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War Field Spy Robot Using Night Vision Technology

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Abstract:
        The main aim of our project is to develop a robot which will be used for the surveillance of human activities in the border regions or restricted areas where it is not possible for the humans to keep an eye in person all the time. It consists of a wireless night vision camera,which can give live monitoring and is able to capture the images of objects and gives the information through the WI-FI module. Our soldiers have a huge risk over the unknown territory during the war it helps them to minimize the human casualties on our side in case of any attack.

Keywords -- **Surveillance, Night vision camera, Territory, WI-FI module.**

1.INTRODUCTION:

With increasing technology day by day, there came many revolutionary changes in all the sectors especially in the field of robotics. Robotic technology is playing a major role in the defense sector.

Smart phones which are the one of the biggest technical advances in the world occupy a major part in people's lives. smart phones also have brought a revolution in changing people's lifestyle and providing numerous applications on different operating systems. Android Operating system is one such OS which providing many applications for robotics.

The main technology used here for the communication is WI-FI module ESP8266. This module will be connected with robot and the commands to the robot will be given through the android application(MIT). The war field robot consists of Raspberry PI board as a controller board. It has two L293D motor driver IC's along with a Wi-Fi module.

Two DC motors are also used for the motion of the robot. Another DC motor is used to rotate the camera. The night vision wireless camera is attached with the robot in order to monitor the current situation in live and the camera can be rotated 360 degrees via the android application through motor. PIR(PASSIVEINFRARED) sensors are used for motion detection. Metal sensors are used to detect the weapons.

2. EXISTING SYSTEM:

There are different types of existing systems depending upon the type of technology used for transmitting of data. The most commonly used method uses Bluetooth technology. The Bluetooth

module HC-05 consists of six pins. The six pins are Key,5V,GND,TX,Rx,Status. The Bluetooth module has two devices i) master device ii) slave device. One device is connected to the master while the other device is connected to the slave. HC 05 Bluetooth has a very short range. Also this method uses Arduino as the controller board. Arduino board is used to capture the images and store them in a memory card inserted at the SD card slot. To view the images or videos we need to remove the SD card and connect it to a PC or a mobile phone. This method has a disadvantage that we cannot find out the happenings in the surroundings at a particular time. Every time when we are supposed to watch the surroundings, we need to take out the memory card and insert it in a PC or a mobile phone. To overcome this drawback, we brought a new technology into existence.

3.PROPOSED METHOD:

In the proposed method, the Arduino board is replaced by a raspberry pi board to make the system compatible for live monitoring. An android application is developed to control the movement of the robot. The main limitation of the
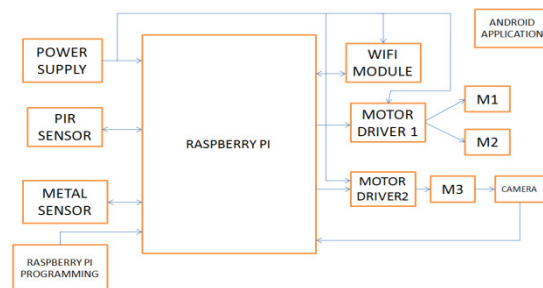
4.BLOCK DIAGRAM DESCRIPTION:

The proposed system consists of a Raspberry Pi board, Wi-Fi module, Two L293D motor drivers, Three DC motors,

existing method is its range. The Bluetooth module used in the system, HC-05 has a very short range. To increase the coverage area, we are going to use the Wi-Fi module ESP8266. The Wi-Fi module is interfaced with the raspberry pi. Two DC motors are used to move the robot in different directions. The third motor is used to rotate the camera and provide a 360 degree viewing angle. The DC motors are run with the help L293D motor driver. One L293D motor can be used to drive two motors at a time. As we are using three DC motors here, we require two motor drivers to drive the motors. The robot continuously monitors the surroundings giving us the live video output of the current situation in the coverage area. As different sensors are used we can detect any movement occurring in the visible area. A night vision specific camera is used so as to monitor the surroundings even at night times.

3.1.BLOCK DIAGRAM:

Fig 1: Block Diagram

PIR sensor, Metal Detection sensor, Night vision camera.

