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Review RTSRT

Surveillance Robot for The Live Video Transmission Application

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Abstract

In this project decides to focus to create a Surveillance Robot, which can prove to be an important undertaking to protect humanity in today's changing environment. By changing the size of this robot, we can monitor any place or get secret information there. It can be fitted in a drone, so that sensitive borders of the country can be monitored. In this period of corona, the ward of corona patients can also be monitored so that our corona warriors come in contact with infected patients to a minimum and their risk of getting infected can be reduced. It can be used for various purposes by changing its form as per the requirement. This robot captures the high-resolution video feed and transmits it to the Android device and the robot can be controlled by means of a remote module. For the purpose, using L293D Motor Driver, L293D IC, HC12 R.F. Transceiver, Arduino Nano, Ultrasonic Sensor, HC-SR04 Ultrasonic Sensor, LCD Display and Camera. This could even be used in household surveillance and in border areas for monitoring. Also be used in naxal areas to get a brief and precise knowledge about the present conditions there. The device has a field of vision of 360 degrees.

Keywords: Surveillance Robot, LCD- ARDUINO, Camera and App, Wi-Fi, naxal

INTRODUCTION

Surveillance is the process of identifying a situation, an area or a person. So, a Surveillance Robot becomes a robot which can be used for video surveillance and monitoring [1]. Now, this can be done in two ways: Through a fully automatic robot and through a remote-controlled robot. Robots arrive in a huge assortment of “size and flavor”, for example, Manipulator, Legged robot, wheeled robot, Autonomous submerged robot, unmanned airborne robot. The robot plays out the occupations that are perilous, exhausting, distressing or work seriously for people [2]. As a matter of first importance, robot should be able to detect its environmental factors and its surroundings. A robot either rolling with the help of wheels or walking with the help of legs, needs to move around its environment [3]. Surveillance robots at remote locations used for defense and military applications presented in [4]. A Wireless Multifunctional Robot for Military Applications has been presented in [5]. A robot unit using Zigbee technology reported in [6]. In paper [7], A Surveillance Robot reported for real time, monitoring and Capturing Controlled for android mobiles.

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Now to choose amongst these we have to make it very clear the purpose of the surveillance robot we are trying to make if it is for household surveillance or the monitoring of a particular fixed place then the fully automatic surveillance robot could work, or may say could do wonders, but if we are wanting it for spying purposes or military purpose or for areas where humans can’t go, then the first option is not at all a good option or may say it should never be done. To explain this let us go back to the problem statement. Here, we want a robot for spying purpose, and spying is done for areas where humans could not

go or inside the enemy's area and many more such places. So, the conditions there are not known properly, the terrain, the physical conditions, the presence of the enemy etc. so sending a fully automatic robot there would be a totally insane activity and will be same as putting your hand inside the lion's mouth intentionally. So, in such a case, the remote-controlled robot would be our best weapon. For example, the UGV displayed in the defense expo (2020) too was a remote- controlled vehicle with a working range of 1 km! Hence, we have chosen the second option that is a remotely controlled surveillance robot.

In different regions, there is a requirement for steady observation and surveillance. The current observation and surveillance framework incorporates checking by utilizing CCTV cameras [7] and another observing framework. For the most part, these systems are stationary, and they can only cover a constrained zone. These systems are generally controlled physically or through a smart device. They cannot be utilized to cover a bigger zone just as they are not being controlled by utilizing any remote device. To put it short, we can say that these systems aren't dynamic enough, which gives the requirement for the improvement of these observation systems which should be increasingly powerful and can be controlled remotely. This task is meant to build up an investigation device which can be controlled remotely by utilizing an Android App. It incorporates a robot with a Wireless Camera connected to it. This robot captures the high-resolution video feed and transmits it to the Android device and the robot can be controlled by means of a remote module.

IMPLEMENTATION

Since from the starting each and every product along with it pin description is explained.

LCD-Arduino Connection

The 16X2 LCD is connected to arduino nano just as shown in the Figure 1.

