Design and Implementation of Wireless SpyCar using Arduino and Wi-Fi Camera

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Abstract

The main objective of the paper is to observe and detect the information about the enemy during the war or on the border lines of country without human. This system is designed as a modernized spy car especially with Wi-Fi Camera. It is configured with spy camera, driver module, and Arduino UNO board. To transmit the surveillance videos about the enemy, the Wi-Fi camera is adapted in the spy car. By this way, we aim to save the human life in the war field. Moreover, it can record and store the history about the situations from the target areas. If this system is used effectively, it can be seen as a modern advanced technology.

Keywords: Spy Car, Arduino, Camera, DC motor and Bluetooth module

1. Introduction

Nowadays spy-car has been widely used in various kinds of fields like industries, academics, research and development, militaries, and so on. This spy-car is small vehicles designed for spying, surveillance, and inspection purposes. Some special features can be added to them for specific target applications. Many developers try to make the spy-car smaller and more compact in order to easy for transportation. Most of them are designed for use in rough terrain. Spy vehicles must be small and lightweight, robust, mobile, teleported (wireless) [1]. In this paper, a light weight spy-car is designed and smartphone application is implemented to control it.

Nowadays, embedded technology is becoming more advanced in the IT world. As more modernized and effective products of embedded technology are being popular in recent years, artificial products become to emerge to use in every field. According to the evolution of embedded technical systems, many spy car systems are included for smart automobile substances. In the paper, the spy car using Wi-Fi Camera tends to be effective usage not only in military fields but also in other areas. It can be used as surveillance at security systems. Moreover, spy cars also utilized not only in the military field but also in others. Especially, this spy car is designed to use in search of mission purposes. In addition, the system gives a more effective security system for utilizers.

When the user drives the robot with Bluetooth wireless technique via written App, the spy-vehicle will move to desired destination and spy video around the vehicle. The vehicle will transmit the video live stream that are spied around the vehicle and retransmit to the driver’s smart phone via Wifi wireless technique for a good spying system. By watching the video, the user will know the required information.

The spy car system is really modernized. This system uses Arduino programs, driver module, spy camera and Arduino Blue control application to drive the car. The spy car spies on the target area, and watches, and display the conditions to the user. Moreover, it can record the situations from the target area. If the spy car is used effectively, it can see the advanced technology. The block diagram is shown in Figure 1.

2. Hardware Specifications

Arduino is an open source electronic platform based on easy-to-use hardware and software. Arduino boards can read inputs: light on the sensor; A finger or a Twitter message on a button - it turns on a motor; Turn on the LED.Arduino is the name of an open source electronic platform based on easy-to-use hardware and software. Hardware requirements to implements are -

2.1. Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega328.Arduino UNO has 14 digital input/output pins (of which 6 pins can be used as PWM outputs). This contains everything needed to support the microcontroller. It simply connects it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Arduino Uno is shown in Figure 2.
2.2 Bluetooth Module (HC-06)

HC-06 is a Bluetooth module designed for establishing short range communication. This module works on Bluetooth 2.0 communication protocol and it can only act as a slave device. It uses frequency hopping spread spectrum (FHSS) to avoid interference with other devices and to have full duplex transmission. It works on the frequency range from 2.402GHz to 2.480 GHz. Bluetooth can reach a range of up to 9meters (30 ft.). Bluetooth module is as shown in Figure 3.

2.3. L298N Driver Module

The L298N is a high voltage dual H-Bridge motor driver which allows up two DC motors to be independently controlled in both forward and reverse directions via a microcontroller such as an Arduino. This module can drive DC motors that have voltages between 5V and 35V, with a peak current up to 2A. The L298N motor drive module is capable of driving a single 4 input stepper motor. L298N Driver Module is as shown in Figure 4.

2.4. Wi-Fi IP Camera (1080p)

An Internet Protocol camera, or IP camera, is a type of digital video camera that receives control data and sends image data via the Internet. They are used for surveillance but unlike analog closed-circuit television (CCTV) cameras, they require no local recording device, only a local area network. Most IP cameras are webcams, but the term IP camera or Netcam usually applies only to those that can be directly accessed over a network connection [11]. Wi-Fi IP Camera is as shown in Figure 5.

