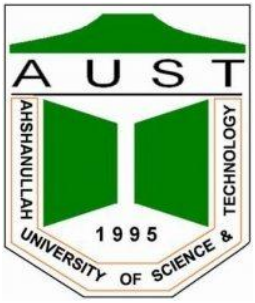
Ahsanullah University of Science and Technology



Project Report

Group Name: Spark Plug

Project Name: Internet Client Controlled Home Security Surveillance Robot.

Submitted by:

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Introduction

Surveillance is the monitoring of the behavior, activities, or other changing information, usually of people for the purpose of influencing, managing, directing, or protecting them. This can include observation from a distance by means of electronic equipment (such as CCTV cameras), or interception of electronically transmitted information (such as Internet traffic or phone calls); and it can include simple, relatively no- or low-technology methods such as human intelligence agents and postal interception. The word surveillance comes from a French phrase for "watching over" ("sur" means "from above" and "veiller" means "to watch"), and is in contrast to more recent developments such as sousveillance.

Our purpose is to build a dynamic surveillance monitoring system that can be used as both monitoring and for security purpose and can be controlled form any distance covered by internet facility. This offers a web based controlling protocol which is much familiar to everyone such as browser or free web servers. So the main feature here can be stated such as, in our project we want to control a mechanical machine to move through as we wish over internet and get a live video feedback from it as a surveillance system.

Equipment and Components:

1. Arduino Uno Rev 3 x1
2. Arduino Ethernet Shield x1
3. TP LINK TL-WR702N nano router x1
4. DC motor x2
5. Chassis (Acrylic made) x1
6. L293D IC x1
7. Capacitors
8. Regulator IC's 7805
9. AOSP based smartphone
10. Battery 1100 mAh
11. Other small stuffs