R.F Transceiver and Arduino Connections

In the Figure 2., the connection of RF transmitter section with arduino and that of the receiver section and arduino are shown in the same for ease of visualization.

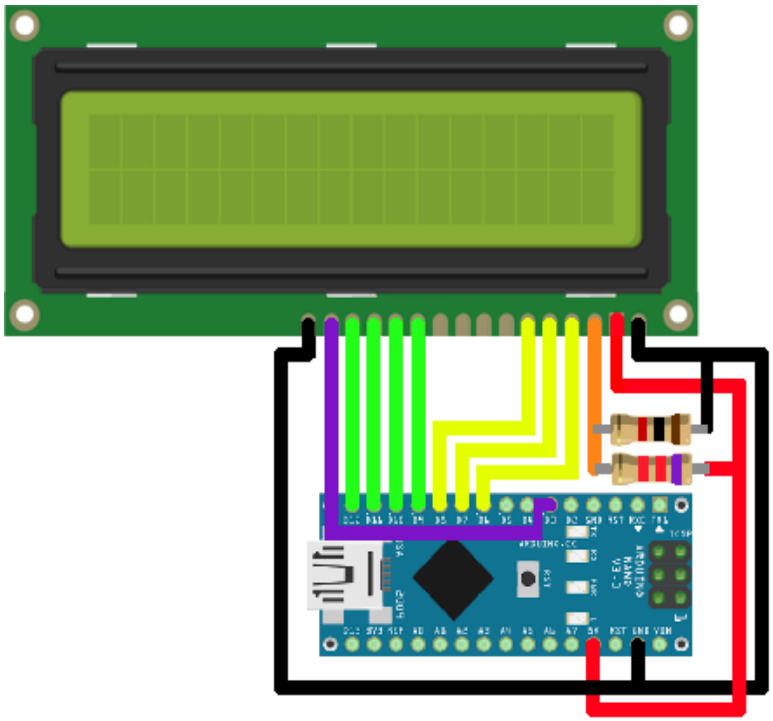

Figure 1. LCD-Arduino Connections.

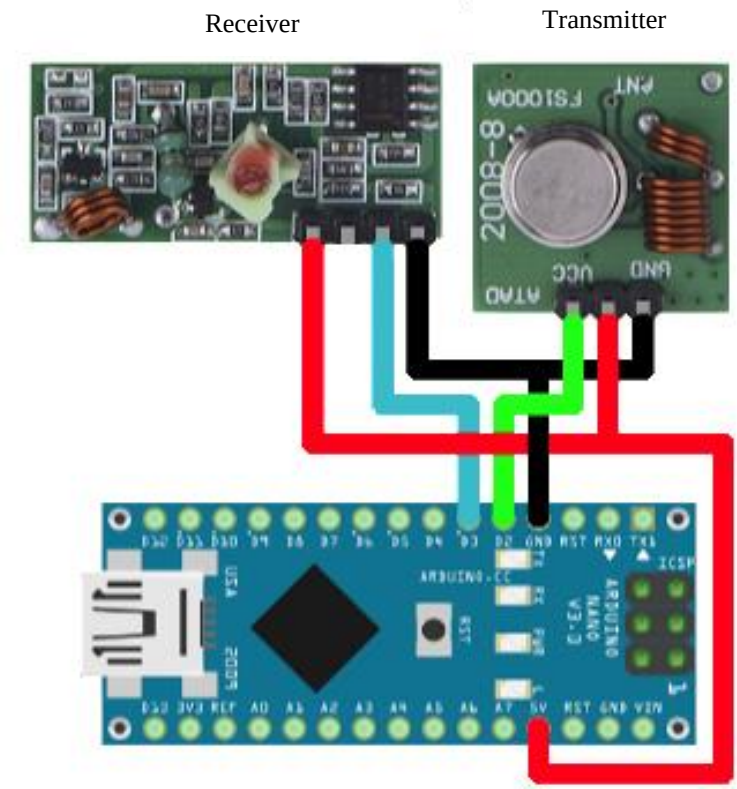

Figure 2. RF Transceiver – Arduino Connection.

