Design and Development of Remote control Surveillance Vehicle

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Abstract: The surveillance vehicle is designed for functionally, comfort and safety. The various stages of operation involved in the designing of a remote surveillance vehicle is described in a paper. The initial phase of the paper focuses on designing of the vehicle. The vehicle contains a Beagle bone Black Board for motor control and Wi-Fi for wireless communications, and a camera to capture images of its environment. The exterior of the vehicle is equipped with camera observation, sensor and wireless communication system The paper outlines while designing the vehicle the environmental conditions are taken into considerations. Focusing on the navigation of the vehicle remotely through Beagle bone   Black Board and continuous video streaming by using IP Camera. LABVIEW is used for user interface.

Keywords: **Beaglebone Black, LABVIEW,   Wi-Fi, IP camera**

I.   INTRODUCTION

Surveillance vehicle are designed and used to gather and analyze in real time multi source audio visual intelligence from the field and communicate to command station. The main purpose of the *surveillance vehicle are* surveillance and to transmitting data from the field to the command station. It can be used for many applications where it may be inconvenient dangerous or impossible to have a human operator present. The remote operated vehicle is a vehicle that is controlled by a human operator via interface. All actions are determined by the operator based upon either direct visual observation or remote use of sensors such as digital video cameras.the vehicle will have a set of sensors to observe the environment, and will either autonomously make decisions about its behavior or pass the information to a human operator at a different location who will control the vehicle through teleoperation.The vehicles can be designed for Military applications for recognition, Environmental observation, maritime surveillance and mine removal activities. Surveillance vehicle is mostly used for the spying purpose.

II.   REVIEW OF VEHICLE

There are a wide variety of surveillance vehicle in use today. Predominantly these vehicle are used to replace humans in hazardous situations.

The vehicle is remotely operated ground vehicle. It is all-terrain surveillance vehicle and it can also climb stair case. The vehicle can be used in military to perform a variety of dull, dirty, and dangerous activities
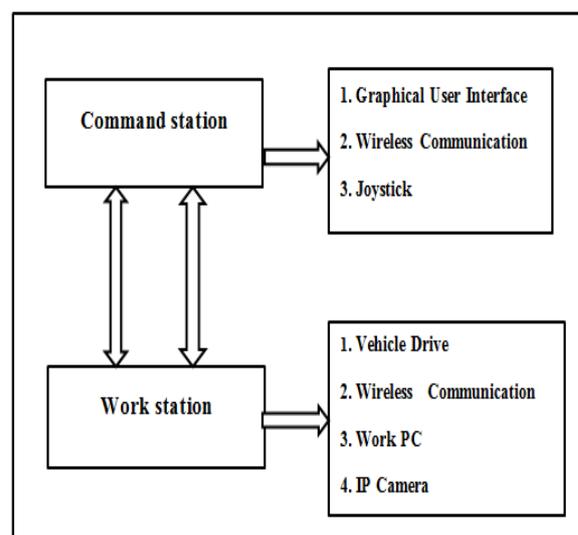
III.   BLOCK DIAGRAM OF THE SYSTEM

Figure 1

This is the block diagram of the system. System is divided into two parts first is a work station and other is a command station. Work station is referred to the vehicle and thecommand station is referred to the base station.
 The chassis is equipped with the six wheels, each side has a three wheels. The wheels are arranged such a that the distance between two adjacent wheel is minimum. If the distance between two wheels is more then the vehicle gets stuck between two steps. The chain belt is used on each side to support the wheels so that vehicle can travel smoothly. Two metal pulleys are attached on front side of the

chassis by using two connecting metal strips. The pulleys are attached to the front side of the vehicle at fixed angle. Thesepulleys helps the vehicle to uplift the chassis when vehicle climb the stairs.

