VISVESVARAYA TECHNOLOGICAL UNIVERSITY

MINI PROJECT REPORT ON

"USING TV REMOTE AS A CORDLESS MOUSE FOR THE COMPUTER"

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NEW HORIZON COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

Certified that the mini project work entitled "**USING TV REMOTE AS A CORDLESS MOUSE FOR THE COMPUTER**" carried out by **Poornima R.M (1NH18EC086), MADALA BHANU PRAKASH (1NH18EC064), Sneha N.S. (1NH18EC106), Vutukuri Gowtham (1NH18EC122),** bonafide students of Electronics and Communication Department, New Horizon College of Engineering, Bangalore.

The mini project report has been approved as it satisfies the academic requirements in respect of mini project work prescribed for the said degree.

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Assistant Professor, Dept. of ECE,	HOD , Dept. of ECE,
NHCE, Bengaluru.	NHCE, Bengaluru.
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External Viva

Name of Examiner Signature with Date

1.

2.

ACKNOWLEDGEMENT

The satisfaction that accompany the successful completion of any task would be, but impossible without the mention of the people who made it possible, whose constant guidance and encouragement helped us succeed.

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ABSTRACT

The project represents how your PC/Laptop can be controlled from with your T.V remote with the help of Aurdino micro & an IR sensor. It means the conventional PC mouse operations can be controlled by using T.V Remote. It turns your Remote into a wireless mouse and don't need any surface. It requires an Arduino software application on your computer/PC. This is an implementation of TV remote on an Arduino micro. The received code is decoded and sent to the PC IR remote software written in Visual Basic. The cursor position is moved according to the keys pressed. The convenience of selecting in the Computer/PC screen using your remote and then pointing the same remote to your Computer so that you can control the whole system using the single remote control. An integrated Infrared Receiver is used to receive the infrared signal from the remote-control handset. The received infrared signal was decoded by using the program, which was written in the software application.

CHAPTER 1

INTRODUCTION

A typical TV remote sends coded infrared data that is read by an IR sensor duly interfaced to a Arduino and then to the com port of a PC.

This IR code is traditionally RC5 code as followed by remotes.

The same data is then burnt to a Arduino the output of which shall drive desired operation through serial port connection as conventionally performed by the PC Mouse.

Up - down, right - left buttons of the TV remote can be used for as similar operation to that of a mouse and remotely thus achieving the same function.

IR, or infrared, communication is a wireless communication technology that is popular, inexpensive, and simple to use. IR light, except that it has a slightly longer wavelength, is very similar to visible light. This means that the human eye is undetectable by IR - ideal for wireless communication.

When you press a button on your TV remote, the basic concept of this project is that we can decode it using an IR receiver and an Arduino, and the decoded values can be used to perform various keyboard operations.

Since it is based on the Arduino micro. ATmega32U4 with a built-in USB that makes the Micro recognizable as a mouse or keyboard, I used Arduino Pro Micro. You can use Leonardo's Arduino, too.

ARDUINO

Arduino is an open source programmable board. It is very easy to use and powerful signal board that has gained traction in the professional market. These boards are able to read inputs-through sensor, finger on button or a message. And these boards turn the input into an output by activating a motor, turning on an LED ,publishing something online .

Arduino boards are physical programmable board that are used for flexible programming signal types and are easily adapted in the existing installation which offer many benefit to world

ARDUINO APPLICATION:

1.They are playing very important role in many disciplines today.

2. They are used in smart homes.

3. Used in defence.

4. They are part of Industries.

5. Used in traffic signal control

6.medical and laboratories

Advantages of Arduino technology:

1. It is low cost board.
2. It's an open supply hardware feature which permitts users to develop their own kit.
3. It allows developers to use the Arduino code to merge with the prevailing programming language libraries.
4. It is very simple for beginners.

CHAPTER 2

LITERATURE SURVEY

Title of the paper	Author & Year of Publication	Outcome	Limitation
The social design for technical systems	Adnan Ahmad, brian whitworth, 2014	It uses internal power supply	The TV remote available in market is not good enough, so sometimes it may be needed to press a button repeatedly
Information communication technologies for enfance éducation	Lawrence A, Tomei, 2009	IR communication	It depends on IR receiver

CHAPTER 3

EXISTING SYSTEM AND PROBLEM STATEMENT

Existing System:

- In this project, we can deal with the usage of TV remote, Arduino micro and TSOP 1738 for the computer.
- As a personal computer mouse is connected to the system, one has to be seated near the PC to work on it. To avoid this, we are making this project to make our daily life simple

Problem Statement:

- The main goal of the project is to control mouse cursor with TV remote.
- This is done with the implementation of TV remote on an Arduino micro. Here the IR receiver is connected to Arduino micro & it's connected to the computer through USB port.

Objectives:

- It operates PC/laptop/computer from our living room using with keypad inputs of T.V remote.
- It allows a power button as well as a switch or series of buttons to select which device the remote is controlling at the moment.

CHAPTER 4

PROPOSED METHODOLOGY

- The project deals with the usage of TV remote and an Arduino micro for the computer.
- A usual PC or laptop uses a mouse/keyboard to function and manage all its applications.
- As a personal computer mouse is connected to the system, one has to be seated near the PC to work on it.
- This becomes very tedious when the PC is used for presentation purposes.
- A typical TV remote sends coded infrared information that is read by an IR sensor which is interfaced.