Push Buttons and Arduino

Here used 5 push buttons in our project for left movement, right movement, forward movement, backward movement and to stop. These are connected in the same manner; one leg of each is connected with one another, and others as shown in Figure 3.

Camera and App

On connecting the camera with the app will ask to either register or to use it normally. As per our requirement we have connected it. The preview of the app is given in Figure 4.

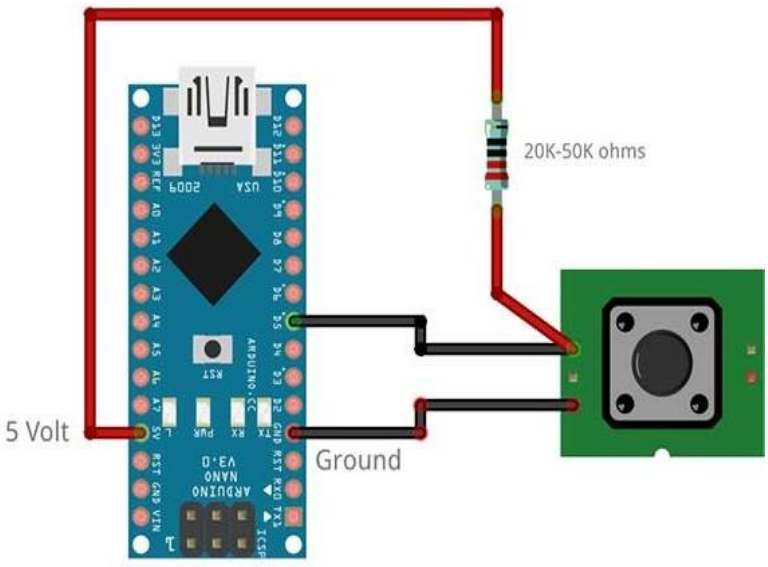

Figure 3. Push Buttons – Arduino Connection.