GUI (Graphical User Interface) of LABVIEW is used for user interface. It is needed to visualize the parameter which is indicated by the vehicle. The vehicle is connected to the base station using Wi-Fi network. Wi Fi is used for a communication purpose. The joystick is used as a remote which controls the navigation of the vehicle. The Beaglebone black board is used as a work PC on the vehicle. The board is capable to store the information during surveillance and it provides the necessary commands to the vehicle which is given by the operator from base station by using wi fi network. PWM driving circuit is used to execute driving command which is come from command station. The IP camera makes vision for navigation and it gives information where vehicle is travelling.
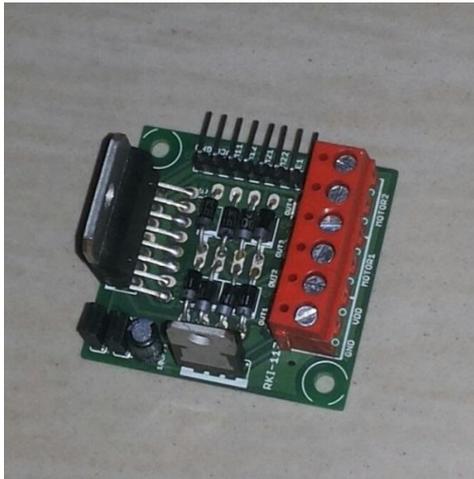
IV. PWM MOTOR DRIVER

Figure 2

Pulse-width modulation is an effective method for adjusting the amount of power delivered to an electrical load.This is 2 A dual motor driver module with PWM control.It is a L 298 Motor driver based module.. It is a Small module which can be used with any circuit very easily. . It can Controls 2 DC motors or 1 Stepper motor in both direction..Diodes provided for back EMF protection.

- Inputs:
1. 8 pin right angle berg strip is input section.

2. Starting form 1st pin towards jumpers pin connections are GND, VCC(+5V output), M1-1, M1-2, M2-1, M2-2,PWM2, PWM1

- Outputs:

1. There are three two pin screw terminals.
2. One written with VDD and GND is for supply
3. Motor1 & Motor2 are for Connecting DC motors.

- Jumpers:

1. There are two jumpers which selects PWM or non
   PWM mode for both motors

2. Disconnect to use PWM mode. In this mode you need
to give external PWM signals.
3. Connect them to use this module in normal mode. No
need of PWM signals.
4. Jumper called "EN1" is for MOTOR1 and "EN2" for
   MOTOR 2

- Features:

   1. Small Size
   2. Can be easily power from an AC – DC source or Battery
   3. On Board 5V Regulator to supply power output to any external control unit like MCU
   4. Jumpers for selecting PWM or Non-PWM mode
   5. TTL input interface

V. BEAGLEBONE BLACK BOARD

The Beagle bone black Board is a low-power open-source hardware single-board computer produced by Texas instruments.
It is a lower-cost, high-expansion focused BeagleBoard.The processor of board is Sitara AM3358BZCZ100 device.

Features:

- 512MB DDR3 RAM
- 4GB 8-bit eMMC on-board flash storage
- 3D graphics accelerator
- NEON floating-point accelerator
- 2x PRU 32-bit microcontrollers

Connectivity:

- USB client for power & communications
- USB host
- Ethernet
- HDMI
- 2x 46 pin headers

Software Compatibility:

- Debian
- Android
- Ubuntu
- Cloud9 IDE on Node.js w/ Bone Script library
- plus much more

VI.   IP CAMERA

Figure 3

An **Internet protocol camera**, or IP camera, is a type of digital video camera commonly employed for surveillance. The camera is mounted on the vehicle. Ti is configured with the Wi-Fi network so that its gives continuous video streaming over along distance. The camera is able to function on a wirelessnetwork. It can be moved around anywhere on a network. The IP camera is used for the surveillance purpose; it also provides the vision for the navigation.

VII.   LABVIEW AS A USER INTERFACE

Graphics User Interface [GUI] of LABVIEW is used for the user interface. By using the different function blocks in LabVIEW, GUI is designed. Remote is interfaced with the LabVIEW, so that command given through the remote can be visualize on the GUI.We can also send the command to the work station through the GUI. As we send the left navigation command to the vehicle through GUI, vehicle moves left according to the command.

The navigation commands are given by the remote control while other command related to the speed control are can give manually through user interface.

VIII.   CONCLUSION

we can design good, efficient, and low cost surveillance vehicle that can be used in spying operation in all terrain dangerous area by using these components.

IX.   RESULT

The vehicle can survey the area effectively, and travel according to the command. It can climb the stair case of upto 10 cm.

X.   ACKNOWLEDMENT

XI.   **REFERRANCES**

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