2.5. DC Gear Motor

DC gears are a type of rotating electric motor that converts electrical energy into mechanical energy. It could be powered from existing direct-current Lighting power distributed systems. Its speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. DC Motor is as shown in Figure 6.

2.6. Robot Car Chassis

The smart car chassis is easy to use as it has all the mounting hole and assembly. This kit comes with battery holder for providing power to motor. It has an exact same size mounting hole for Arduino and Raspberry Pi. Robot car chassis is as shown in Figure 7.
3. Hardware Implementation

In this system, Arduino UNO is specially used to run the circuit. It uses mainly pin9, pin10, pin11, and pin12 of Arduino UNO board to drive the car, the driver module is configured on the Arduino with jumper wires to receive control with phone. And also TX and RX pins are connected to 0, 1 pins of Arduino. And application is used to control the car and to establish the Wi-Fi. Wi-Fi camera is awarded on the spy car. Two mobile phones are used to control the car using Arduino Blue control application, and to watch video-streaming from the spy camera. This system is designed usefully and effectively as shown in the following figure. The circuit diagram of the system is shown in Figure 8.

4. System Design

In the implementation steps, the spy car is started to power on some voltage. Firstly, the spy car is checked whether it is ready to move or not. If the spy car is working, it is connected with Arduino Blue Control Application to control the spy car. And, when the spy car is ready to move to the desired directions, the Wi-Fi IP camera is installed in the spy car that is configured the Wi-Fi connection to the PC or mobile phone. Here, the Wi-Fi IP camera must be supplied power when the spy car is controlling by mobile phone to record the live streaming. It can now watch video live-streaming from the camera as depicted in Figure 9.

5. Operation

Firstly, if the Arduino UNO is given sufficient voltage, the spy car is ready to work immediately. By the usage of Arduino Blue Control application, the spy car can be moved to the desired directions (left, right, forward, backward and stop). After driving test of the car, Wi-Fi camera is configured to get the Wi-Fi connection. If Wi-Fi camera recognizes Wi-Fi connection, it starts working to display. So, users can control the spy car to the desired target area, and can watch live-streaming effortlessly. In addition, users can record the conditions from the camera and store the recorded files in the memory card. Moreover, as the Wi-Fi Camera is included special functions, it can instruct by voice control and display in reverse and front side views.
6. Experimental results

In this system, the spy car can be moved in the range of (30 feet or 9.144 meters) according to the type of Bluetooth. Beyond this range, the spy car cannot move as fast as before. Furthermore, it can be connected with other communication devices, such as routers or switches, and can also create dedicated networks to watch live streaming from a lot of PCs. The prototype of the system is illustrated in Figure 10. (a) and Figure 10. (b).

![Figure 10. (a) The prototype of the system](image1)

![Figure 10. (b) The prototype of the system](image2)

7. Advantages

The spy car can track the children in every target. As a surveillance, the spy car can be used in military areas such as army force. It can also be utilized as search mission systems and can collect the important data from target destinations that human can’t perform. By configured with dedicated systems, it can be recognized advanced security systems. Our test results allow us to implement advanced driver models and autonomous strategies and test their legitimacy in their physical multi-lane setup.

8. Conclusions

The system is configured simply to utilize. The spy car system is not only used in the military field but also in other security systems. By using this system, it is really workable in situations that humans can’t go and perform. The spy car can go and spy on the target area, and utilizing can also be recorded and watched the important data in secret missions. So, this spy car can use a toy for children and can watch the condition of the children at home. The proposed SPY Car Act makes hacking prevention. This system allows rewarding with great experience, arise huge confidence in mind. This system can work automatically or can be controlled by smart phone over Bluetooth. A kind of wireless personal network that can be used to interface between Arduino and smartphone. This spy car can move to any place and perform smartly within the Bluetooth network range.

9. Further Extensions

In the system, two mobile phones are used to control the car and to watch the video from target areas. Instead of mobile phone, the system can be controlled by hand gesture control at the place of mobile phone. If the system is connected with other communication devices such as routers and switches instead of mobiles phone, it will be possible watch the streaming through dedicated computer. This system can be extended by using advanced boards and OFD trader to find the location of the spy car easily.

References