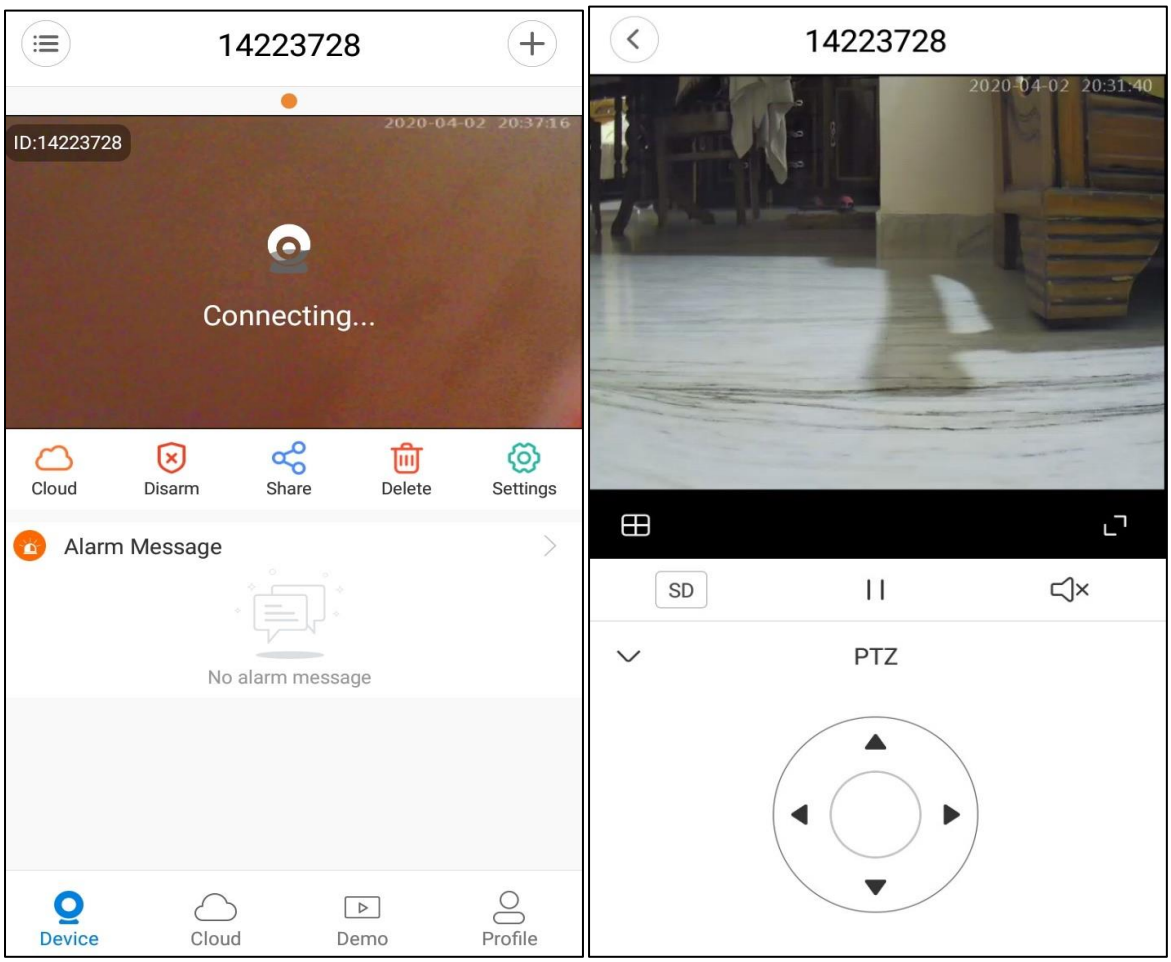

Figure 4. Screen Shots of the App.

CIRCUIT OPERATION

Through the use of the push buttons of the transmitter, we can send information to the receiver for controlling the development of the wireless robotic automated vehicle. The receiver and automobiles utilized for the motion of the robot are interfaced to the Arduino-nano of the robot vehicle. The transmitter encodes the info orders given by the controller and transmits the encoded measurements the utilization of radio recurrence [8].

This encoded information transmitted from the RF transmitter is then receiving by means of the receiver at the less than desirable end, which is associated with the robotic vehicle. The receiver consists of RF antenna designed in such a way so that to work over a satisfactory scope of roughly 1000 m. This receiver in the wake of getting the information from the transmitter deciphers the information and sends it to the Arduino module for driving the DC engines the use of the motor driver IC to move the robotic vehicle according to the provided order [9].

While in the motion of the vehicle the ultrasonic sensors continuously measure the distance between it and the obstacle that is in front of it, as the distances between the reduces to 50 meters this sends the signal to the Arduino board and the device stops. We can then with the help of the camera and its video move vehicle by changing its direction through the remote control. The camera when activated starts to give video as soon as the device is switched on. It can be rotated 360 degrees and we can hear and even talk back to the vehicle. The camera has within itself a Wi-Fi module and works on that, or it could even operate on Wi-Fi hotspots in the area it is operating for a larger range, and we can see the video throughout with the help of the app. The camera too can be controlled with the help of the app [10].

The system is useful for spying purposes, the device has a two way audio capability, so we can listen to, and talk back to the other side. The device has a field of vision of 360 degrees. This could even be used in household surveillance. The device could be helpful in border areas for monitoring. This could also be used in naxal areas to get a brief and precise knowledge about the present conditions there. There are few disadvantages like the range of the robot is 1000 m or 1 km as of now. Since the camera is working on Wi-Fi, the range of the camera will be 40–50 m approx. (Figures 5 and 6).

PROJECT MODELING

After completing the modeling of the project the final view of the device as shown in Figure 5 was achieved. Here the range of the camera is 40-50m approx and the remote model is shown in Figure 6.

