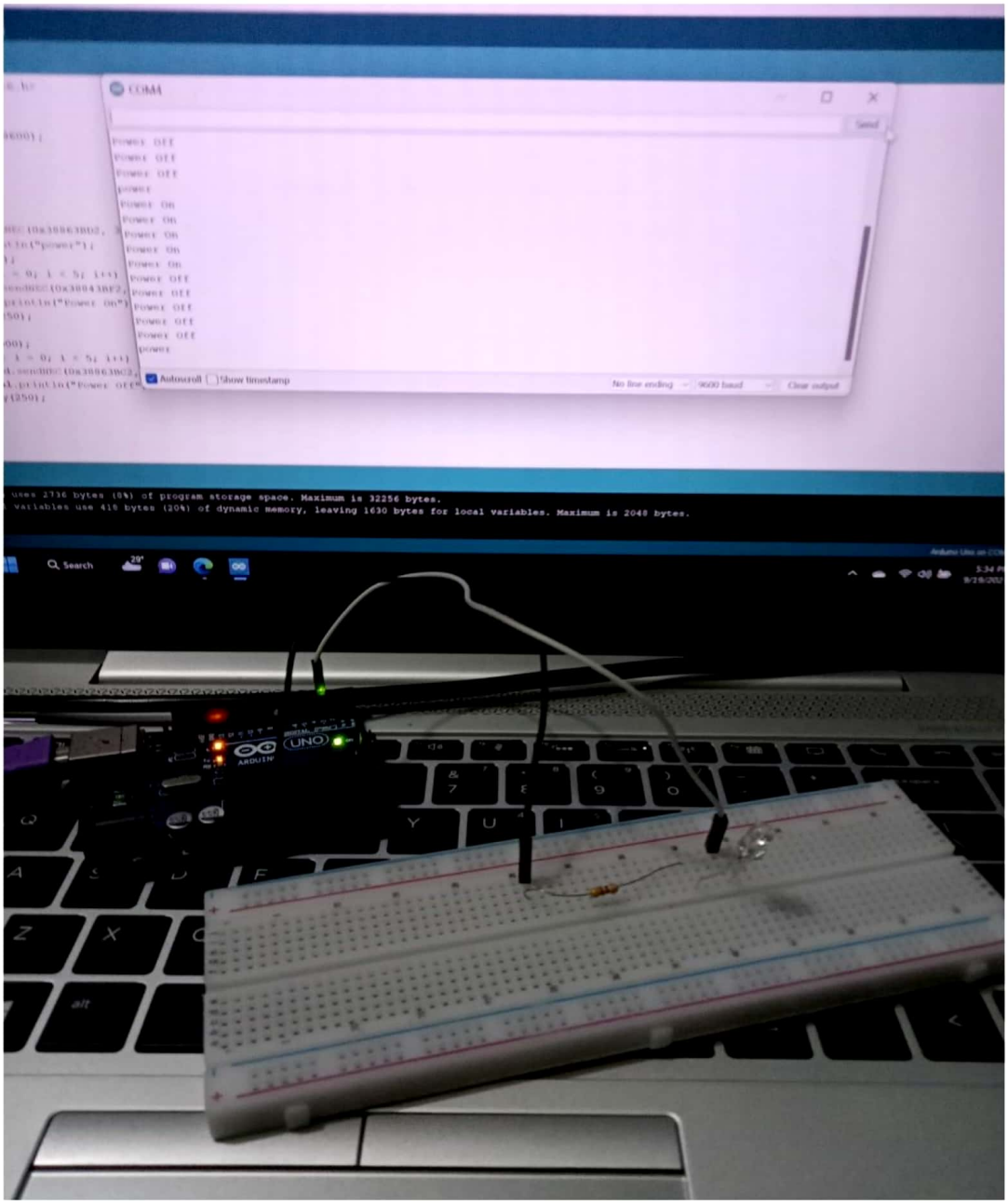


Fig 3.4: Giving ON and OFF instruction command in serial monitor

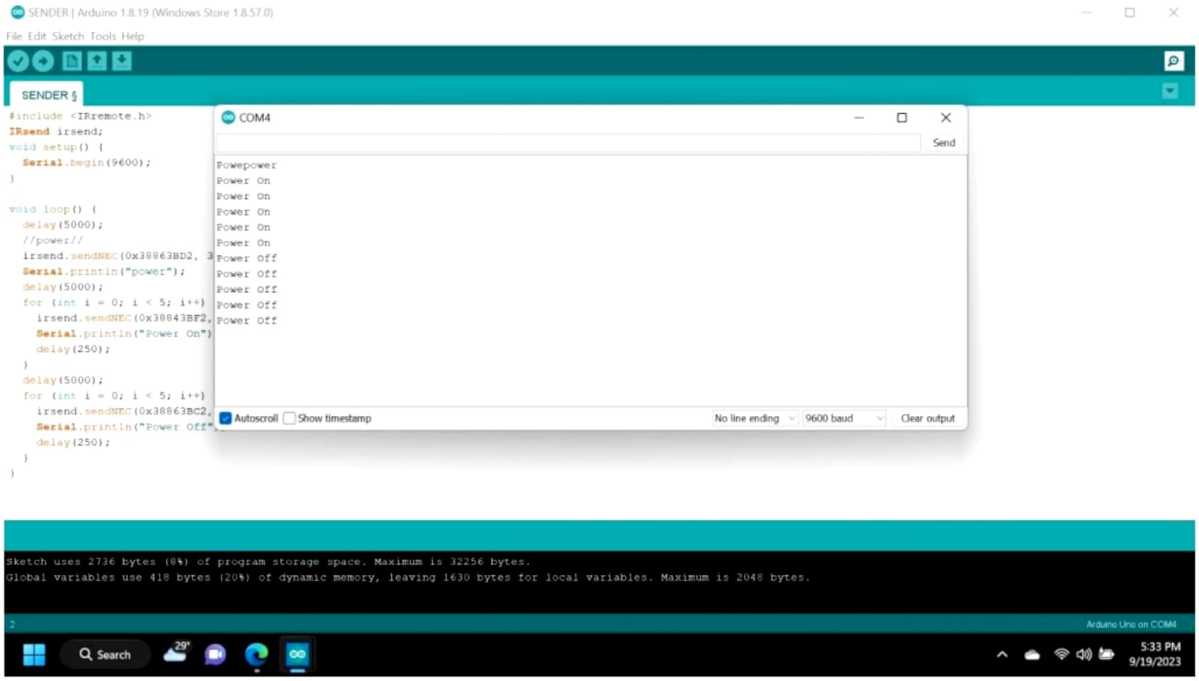


Fig 3.5: Serial Monitor view

1.4. Data Transmitting Output:

2. Analysis:

From the first circuit where we used IR receiver. We used the circuit as a preliminary step in our project. Here after building the circuit and connectiong it with Arduino IDE by the port, whenever we press a button on the normal Air Conditioner Remote or mobile remote it showed a bit value and its hexa value as shown in the Result data receiving output “figure 3.3” with the help of data receiving procedure shown in “figure 3.1” and “figure 3.2”. For each button in the remote it will show different values. Then we stored all the value by the help of receiver in a note.

After gaining all the values we need, we created the transmission circuit by using IR Transmitter. In this circuit we put the saved value on Arduino with the help of source code. Now, when we give command “ON” / “OFF” in the serial monitor, the transmitter send the signal value for these commands what we gained from the receiver. Then the circuit is turning on and off as shown in “figure 3.3” and “figure 3.4”.

Chapter 4: Conclusions

1. Conclusion:

This Air conditioner on and off project was a difficult and useful project. Although it was a small project. It took us too much hard work to understand it. Its circuits were created with two basic circuit of IR receiving and IR Transmitting circuit. But the code segment was hard to understand. We were successful to had result in receiving circuit were we got the values from the remote control of Air Conditioner. But the transmission process isn't done for some unknown issue. We are trying to complete the project successfully by receiving and transmitting values and turn on/off the Air Conditioner.

2. Future Enhancements:

This project can be enhanced by adding some other features as we represented earlier. Our Project was to turn on and off the Air Conditioner. But it is possible to do other staffs that probably even cannot be done by remote control. Some key features we can increase are:

2.1. Temperature Control:

By the help of the temperature sensor and digital display, controlling the AC temperature can be further more upgraded to maintain temperature.

2.2. Voice Control:

Set a voice recognition module with the Arduino cen make a voice controlled AC. It will allow the user to command the Air conditioner with human voice and some specific voice command strings.

2.3. Mobile Remote:

Creating a web base remote and connecting it with your smartphone is the most upgraded form of AC controlling. Some of these smartphone remotes can control the AC from distance.

2.4. Energy Tracking:

By adding energy monitoring sensors to track power consumption can display real-time energy usage and calculate estimated costs. This information can help users to learn how much energy the Air Conditioner is consuming.

2.5. Smart Scheduling:

Develop a smart scheduling system can help the user in many ways. As when the user probably be outside that time can be scheduled to turn off the AC. It is mainly a routine that will control the AC on/off timing.

2.6. Humidity Control:

Add humidity sensor (DH11) to maintain indoor humidity. High humidity can make a room feel warmer, so controlling both temperature and humidity is essential for comfort.

2.7. Emergency Turn Off:

Implement safety features like an emergency shutdown in case of overheating or other critical issues. This ensures the system doesn't operate in risk situations.

2.8. Depend on weather:

This feature is to understand and receive the weather forecast. Base on that information the AC automatically can switch temperature or turn on/off.

❖ References:

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2.3. https://github.com/Grensom/IR-Project/blob/master/IR_REMOTE_send.ino