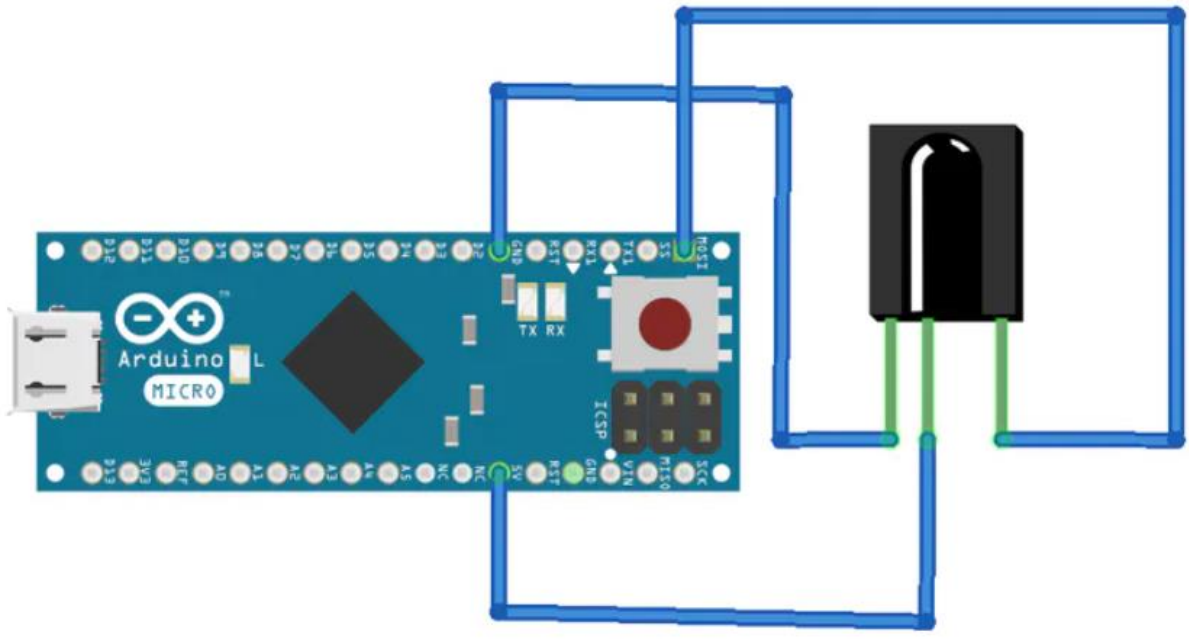

Fig: 4.1 – circuit

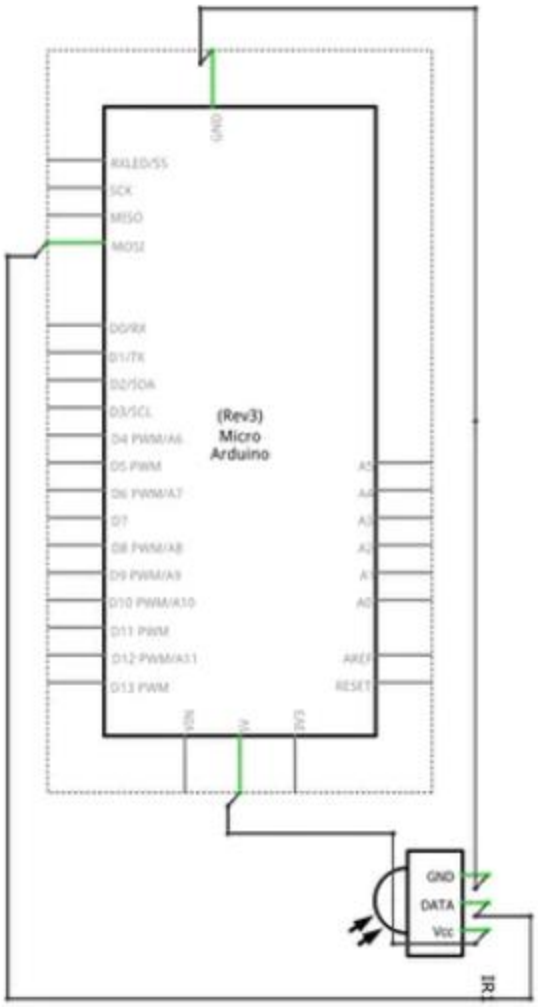

Fig: 4.2 - circuit

Working:

First, we have to find the code of each button (Remote button).

To find the code we need to upload the demo code to the Arduino and find the codes of each button and note them.

Install the irremote library first and open the democode of irremote library.