Figure 5. Final View of the Project.

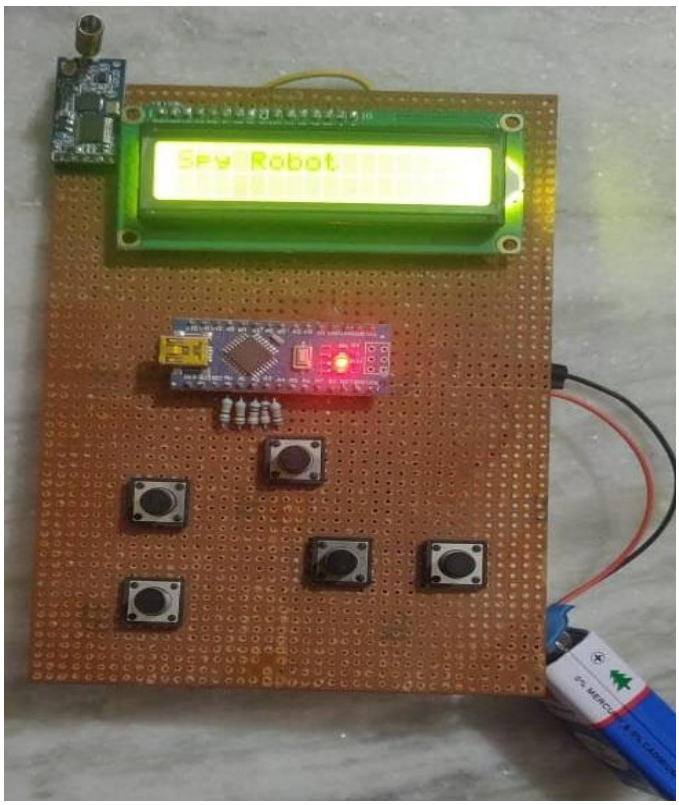

Figure 6. Remote Module.

Source Code Receiver

```
#include <SoftwareSerial.h> SoftwareSerial HC12(2,3); int trig=6;
int echo=7; char i;
long duration, dist; void setup() {
pinMode(trig, OUTPUT); pinMode(echo, INPUT); pinMode(13,OUTPUT); pinMode(9,OUTPUT);
pinMode(12,OUTPUT); pinMode(11,OUTPUT); pinMode(10,OUTPUT); HC12.begin(9600);
Serial.begin(9600); pinMode(13,OUTPUT);
}
void loop() {
while (HC12.available()) {     // If HC-12 has data i=HC12.read();
Serial.print(i); if(i=='a')
{
HC12.write('a'); digitalWrite(9,HIGH); digitalWrite(12,LOW); digitalWrite(10,HIGH);
digitalWrite(11,LOW); Serial.println("RIGHT");
}
if(i=='b')
{
HC12.write('b'); digitalWrite(12,HIGH); digitalWrite(9,LOW); digitalWrite(11,HIGH);
digitalWrite(10,LOW);
Serial.println("Forward");
}
if(i=='c')
{
HC12.write('c'); digitalWrite(9,HIGH); digitalWrite(12,LOW); digitalWrite(11,HIGH);
digitalWrite(10,LOW); Serial.println("BAck");
}
if(i=='d')
{
HC12.write('d'); digitalWrite(12,HIGH); digitalWrite(9,LOW); digitalWrite(10,HIGH);
digitalWrite(11,LOW); Serial.println("left");
}
if(i=='e')
{
HC12.write('e'); digitalWrite(10,LOW); digitalWrite(9,LOW); digitalWrite(11,LOW);
digitalWrite(12,LOW); Serial.println("STOP");

}
}
/*digitalWrite(trig, LOW); delayMicroseconds(1000); digitalWrite(trig, HIGH);
delayMicroseconds(30); digitalWrite(trig, LOW); delayMicroseconds(10); duration = pulseIn(echo,
HIGH);
dist= duration*0.034/2;         //         conversion         into centimeter
HC12.write(dist);
*/
}
```