Working Principle

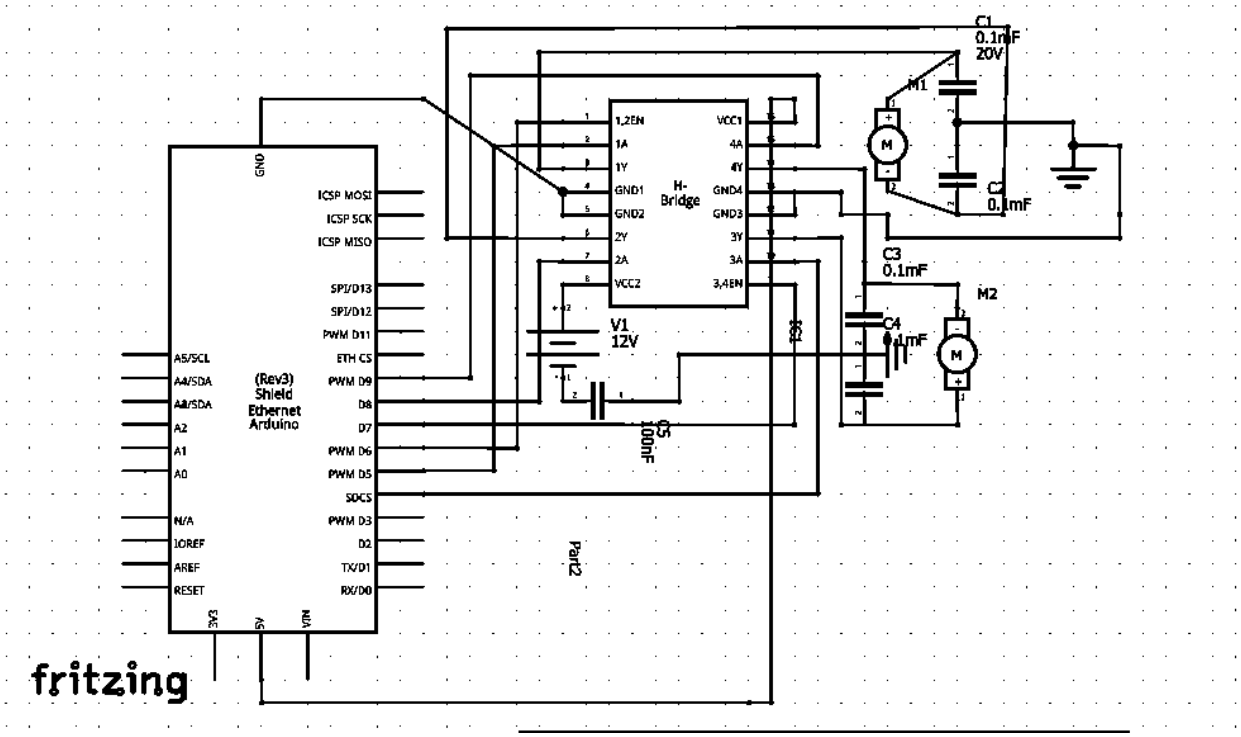
Controlling The Robot

1. The inbuilt server on the Ethernet Shield is used to perform as a web page in basis of client request from any browser that can accessed over the server's proxy address.
2. The appeared page can be used as a navigator panel for the robot. The page provides five buttons to the client i.e., Forward, Backward, Rotate CW (clockwise rotation), Rotate CCW (counter clockwise rotation) and Stop.
3. If the client hit those buttons to perform any actions thus specific number of bytes would be sent over the internet and is received by the Home router in the zone of which the robot can play.
4. The home router supplies the signal carrying bytes to the client router situate d on the robot.
5. Client router is instantaneously send the client request to the Ethernet shield buffer and when it finds client request 1 for predefined arduino pin in the code, it turns on the corresponding arduino pin. Thus when the it finds client request 0 it turns off the corresponding arduino pin.
6. Finally by turning off and on the arduino pin we can control two motors using L293D motor driver IC in forward, backward, clockwise and counterclockwise.

Live video feedback:

1. To avoid video processing and capturing related complexity we have used an AOSP based smartphone and an android app (AirDroid^{TM}).
2. Airdroid has to be installed in the smartphone and the user device such as Computer has to follow a link that is airdroid.com to have a control on the smartphone.
3. At first we need to install the Airdroid and run it through scanning the QR code and the device is integrated to the user PC.
4. Now the user can control the AOSP based device from his computer over internet.
5. So we have now access to the device and can take live video feedback over the internet from the smartphone.

