Arduino Based Spy Robot Using Night Vision Wireless Camera

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ABSTRACT

The main objective behind developing this robot is to prevent human life losses in war fields where there is a threat to the soldiers. The robot will be able to alert the soldiers in unknown territories and will be a great help. It consists of a wireless camera to update the soldiers for the where about of unknown territory and is controlled by Arduino Uno by the help of which the robot can transmit live videos. It also makes use of RF technology to make the interfacing of wireless camera and the display screen. It also carries mine detection and fire detection sensor in order to detect bomb and fire which further gives more security to our soldiers. The robot will serve as the appropriate machine for the defense sector to reduce the loss of human life and will also reduce illegal activities.

Keywords: War, Night Vision, Bluetooth Module, Arduino UNO, RF technology

I. INTRODUCTION

The armies which invested in modern technologies and development of robotic system have a considerable advantage over other less developed armies, which may make them stronger in combat. Even without deep analysis we are able to predict that modern conflicts will be to a large extent carried by devices with a high degree of autonomy, thus with the greatest possible independence on human. Robotic automation is in fact an inevitable process of modern human civilization development and therefore the topicality of the issue is undeniable. If armies want to be competitive (facing new global threats) they will have to invest heavily in the development of modern technologies and especially into robotic system.[1]

The remote control station and the robot play very important role in the future military operations. Nowadays the technologies are improved so creating a multipurpose operation robot for military surveillance will be an asset. Currently, the Indian Army has Daksh Military robot to combat in battle field. As the technology proliferate rapidly in automation field by incorporating Military Robots as Soldiers in war field to reduce grievance and demise in war fields.[2]

The main technology used here for serial communication is Bluetooth technology. This technology can be used to share data between two devices considering the distance between the two. The Bluetooth module HC-05 will be connected with the robot and the commands to the robot will be given through the Android application. The war filed robot consists of Arduino Uno board as a controller board. It has L293D motor driver ICs along with the HC-05 Bluetooth module. Two DC motor are also used for the motion of the robot. The night vision wireless camera is attached with the robot in order to monitor the situation and the camera can be rotated 360degree via the Android application through motor.[3]

The existing system has used the 8051 micro controller and PIC microcontroller in order to design the robot. Here, we are using Arduino with Bluetooth and RF technology[4].

In proposed system user can control the robot by using the blue control screen app from the Android mobile. We use a wireless night vision camera. This is connected by an RF module receiver section. The receiver module is connected to a laptop or a monitor. The video surveillance will be monitored by a person. The video can be recorded for future purposes. Through this robot

we can easily spy the remote areas as it can be used for military purposes and other rescue operations.[4]

II. METHODS AND MATERIAL

BLOCK DIAGRAM

We have over here an Arduino Uno, few sensors like metal detector sensor and fire detector sensor, DC motor, Bluetooth module, RF module and night vision wireless camera. The Arduino has been interfaced with these components through our program. The Arduino acts as the brain of the whole project.

Firstly, when we apply the power supply to Arduino, it turns on along with other components. We need to write the program first in the software called as Arduino, as the name suggests. Then the program is dumped into the Arduino hardware and this minicomputer is ready for the operation now.

The Arduino Uno uses the microcontroller ATmega328. All the components used are connected to it. The wireless camera is connected to the Arduino and transmits data with the help of RF transceiver. The wireless camera is a night vision camera which can send images and video at night also. The data transmitted by the camera is shown in the laptop with the help of RF technology. The robot is controlled by an Android application which is interfaced by the microcontroller first i.e. ATmega328. The commands are sent by the Android application and it is implemented by the robot. The Android application and the robot are connected through the Bluetooth module.

The DC motors are required for the movement of the robot. For this purpose we are using two DC motors. These motors can perform movements like forward, backward, right and left. We have also connected fire sensor which can detect fire and a metal detector which will be able to detect explosive bombs containing metal. These are connected to the Arduino Uno directly.
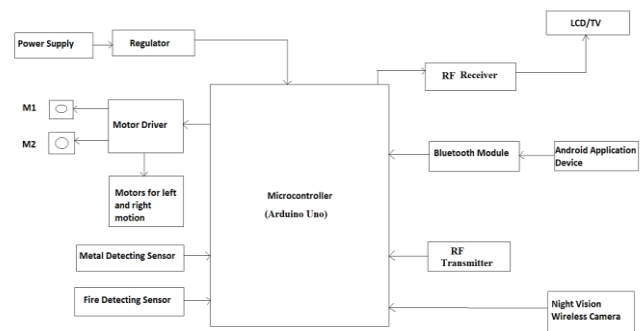

Fig.1: Block diagram

This section includes the description of the components that are going to be used in the proposed system.