Source Code Transmitter

```
#include <LiquidCrystal.h> #include <SoftwareSerial.h>
SoftwareSerial HC12(2,3);
LiquidCrystal LCD(12,11,10,9,8,7); void setup()
{
Serial.begin(9600); HC12.begin(9600);
```



```
LCD.begin(16,2); pinMode(14,INPUT); pinMode(15,INPUT); pinMode(16,INPUT);
pinMode(17,INPUT); pinMode(18,INPUT); pinMode(13,OUTPUT); LCD.setCursor(0,0);
LCD.print("Spy Robot");
}
void loop() { if(digitalRead(14)==1)
{
HC12.print("a");
Serial.print("a"); LCD.setCursor(0,1); LCD.print("a"); digitalWrite(13,HIGH); delay(500);
digitalWrite(13,LOW);
}
if(digitalRead(15)==1)
{
HC12.print("b");
Serial.print("b"); LCD.setCursor(0,1); LCD.print("b"); digitalWrite(13,HIGH); delay(500);
digitalWrite(13,LOW);
}
if(digitalRead(16)==1)
{
HC12.print("c");
Serial.print("c"); LCD.setCursor(0,1); LCD.print("c"); digitalWrite(13,HIGH); delay(500);
digitalWrite(13,LOW);
}
if(digitalRead(17)==1)
{
HC12.print("d");
Serial.print("d"); LCD.setCursor(0,1); LCD.print("d"); digitalWrite(13,HIGH); delay(500);
digitalWrite(13,LOW);
}
if(digitalRead(18)==1)
{
HC12.print("e");
Serial.print("e"); LCD.setCursor(0,1); LCD.print("e"); digitalWrite(13,HIGH); delay(200);
digitalWrite(13,LOW);
}
// put your main code here, to run repeatedly:
while (HC12.available())
{
// If HC-12 has data char i=HC12.read(); LCD.setCursor(7,1); LCD.print(i);
{
digitalWrite(13,HIGH); delay(400); digitalWrite(13,LOW);
}}
}
```

CONCLUSION

The primary need for our paper might be accuracy. We have been capable of view the things appropriately that are presently taking place within the surrounding vicinity. Our design has not set off any kind of disturbances. The robot will move depending on the motor direction based upon the input we give through command by the remote section unit. With the assist of the camera, we are able to view the things that are going on in the surrounding area vicinity where the robot is hidden.

By keeping the circuit basic, simple and easy, most users will be utilizing it easily without any problem. We have used RF signal for our bot and due to which the range of the bot is close to approx.

1 km. the camera, on the other hand uses inbuilt Wi-Fi and it adheres to its range of 3040m. The camera can also use the hotspot of the area to increase its range and performance as per requirement. (The driverless unmanned car made by DRDO which was kept at the defense expo 2020 too had a fixed range of operation of 1 km). The robot is best for surveillance purpose within a range of half a km, providing with a clear and secure video of the area.

Future Scope

Since this is a surveillance camera till now, it is made only for the purpose of surveillance or spying, in the near future many changes can be done in the same like, It could be equipped with a metal detector sensor too, to work even as a mine detector. It could be equipped with CO detector so that it could check for the CO level in the atmosphere and tell whether the atmospheric conditions are normal for humans to go (for this purpose till now, even after achieving such technologically great heights, birds are used in villages, because of which many birds have to lose their life). It could be equipped with any temperature detector to detect the temperature of the surroundings. It could even be converted to fire fighter too in case of immediate fire attacks too, as the temperature detector and the camera can tell us about such a situation clearly.

The proposed robot can be additionally improved regarding decision taking abilities by utilizing wide- ranging sensors and hence can be utilized in large enterprises in favor of various applications. The device could even be very helpful in the current scenario where we people are facing the pandemic COVID-19, here we can use this bot in the hospitals or isolation centers to keep a watch on the quarantined people and reduce the human to human interaction that would have happened otherwise.

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