To open it

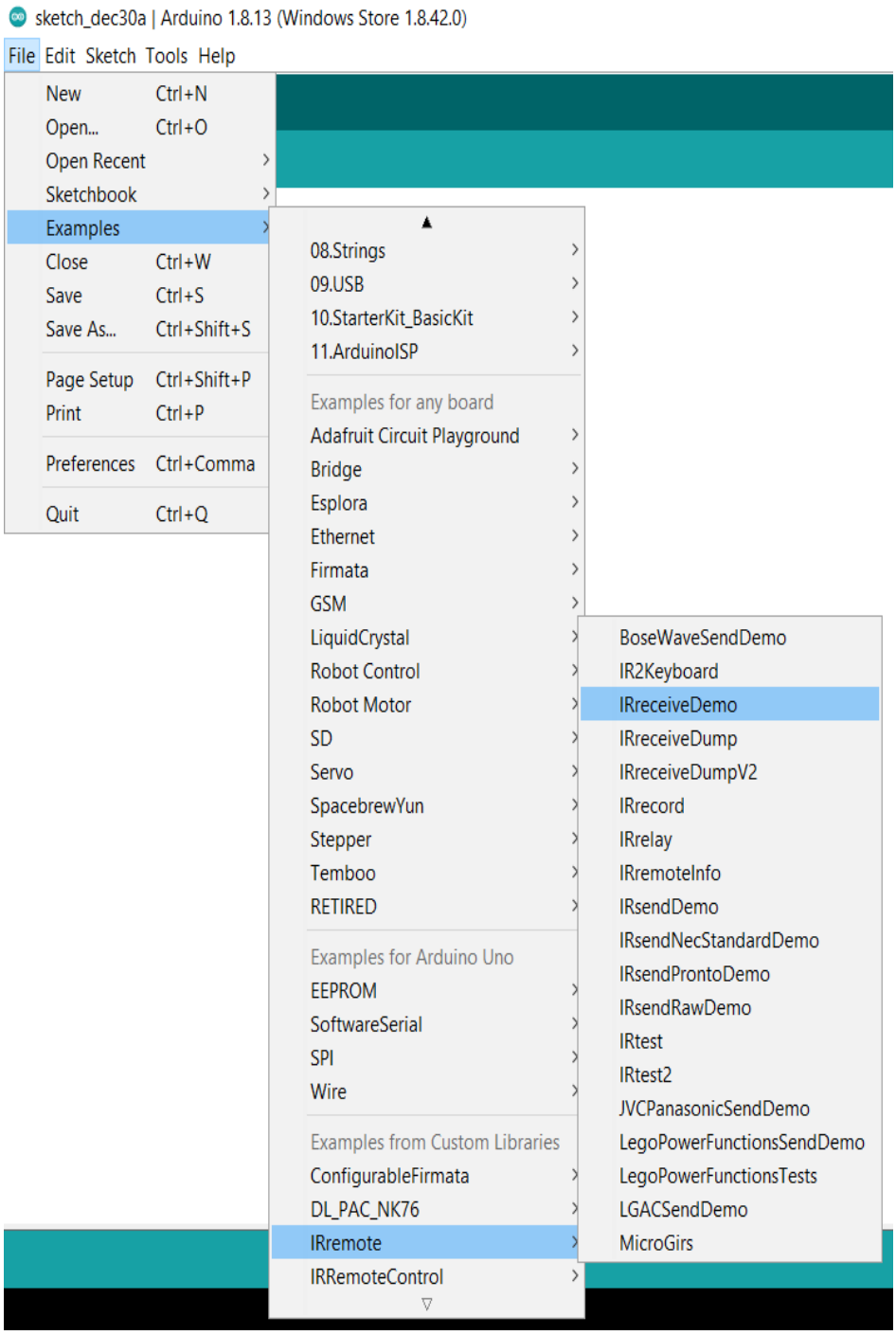

Fig: 4.3 -

Upload the code:

After uploading the code. open the serial monitor and press each button on the remote and note the code which is displayed in serial monitor for each button.

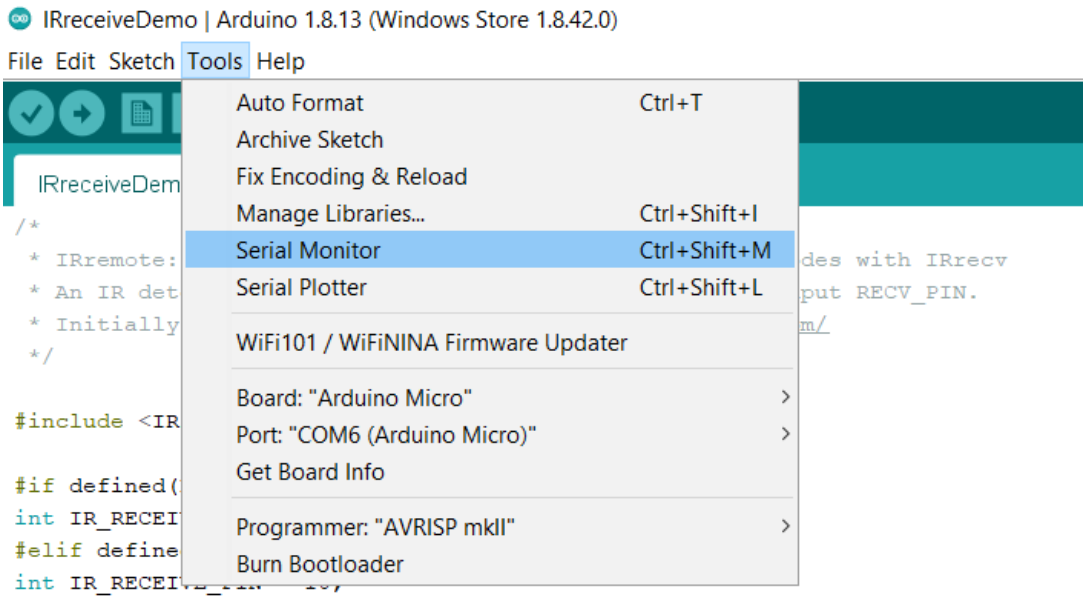

Fig:4.4 -

After noting all the codes now assign one -one operation to each button.

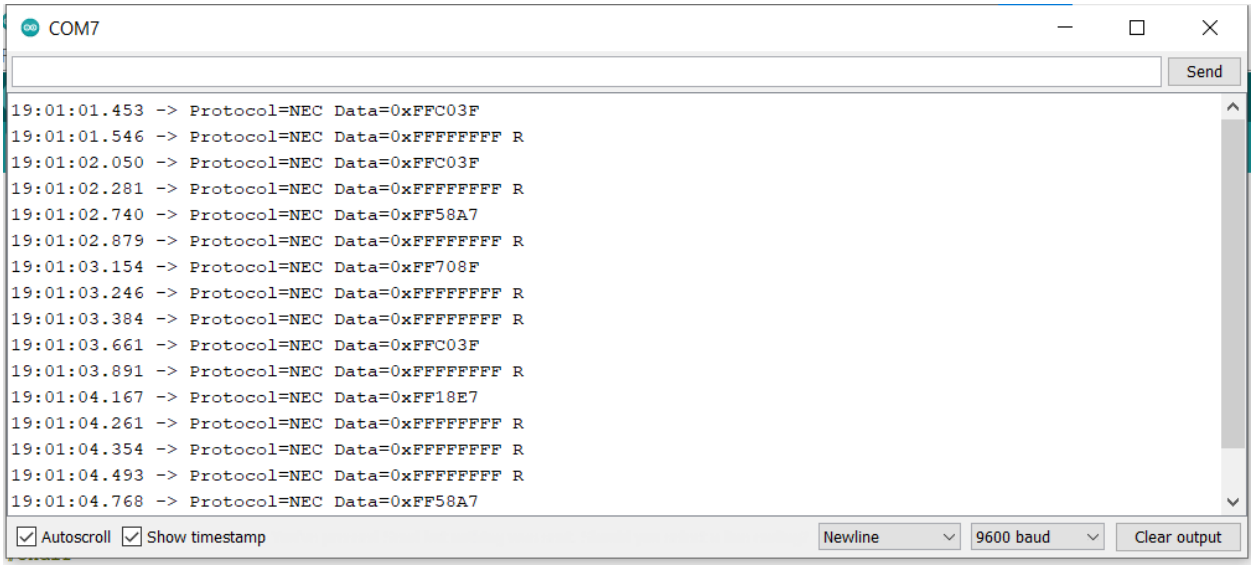

Fig:4.5 -

The 6 digits after “0x “is the code of the button we pressed.