Algorithm

Algorithm for this paper is given in this section.

1. Power up.
2. Arduino board is connected to the Bluetooth module.
3. Through Bluetooth module Arduino is connected to the Android application.
4. Arduino is connected to the metal sensor and fire sensor.
5. Through RF module the wireless camera is connected to the laptop.
6. The robot is then ready to act. It waits for the Android application to send the command.
7. When command is send it performs the respective operation.
8. The photos and videos are captured and send to the laptop.
9. It simultaneously checks for fire and metal.
10. If fire and metal is detected it sends the signal to laptop through RF.
11. If not detected it keeps on following the commands provided by the Android application and captured images and videos.
12. Power down.

Arduino Uno

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

Bluetooth Module

Bluetooth is an open wireless technology standard for exchanging data over short distances from fixed and mobile devices, creating personal area networks with high levels of security. It can connect several devices, overcoming problems of synchronization. Bluetooth technology is designed for and optimized for use in mobile devices. Mobile computers, cellular handsets, network access points, printers, PDA's, desktops, keyboards, joysticks and virtually any other device can have short range Bluetooth radios operating in the free 2.4GHz Industrial-Scientific-Medical (ISM) band integrated into them (single chip).

Metal Detector Sensor

Inductive Proximity Sensors detect the presence of metal objects which come within range of their oscillating field and provide target detection to "zero speed". Internally, an oscillator creates a high frequency electromagnetic field (RF) which is radiated from the coil and out from the sensor face. When a metal object enters this field, eddy currents are induced into the object. As the metal moves closer to the sensor, these eddy currents increase and result in an absorption of energy from the coil which dampens the oscillator amplitude until it finally stops.

Fire Detector Sensor

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system.

There are different types of flame detection methods. Some of them are: Ultraviolet detector, near IR array detector, infrared (IR) detector, Infrared thermal cameras, UV/IR detector etc. When fire burns it emits a small amount of Infra-red light, this light will be received by the Photodiode (IR receiver) on the sensor module. Then we use an Op-Amp to check for change in voltage across the IR Receiver, so that if a fire is detected the output pin (DO) will give 0V(LOW) and if the is no fire the output pin will be 5V(HIGH).

Motor Driver

A motor driver is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver act as an interface between Arduino and the motors. L293D consists of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor. L293D consists of 16 pins with 8 pins on each side dedicated to the controlling of a motor. There are two INPUT pins, two OUTPUT pins and one ENABLE pin for each motor.

Night Vision Wireless Camera

The wireless night vision camera consists of automatic motion detector features. It has minimum 100meters transmission distance without block. It consists of imaging sensor 1/3 inch-CMOS. The total CMOS pixels in this camera is 628*582(PAL)/510*592(NTSC). The minimum illumination of this camera is 1.5 lux. The view angle is 62 degrees. The head weight of the camera is 15 grams.

Power Supply

A power supply unit (or PSU) converts main AC to low voltage regulated DC power for the internal components of a computer. Modern personnel

computers universally use switched-mode power supplies. Some power supplies have a manual switch for selecting input voltage, while others automatically adapt to the mains voltage.

III. RESULTS AND DISCUSSION

The figure 2 is the robot prototype which will continuously live stream the video with the help of LCD/TV. The robot is controlled by the android application with help of Bluetooth module. It will also sense the metallic bomb and fire with the help of metal sensor detector and fire sensor respectively.

Fig.2 : Hardware model

IV. CONCLUSION

In this paper, the model of spy robot is described which can be operated in night irrespective of the intensity of available light. Fire detection and metal detection are introduced in this robot which makes this robot multifunctional. More features can summon in the robot to make it useful. The robot can be made for advanced by adding features like gas sensors, automatic shooting gun and bomb diffuse kit. In future the robot may also consist of gas sensors to detect the poisonous gas in the environment. The robot may also include a bomb disposal kit in order to diffuse bombs in the war field.

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