4.1.RASPBERRY PI:

The raspberry pi 3, with a quad core ARM processor has a performance 10 times greater than that of raspberry pi 1. Raspberry pi 3 has 40 pins. There are four USB ports. It consumes less power, provides better audio quality.

4.2.Wi-Fi MODULE:

ESP 8266 is used in this project.ESP8266 WIFI module is preferred. This module is connected to raspberry pi 3 to communicate with the robot. It has a self contained System on chip. Integrated TCP/IP protocol is used in this module.
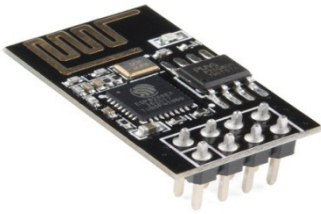

Fig 2: Wi-Fi module

The TX pin of the Wi-Fi module is connected to the RxD pin of Raspberry pi 3.The Rx pin of Wi-Fi module is connected to the TX pin of the raspberry pi 3. Thus, in a way cross-connection is required for the operation of Wi-Fi module. The GND pin is given to the GND pin of raspberry pi and power supply pin of raspberry is given to the pin of power. It is not backward compatible but frequently updated.

The Wi-Fi module takes commands via a simple serial interface and gives response with the outcome; it will send acknowledgment whenever the new request is made.

4.3.MOTOR DRIVER:

The L293D is a quadruple high-current half-H driver. The L293D is designed to provide the drive current in bidirectional up to 600mA at voltage from 4.5V to 36V. This is used to drive the dc motors. The purpose of motor driver is to turn on or rotate the motors when desired. The

L293D IC has sixteen pins. There are four input pins and four ground pins. Two motors are connected between the four output pins.
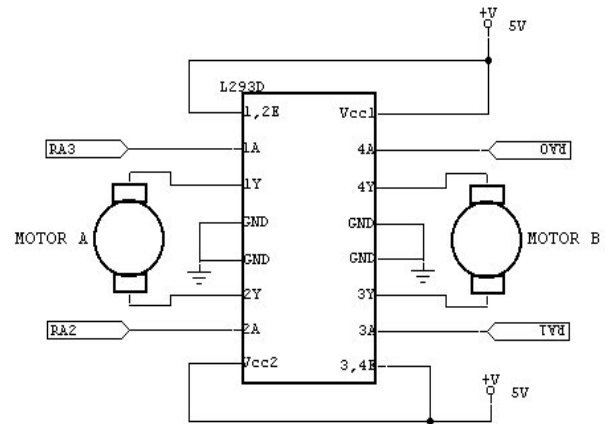

Fig 3:Motor driver

4.4.PIR SENSOR:

A passive infrared sensor consists of pins which is used for calculating infrared (IR) light radiating from the resulting objects in its field of view, which are commonly used for motion detection .This term passive refers to the fact that PIR devices do not generate or radiate energy for detection purposes. The entire work can be done by detecting infrared radiation emitted by or reflected from the objects. They don't detect or measure heat.

4.5.NIGHT VISION CAMERA:

Fig 4: Night vision camera

Features of night vision camera:

- The module is attached to Raspberry Pi with the help of a 15 Pin Ribbon Cable

- Native resolution of 25 megapixel.

- Fixed focus lens onboard.

- Supports all versions of the Pi.

- Provides 3.3V power output

5.ANDROID APPLICATION:

As we need an application for controlling the robot in this project, we can design and implement this application(App) by making use of MIT App inventor .It is one of the easiest way of creating our customized Android Applications. The following are the steps for creating an Android application.

Steps for creating Android Application:

1. Select the ai2.appinventor.mit.edu website and create and account with the help of your Gmail.

2. After successful completion of creating an account login to the account and there you can have an option like NEWPROJECT.

3. Then by clicking it you can create your new project with a title.

4. Then there will be two sections A)Designer B)Blocks.

5. Frist we need to pick the horizontal alignment form the Layout option.

6. Then we need some buttons for saving the url and for delete so that we can pick required number of buttons from the user interface option.