To assign the function the code for each function is:

For assigning password to unlock the device:

Keyboard.print("P@@sW0rD"); // add your PC's Password here

Keyboard.press(KEY_RETURN); //Enter Key delay(100);

Keyboard.releaseAll(); break;

Here the password should be written with in the brackets .and assign for a particular button using case condition.

- The code for left key operation is:

Keyboard. press(KEY_LEFT_ARROW); //left key

delay (100);

Keyboard.releaseAll();

break;

the code will be assigned to a particular button using case condition.

In the same way the codes for right,up,down key operations are

- KEY_UP_ARROW
- KEY_RIGHT_ARROW
- KEY_DOWN_ARROW

- For funtions like paste,copy the codes are:

//Select all operation(Ctrl+a)-1st key

Keyboard.press(KEY_LEFT_CTRL); //Ctrl key

Keyboard.write(97); // ascii value of 'a' is 97

delay(100);

Keyboard.releaseAll();

break;

```
//Copy Operation(Ctrl+c) -4th key
Keyboard.press(KEY_LEFT_CTRL);          //Ctrl key
Keyboard.write(99);                     //ascii value of 'c' is 99
delay(100);
Keyboard.releaseAll();
break;
//Paste Operation(Ctrl+v)-7th key
Keyboard.press(KEY_LEFT_CTRL);          //Ctrl key
Keyboard.write(118);                    //ascii value of 'v' is 118
delay(100);
Keyboard.releaseAll();
break;
```

- For Mouse operation we use the code:

- Mouse.click(MOUSE_LEFT);
- Mouse.click(MOUSE_RIGHT);
- Mouse.move(0, -range, 0);
- Mouse.move(-range, 0, 0);
- Mouse.move(range, 0, 0);
- Mouse.move(0, range, 0);

After assigning the codes to each button .upload the code and verify.

To verify:

Press the particular button to check the function and working .

When a particular button is pressed

The ir receiver receives the command or code of the button.

The arduino will do the futions which was assigned to the pricular button code and the function will take place.

- This project uses an IR receiver such as TSOP1738 that responds to only specific frequency of 38KHz.
- A standard TV remote that delivers the infrared codes at 38KHz is this received by the TSOP receiver feeding a data so emitted from the remote to the controller through receiver.
- The program is so returned that it recognises the data relating to a particular number being pressed at the remote.
- Here the channel ON & OFF buttons and volume low to volume high buttons of the TV remote buttons are used for sending the specific data.

When we press the power button the password will be entered and the lock will be opened for the computer.

- When we press the volume + button the mouse curser moves right.
- When we press the volume - button the mouse curser moves left.
- When we press the channel + button the mouse curser moves up.
- When we press the channel + button the mouse curser moves down.
- When we press button 1 the action Ctrl +A takes place.
- When we press button 2 the action Ctrl +C takes place.
- When we press button 3 the action Ctrl +V takes place.
- When we press button 4 the alphabet A prints.
- When we press button 5 the alphabet B prints.
- When we press button 6 the alphabet C prints.
- When we press button 7 the alphabet D prints.
- When we press button 8 the alphabet E prints.
- When we press button 9 the alphabet F prints.

- When we press button 0 the action space occurs.
- When we press button mail the action up arrow takes place.
- When we press button remainder the action down arrow takes place.
- When we press button yellow the action right arrow takes place.
- When we press button red the action left arrow takes place.

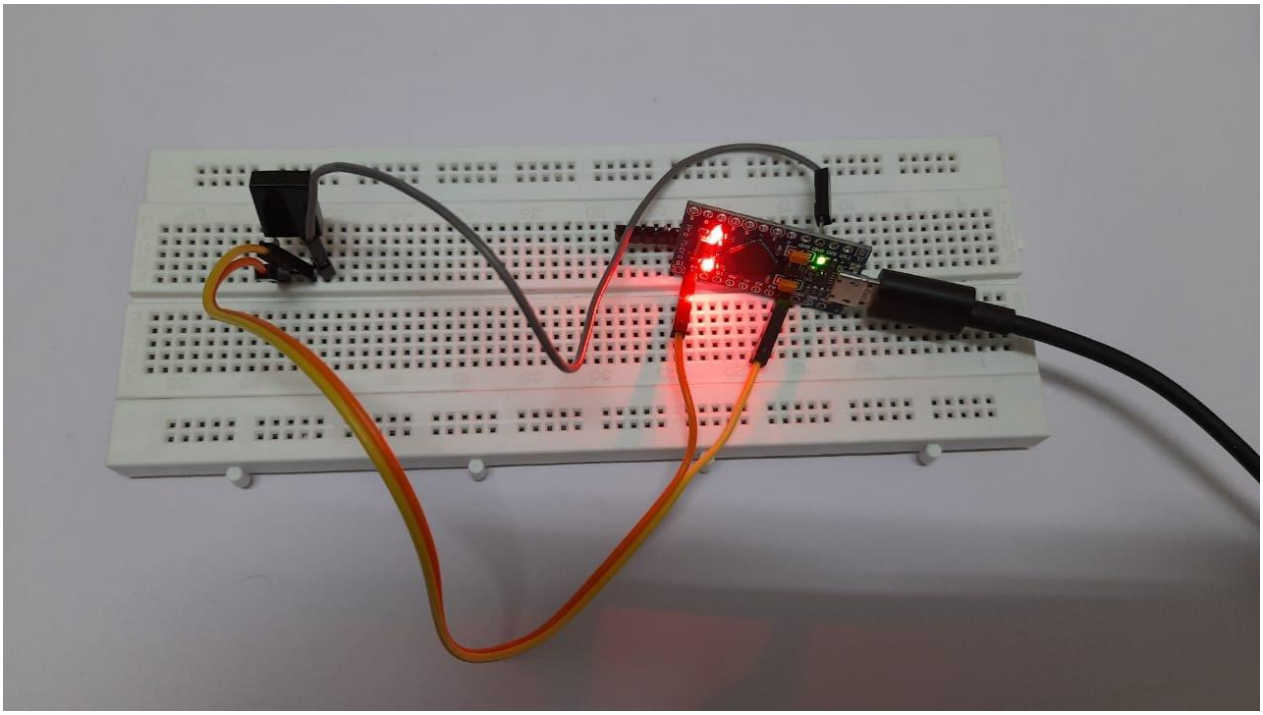

Fig:4.6 - output

CHAPTER 5

HARDWARE AND SOFTWARE SPECIFICATIONS

HARDWARE SPECIFICATION:

1. **Arduino :**

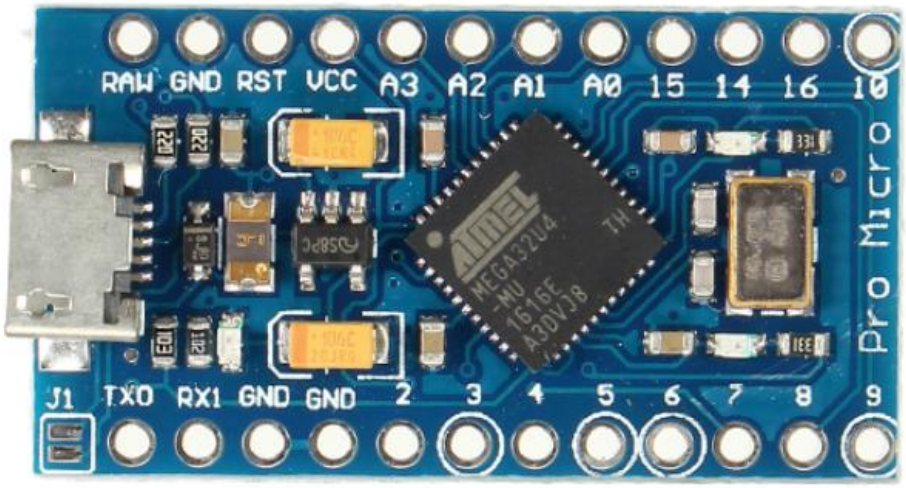

Fig : 5.1 - Arduino

Arduino is an open source business, project and user community for hardware and software that designs and develops single-board microcontrollers and microcontroller kits for digital computer construction. Its hardware products are licensed under the CC-BY-SA license, while the software is licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), which allows anyone to develop and distribute Arduino boards and software.

Usable Arduino boards are from the official website or by registered distributors, commercially. A variety of microprocessors and controllers are utilized in Arduino board designs. The boards are fitted with digital and analog input/output (I/O) pin sets which will be attached to different expansion boards ('shields') or breadboards (for prototyping) and other circuits.

On some versions, the boards feature serial communications interfaces, including Universal Serial Bus (USB), which are often used to load programs from Computers for personal use. Using the

programming languages C and C++, the microcontrollers can be programmed using a standard API that is also known as the Arduino language.

In addition to the use of conventional compiler toolchains, an integrated development environment (IDE) and command line tool (arduino-cli) built in Go are provided by the Arduino (project.-cli) built in go are provided by Arduino project. The Arduino project started in 2005 as a tool for students at the Ivrea Institute of Interaction Design in Ivrea, Italy, with the intention of providing a low-cost software. A quick and easy way for novices and professionals to build devices that use sensors and actuators to communicate with their environment. Simple robots, thermostats and motion detectors are typical examples of such devices intended for inexperienced hobbyists. The Arduino name comes from a bar in Ivrea, Italy, where some of the project's founders used to meet. The bar was named after Arduin of Ivrea, who from 1002 to 1014 was the Margrave of the March of Ivrea and therefore the King of Italy.

2. IR Receiver (TSOP1738)

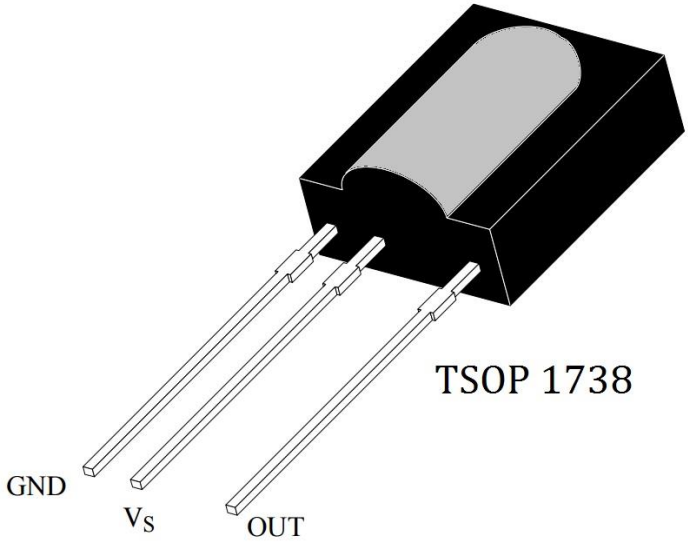

Fig : 5.2 – IR Receiver

TSOP1738 is that the standard IR remote receiver series, supporting all major transmission codes. The sensor are often used for Proximity detection application along side a IR led in robotics and security systems. It receives IR signal at 38khz frequency.

The TSOP 1738 may be a member of IR remote receiver series. This IR sensor module consists of a PIN diode and a pre amplifier which are embedded into one package. The output of TSOP is active low and it gives 5V in off state.

Pin Number	Pin Name	Description
1	Ground	Connect to the Ground of circuit
2	Vcc	Typically connect to +5v, maximum of 6V can be given.
3	Signal	The sinnal pin gives out the sequence based on the IR signal detected.

Features of TSOP 1738:

- Photodetector and preamplifier in one package.
- Internal filter for PCM frequency.
- Improved sheilding against electric field disturbance.
- TTL and CMOS compatibility.
- Output active low.
- Low power Consumption.
- High Immunity against ambient light.
- Continuous data transmission possible (upto 2400 bps).

DECODING IR SIGNAL WITH A AURDINO MICRO:

The micro follows the timing. Note that the Infrared Receiver invert the bit signal, low level means bit ON.

During inactivity (no Infrared present) the output of the Infra

can connect the IR receiver output to any input port pin or interrupt pin of our micro, and

keep polling it or prepare the interrupt routine to trigger our reading after the first low level sensed.