Basic Circuit Diagram



The CODE:

```
#include <SPI.h>

#include <Ethernet.h>

byte mac[] = { 0x00, 0xAA, 0xBB, 0xCC, 0xDE, 0x02 };

byte ip[] = { 192,168,0,101 };

const int MAX_PAGENAME_LEN = 8; // max characters in page name

char buffer[MAX_PAGENAME_LEN+1]; // additional character for terminating null
```

```
EthernetServer server(80);

const int en1=6;

const int en2=7;

const int pin8=8;

const int pin9=9;

const int pin5=5;


void setup()

{

Serial.begin(9600);

Ethernet.begin(mac, ip);

server.begin();

delay(2000);

pinMode (en1, OUTPUT);

pinMode (en2, OUTPUT);

}

void loop()

{

EthernetClient client = server.available();

if (client) {

int type = 0;

while (client.connected()) {

if (client.available()) {

  // GET, POST, or HEAD

memset(buffer,0, sizeof(buffer)); // clear the buffer
```

```
if(client.find("/"))

if(client.readBytesUntil('/', buffer,sizeof(buffer))){

Serial.println(buffer);

if(strcmp(buffer,"POST") != 0){

  Serial.println("State:1");

client.find("\n\r"); // skip to the body

// find string starting with "pin", stop on first blank line

// the POST parameters expected in the form pinDx=Y

// where x is the pin number and Y is 0 for LOW and 1 for HIGH

while(client.findUntil("pinD", "\n\r")){

int pin = client.parseInt(); // the pin number

int val = client.parseInt(); // 0 or 1

const int pin4=4;

pinMode (pin4, OUTPUT);

pinMode(pin, OUTPUT);

pinMode (pin8, OUTPUT);

pinMode (pin9, OUTPUT);

  pinMode(pin5, OUTPUT);

digitalWrite(en1, val);

digitalWrite(en2, val);

digitalWrite(pin, val);

digitalWrite(pin4, val);

digitalWrite(pin8,LOW);

digitalWrite(pin9,LOW);

if (val==2){
```

```
  pinMode(pin5, OUTPUT);
  digitalWrite (pin4, LOW);
  digitalWrite(pin5, LOW);
digitalWrite(pin8, HIGH);
digitalWrite(pin9, HIGH);
}
else if (val==3) {
  digitalWrite (pin4, LOW);
  digitalWrite(pin5, HIGH);
digitalWrite(pin8, HIGH);
digitalWrite(pin9, LOW);
}
else if (val==4) {
  digitalWrite (pin4, HIGH);
  digitalWrite(pin5, LOW);
digitalWrite(pin8, LOW);
digitalWrite(pin9, HIGH);
}
else if (val==5) {
  digitalWrite (pin4, LOW);
  digitalWrite(pin5, LOW);
digitalWrite(pin8, LOW);
digitalWrite(pin9, LOW);
}
}
```

```
}

sendHeader(client,"Post example");

//create HTML button to control pin 8

client.println("<h2>SPARKPLUGS PRESENT: GrooVeNeT</h2>");

//create HTML button to turn on pin 8

client.print(

"<form action='/' method='POST'><p><input type='hidden' name='pinD3'");

client.print(" value='2'><input type='submit' value='Forward'/></form>");

client.println("</body></html>");

client.print(

"<form action='/' method='POST'><p><input type='hidden' name='pinD5'");

client.print(" value='1'><input type='submit' value='Backward'/></form>");

client.println("</body></html>");

client.print(

"<form action='/' method='POST'><p><input type='hidden' name='pinD3'");

client.print(" value='3'><input type='submit' value='Rotate-1'/></form>");

client.println("</body></html>");

client.print(

"<form action='/' method='POST'><p><input type='hidden' name='pinD3'");

client.print(" value='4'><input type='submit' value='Rotate-2'/></form>");

client.println("</body></html>");

client.print(

"<form action='/' method='POST'><p><input type='hidden' name='pinD3'");

client.print(" value='5'><input type='submit' value='STOP'/></form>");

client.println("</body></html>");
```

```
client.stop();

}

break;

}

}

// give the web browser time to receive the data

delay(1);

client.stop();

}

}

void sendHeader(EthernetClient client, char *title)

{

// send a standard http response header

client.println("HTTP/1.1 200 OK");

client.println("Content-Type: text/html");

client.println();

client.print("<html><head><title>");

client.print(title);

client.println("</title><body>");

}
```

Trouble Shooting:

1. Back emf of DC motor plays a vital role to overflow the circuit current. So the capacitors grounded from the motor should be carefully introduced.
2. The Ethernet shield has only 16KB buffer IC which is not efficient for a high load such as motor. So micro SD card should be introduced to eliminate this problem.
3. Heavy duty DC batteries (at least 1500 mAh) to support the robot to supply minimum 2 A current is required.

4. High speed internet is required to ensure sharp signals.
5. The IP address confliction may arise. In that case, the code should be rebuild according to the new IP address provided from the local ISP.

Opportunities and Applications:

1. This project has opened a new way of building many interactive systems to control physical output over internet.
2. A cheap movable surveillance system has been introduced with this project that may be used for the security and monitoring purpose of home, industry, office and so on.
3. It has a use in detective and investigational works to ensure a wide range and smooth way of control.
4. Finally, it can be used in public place monitoring to avoid any type of crime and violence.

Further Improvements:

1. Replacing the AOSP based video streaming system by Ethernet enabled wireless web camcorder.
2. Using another router as a bridge between client and home router to avoid the IP address confliction.
3. Using external memory card to host the server and to bear much load on it.
4. Some other services like temperature feedback, Gas/Smoke sensor, Touch sensing etc. will be added.
5. Instead of using browser, a windows application will be introduced which will be made to increase the security protocol and make the operation more user friendly.
6. The application may be further developed for AOSP.