7. For controlling the camera as well as grippers we need four more buttons, so again pick it from the user interface option and drop it on the screen.

8. Then for entering the url we need a text box. We can pick this from the user interface option.

9. With this screen one designing part is completed, then the next task is to design screen2.

10. The purpose of screen2 is to control the robot, camera and for displaying video.

11.Then for controlling the robot in all directions we need four buttons, so pick four buttons from the user interface option.

12. For displaying the video we need an video player, we can pick it from the media option.

13. With this the design part is completed and next task is arranging the blocks.

14.In the blocks section we do the actual coding. Here we need to interconnect the proper blocks for passing the commands to the robot.

15. Some figures below will describe the block programming.

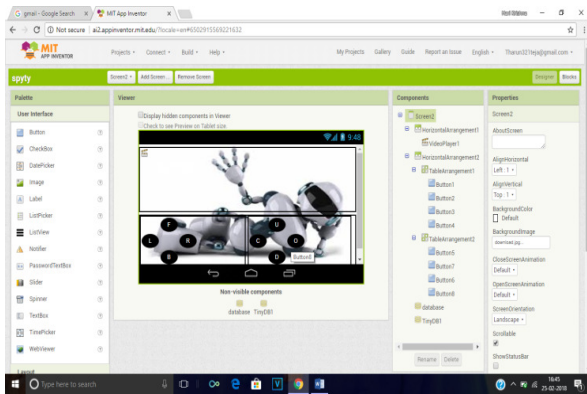Fig 5:Design of android application

Fig 6:Android Application design

Fig 6.1:Android application in smart phone
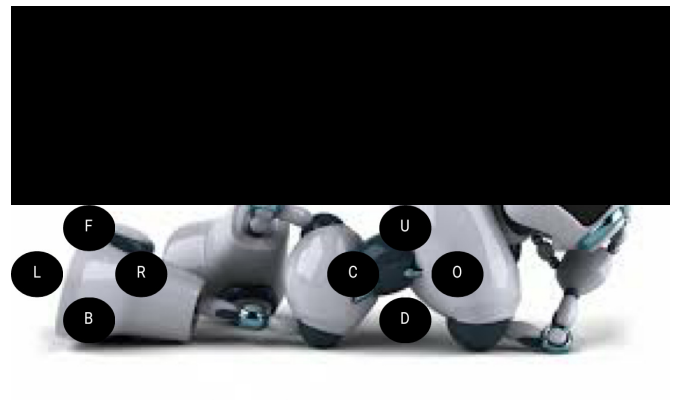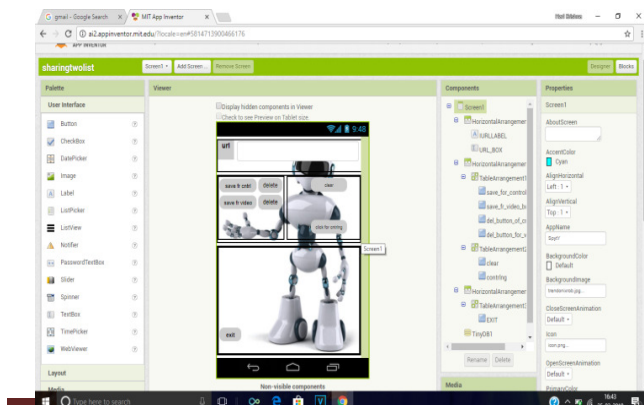

Fig 6.2: Android application in smart phone

6. APPLICATIONS:

• Military operations.

 • Surveillance along border.

• Rescue Operation.

• Maneuvering in hazardous environment.

7. FUTURE ENHANCEMENT:

The robot can be made much lesser in size. Although Wi-Fi module is used here, it has a limited range. To increase the range need hosting from a server to upload and access the data.

In future, the robot may also consist of gas sensors to detect the poisonous gases in the environment.

8. CONCLUSION:

In this paper, the robot can be described by using night vision wireless camera control and operated through android application and the people may learn about developing an android application which will be used in to move the motion of the robot through wireless application using the platform of MIT app inventor.

The robot can be made more enhanced by adding features like gas sensors.

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