When we press a key at the remote, it transmits the train of pulses, and our micro will

receive bit #1 first. It will be sensed right after the middle of the bit when it changes from high to low level to means bit "1".This is the first time that your micro
signal. We don't need to decode those first two bits,
control as the TV do and described above), so we can skip those 3 bits and start to receive the ADDRESS bits. To do that, we need to skip 2.75 bits time, and we will be exactly at the middle of the right level of the first ADDRESS bit to be read.
So, upon sensing the first low level, our software should wait 3.752 milliseconds and then start to read the next 11 bits spaced 1

command, logic correct level, LOW = 0, HIGH = 1. At our bit reading routine use an available

micro port pin and generate a fast pulse UP and DOWN, then use one scope channel to display this pulse, and the other scope channel to show and hold key number ZERO at the remote, and sync the scope to show a complete wave form, don't

worry with timing. The fast 11 pulses should always be in place

figure. It means that the "bit reading" software routine will reading exactly in the middle of the correct bit level. To receive this signal using a

micro follows the timing. Note that the Infrared Receiver invert the

bit signal, low level means bit ON.

3. Jumping wires:

Fig : 5.3 – Jumping wires

A jump wire (also mentioned as jumper wire, or jumper) is an electrical wire, or group of them during a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is generally won't to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

Individual jump wires are fitted by inserting their "end connectors" into the slots provided during a breadboard, the header connector of a circuit board , or a touch of kit .

Types :

There are different types of jumper wires. Some have an equivalent sort of electrical connector at both ends, while others have different connectors. Some common connectors are:

• Solid tips – are wont to connect on/with a breadboard or female header connector. The arrangement of the weather and simple insertion on a breadboard allows increasing the mounting density of both components and jump wires without worrying of short-circuits. The jump wires vary in size and colour to differentiate the various working signals.

• Crocodile clips – are used, among other applications, to temporarily bridge sensors, buttons and other elements of prototypes with components or equipment that have arbitrary connectors, wires, screw terminals, etc.

• Banana connectors – are commonly used on equipment for DC and low-frequency AC signals.

• Registered jack (RJnn) – are commonly utilized in telephone (RJ11) and computer networking (RJ45).

• RCA connectors – are often used for audio, low-resolution composite video signals, or other low-frequency applications requiring a shielded cable.

• RF connectors – are wont to carry frequency signals between circuits, equipment , and antennas.

• RF jumper cables - Jumper cables may be a smaller and more bendable corrugated cable which is employed to attach antennas and other components to network cabling. Jumpers also are utilized in base stations to attach antennas to radio units. Usually the foremost bendable jumper lead diameter is ½.

4. Remote:

Fig : 5.4 - Remote

In electronics, a far off control or clicker is an device used to operate another device from a distance, usually wirelessly. In consumer electronics, a foreign control are often wont to operate devices like a television receiver , DVD player or other household appliance . A remote control can allow operation of devices that are out of convenient reach for direct operation of controls. They function best when used from a brief distance. This is primarily a convenience feature for the user. In some cases, remote controls allow an individual to work a tool that they otherwise wouldn't be ready to reach, as when a garage door opener is triggered from outside.

Early television remote controls (1956–1977) used ultrasonic tones. Present-day remote controls are commonly consumer infrared devices which send digitally-coded pulses of infrared . They control functions like power, volume, channels, playback, track change, heat, fan speed, and various other features. Remote controls for these devices are usually small wireless handheld objects with an array of buttons. They wont adjust to various settings like channel , track number, and volume. The remote code, and thus the specified remote device, is typically specific to a line. However, there are universal remotes, which emulate the remote made for several major brand devices.

Remote controls within the 2000s include Bluetooth or Wi-Fi connectivity, motion sensor-enabled capabilities and voice control.

5. **USB interface:**

Fig: 5.5 - USB interface

USB-Universal Serial Bus, is one of the most common interfaces for connecting a variety of peripherals to computers and providing local and small levels of data transfer.

These are found on everything from PC and Laptops to peripheral devices, mobiles, cameras ,backup hard-drives, flash memory sticks and many other devices. It is a combination of convenience and performance has meant that it is now one of the most widely used computer interfaces.

SOFTWARE SPECIFICATION:

1. **Arduino Software**:

Arduino is an open-source gadgets stage upheld simple to-utilize equipment and programming. Arduino sheets can understand inputs - light on a sensor, a finger on a catch, or a Twitter message - and switch it into a yield - actuating an engine, turning on a LED, distributing something on the web. you'll mention to your board what to attempt to by sending a gaggle of directions to the microcontroller on the board. to embrace to so you utilize the Arduino programing language (in light of Wiring), and consequently the Arduino Software (IDE), upheld Processing.

Throughout the long term Arduino has been the mind of thousands of tasks, from ordinary items to complex logical instruments. An overall network of creators - understudies, specialists, craftsmen, software engineers, and experts - has accumulated around this open-source stage, their commitments have amounted to an unfathomable measure of available information which might be of extraordinary assistance to learners and specialists the same.

Arduino was conceived at the Ivrea Interaction Design Institute as a simple device for quick prototyping, pointed toward understudies without a foundation in hardware and programming. As soon in light of the fact that it arrived at a more extensive network, the Arduino board began changing to adjust to new requirements and difficulties, separating its proposal from straightforward 8-bit sheets to items for IoT applications, wearable, 3D printing, and installed conditions. All Arduino sheets are totally open-source, enabling clients to cause them to autonomously and ultimately adjust them to their specific necessities. The product, as well, is open-source, and it's developing through the commitments of clients around the world.

ARDUINO APPLICATION:

1.They are playing very important role in many disciplines today.

2. They are used in smart homes.

3. Used in defence.

4. They are part of Industries.

5. Used in traffic signal control

6.medical and laboratories

Advantages of Arduino technology:

1. It is low cost board.
2. It's an open supply hardware feature which permitts users to develop their own kit.
3. It allows developers to use the Arduino code to merge with the prevailing programming language libraries.
4. It is very simple for beginners.

CHAPTER 6

RESULTS AND DISCUSSION

Remote Button Mouse Operations:

- Power = password 9148
- Volume + = Move right
- Volume - = Move left
- Channel+ = Move up
- Channel - = Move down
- Key 1 = ctrl +A
- Key 2 = ctrl + C
- Key 3 = ctrl + V
- Key 4 = alphabet A
- Key 5 = alphabet B
- Key 6 = alphabet C
- Key 7 = alphabet D
- Key 8 = alphabet E
- Key 8 = alphabet f
- Key 0 = ---SPACE---
- Button mail = up arrow
- Button remainder = down arrow
- Button red = left arrow

- Button yellow = right arrow

Output

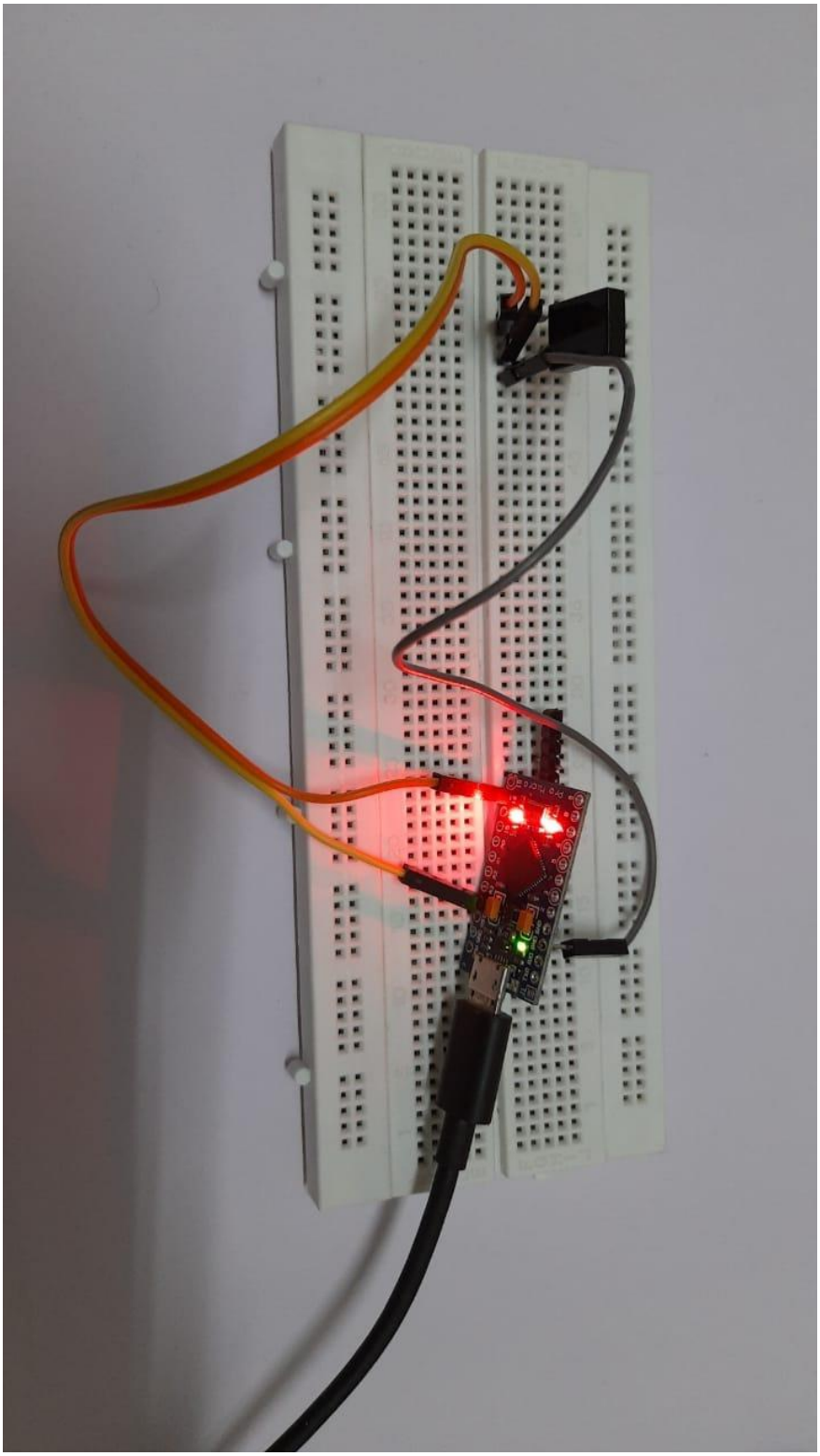

fig:6.1 Output

When we press the power button the password will be entered and the lock will be opened for the computer.

- When we press the volume + button the mouse curser moves right.
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- When we press button 3 the action Ctrl +V takes place.
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- When we press button 6 the alphabet C prints.
- When we press button 7 the alphabet D prints.
- When we press button 8 the alphabet E prints.
- When we press button 9 the alphabet F prints.
- When we press button 0 the action space occurs.
- When we press button mail the action up arrow takes place.
- When we press button remainder the action down arrow takes place.
- When we press button yellow the action right arrow takes place.
- When we press button red the action left arrow takes place.

CONCLUSION

- Using this project there need not be any wire interface between PC / laptop / computer and mouse and we can perform various computer functions through TV remote.
- From this project we can conclude that with the help of Arduino micro we can make a universal remote. With the help of this remote we can control both TV and PC/laptop/computer.
- From this project we can perform various computer functions through TV remote.
- In this age we can operate many digital devices through the remote control. We have to use different types of remote control to operate the P.C. using the remote which we are using for the TV. TV remote is working or the mouse for P.C
- With the help of this project, we can overcome many complexities in daily life. We don't need to learn different remote to operate different devices.
- Also, we can operate the computer from the distance. But this distance should be equal to the infrared range.
- From this project we can conclude that with the help of Arduino micro we can make use of universal remote to control both PC or Computer.

CHAPTER 7

Advantages and Applications

Advantages:

1. Low-cost facility than any other mouse.
2. Easy to operate.
3. Two in one facility (TV, PC mouse)
4. Higher range facility than any other wireless mouse.
5. Multi-function operation in PC.
6. Easy to construct and use.
7. Use internal power supply

Applications:

1. Involves security system
2. Television remote control
3. Wi-Fi, cellphones control
4. Controlling wireless power transfer and various wireless communication-based projects.

CHAPTER 8

Future Scope

- By just changing the code we can also interface the keyboard using the same circuit & TV remote
- Instead of IR, the other signal like RF, Bluetooth can be used modifying the receiver circuit
- The code can be transformed to work with any TV remote
- Modifying the code other commands like shutdown, volume up & volume down can be controlled by the TV remote too.

REFERENCES

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[2] The social design for technical systems by Adnan Ahmad, brian whitworth, 2014

[3] www.howstuffworks.com

[4] Mr. A.V. Deshmuk, "Microcontrollers (Theory & Applications)", WTMH, 2005

APPENDIX

Code to get the codes of each button:

```
#if defined (ESP32)

int IR_RECEIVE_PIN = 15;

#elif defined (ARDUINO_AVR_PROMICRO)

int IR_RECEIVE_PIN = 10;

#else

int IR_RECEIVE_PIN = 16;

#endif

IRrecv IrReceiver(IR_RECEIVE_PIN);

// On the Zero and others we switch explicitly to SerialUSB

#if defined(ARDUINO_ARCH_SAMD)

#define Serial SerialUSB

#endif

void setup() {

pinMode(LED_BUILTIN, OUTPUT);

   Serial.begin(115200);

#if defined(__AVR_ATmega32U4__) || defined(SERIAL_USB) || defined(SERIAL_PORT_USBVIRTUAL)

   delay(2000); // To be able to connect Serial monitor after reset and before first printout

#endif
```

```
    // Just to know which program is running on my Arduino
    Serial.println(F("START " __FILE__ " from " __DATE__));
    // In case the interrupt driver crashes on setup, give a clue
    // to the user what's going on.
    Serial.println("Enabling IRin");
    IrReceiver.enableIRIn();  // Start the receiver
    IrReceiver.blink13(true); // Enable feedback LED
    Serial.print(F("Ready to receive IR signals at pin "));
    Serial.println(IR_RECEIVE_PIN);
}
void loop() {
    if (IrReceiver.decode()) {
        IrReceiver.printResultShort(&Serial);
        Serial.println();


        IrReceiver.resume(); // Receive the next value
    }
    delay(100);
}
```

Code of the project:

```
#include <IRremote.h>

#include "Mouse.h"

#include <Keyboard.h>

int RECV_PIN = 16;

IRrecv irrecv(RECV_PIN);

decode_results results;

int range = 8;              // output range of X or Y movement; affects movement speed

int responseDelay = 10;     // response delay of the mouse, in ms

     int leftState = 0;

     int rightState = 0;

     int upState = 0;

     int downState = 0;

     int  xDistance=0;

     int  yDistance=0;

void setup()

{

 Serial.begin(9600);

 irrecv.enableIRIn(); // Start the receiver

 Keyboard.begin();

}

void loop() {
```

```
if (irrecv.decode(&results))
{
   switch(results.value)
   {
         //The power button is used to unlock your PC
    case 0xFF38C7:   Keyboard.print("9501"); // add your PC's Password here
                  Keyboard.press(KEY_RETURN); //Enter Key
                  delay(100);
                  Keyboard.releaseAll();
                  break;
          //Backward key is used for left key operation
    case 0XFFF20D:   Keyboard.press(KEY_LEFT_ARROW); //left key
                  delay(100);
                  Keyboard.releaseAll();
                  break;
         //Forward Key is used for right key operation
    case 0XFFDA25:   Keyboard.press(KEY_RIGHT_ARROW); //right  key
                  delay(100);
                  Keyboard.releaseAll();
                  break;
    case 0XFFCA35:   Keyboard.press(KEY_UP_ARROW); //left key
                  delay(100);
```

```
            Keyboard.releaseAll();
            break;
      //Forward Key is used for right key operation
case 0XFF609F:   Keyboard.press(KEY_DOWN_ARROW); //right  key
            delay(100);
            Keyboard.releaseAll();
            break;


     //Space bar operaion , It can be used for pause/play -0th key
case 0xFF48B7:   Keyboard.write(32);            //space bar operation
            delay(100);
            Keyboard.releaseAll();
            break;
      //Select all operation(Ctrl+a)-1st key
case 0xFF906F:   Keyboard.press(KEY_LEFT_CTRL);       //Ctrl key
            Keyboard.write(97);               // ascii value of 'a' is 97
            delay(100);
            Keyboard.releaseAll();
            break;
       //Copy Operation(Ctrl+c) -4th key
case 0xFFB847:   Keyboard.press(KEY_LEFT_CTRL);        //Ctrl key
            Keyboard.write(99);                //ascii value of 'c' is 99
```

```
            delay(100);
            Keyboard.releaseAll();
            break;
        //Paste Operation(Ctrl+v)-7th key
case 0xFFF807:   Keyboard.press(KEY_LEFT_CTRL);          //Ctrl key
            Keyboard.write(118);                 //ascii value of 'v' is 118
            delay(100);
            Keyboard.releaseAll();
            break;
        //closes  opened tab
case 0xFF18E7:   Keyboard.press(KEY_LEFT_ALT);          //Alt Key
            Keyboard.press(KEY_F4);              //F4 Key
            delay(100);
            Keyboard.releaseAll();
            break;
case 0xFF708F:   Mouse.move(-range, 0, 0);              //Left
            break;
case 0xFF58A7:   Mouse.move(range, 0, 0);               //Right
            break;
case 0xFFC03F:   Mouse.move(0, -range, 0);              //UP
            break;
case 0xFF40BF:   Mouse.move(0, range, 0);               //DOWN
```

```
                break;
      case 0xFFB04F:   Keyboard.write(65);                  //a
                break;
      case 0xFF9867:   Keyboard.write(66);                  //b
                break;
      case 0xFFD827:   Keyboard.write(67);                  //c
                break;
      case 0xFF8877:   Keyboard.write(68);                  //d
                break;
      case 0xFFA857:   Keyboard.write(69);                  //e
                break;
      case 0xFFE817:   Keyboard.write(70);                  //f
                break;
      default:
                break;
    }
  irrecv.resume(); // Receive the next value
 }
}
```