

DESIGN AND REALIZATION OF LABVIEW BASED MONITORING AND CONTROL OF MILITARY SURVEILLANCE BOT

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Abstract - The System is an automatic robot which has the capability to reach any corner of the security region without alarming the enemy. It can be employed for suspicious bomb detection & demolition, threat detection etc. This BOT is equipped with different sensors, camera and Raspberry Pi to accomplish the security issues. Raspberry Pi monitors the controlling action of the robot which is programmed with LabVIEW for efficient interaction and presentation. Addition of the Kinect sensor improves the image processing capabilities. The proposed prototype has a wide application such as, military ground surveillance in naxal threatened area, no man's land between international borders, hijacked buildings. It can also be used to study animals, stand alone security systems, Safety monitoring in industries, Continuous monitoring of epidemic patients who are kept isolated.

Keywords- Raspberry pi, Kinect Sensor, DC motor and Lab VIEW

I. INTRODUCTION

Surveillance is the monitoring of behavior, activities or other changing information to influence, manage, guide or protect people. This may include remote monitoring by electronic devices or interception of electronically transmitted information. Military robots are mainly designed for transport to search & rescue and attack. It can be employed for suspicious bomb detection and diffusion, threat detection etc.

The robot is designed by Raspberry Pi. Monitor and control is done using LabVIEW. Distance is measured using ultrasonic sensor. Motion control by DC geared motor and motion detected by passive IR sensor. Robot arm movement is controlled by using servomotor. Fire is detected using Flame detector. Image processing is done by Kinect Sensor.

II. EXISTING METHOD

The existing system identifies the objects/obstacles by a camera. It only uses UV sensors. Currently existing robots have limited range of coverage as they are on RF Technology, Bluetooth and Wi-Fi. Most of the earlier robot used charged batteries as source of power. [1] Thus it becomes inconvenient to use this robot for long period. Earlier surveillance robots sense only one or two physical quantities. Existing robots use video camera for live streaming for manual control. [2][5]

III. PROPOSED METHOD

The main concept of building this prototype is that it can be used in two sectors. First one is, it could be used in military and defence sensors for certain purpose like as a spying robot, bomb disposal unit, suspect/threat detection and demolition, in such area where our soldiers couldn't have an easy access to and complex conflicts irrational of any situation and atmosphere. Second one is, it could also be used in the service of civilians as a predator, a guide, a firefighter. It is battery powered wireless remote controlled robot on caterpillar track wheels which makes it a robust vehicle. The primary role of integrated Autonomous Vehicle is to guard and guide soldiers as well as civilians. It can be controlled with the Remote - Operator as well as with self-Assistance. It can navigate through narrow corridor; negotiate steep slopes and two vehicles to reach hazardous materials. The Kinect sensor is used for image processing and it can cover 360 degree. It can capture the 3D image of an enemy and used instant of Passive IR sensor. Zig-Bee network is used instant of Wi-Fi network. IAV SWAYAM BHU is an electrically powered robot, which can be controlled remotely and can be used for locating, handling and destroying the hazardous objects safely as well as protecting and rescuing civilians from hazardous situations without any loss of life.

Consider the output frequency is 50 Hz. To achieve this, when the supply voltage is positive the switch is in state 1 (S1a and S4a are turned ON). On the other hand switching state 2 are used during negative cycle to produce the next half Cycle.

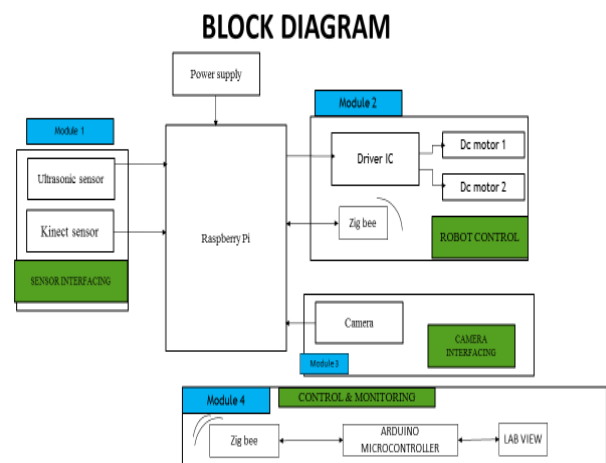


Fig (1). Proposed Method Block Diagram

IV. HARDWARE USED

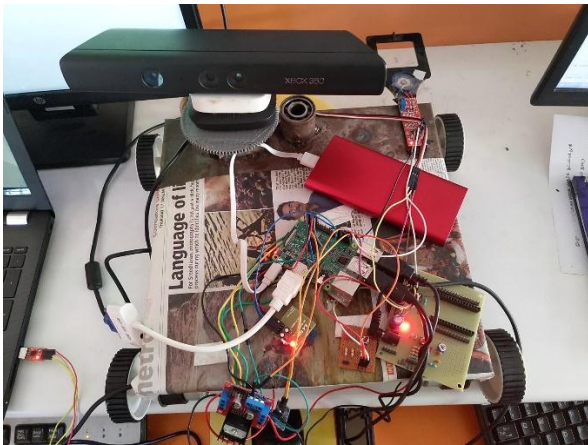


Fig (ii). Hardware Setup

A. RASPBERRY PI

The Raspberry Pi 2B uses a 32-bit 900 MHz quad-core ARM Cortex-A7 processor. The Broadcom BCM2835 SoC used in the first generation Raspberry Pi includes a 700 MHz ARM11 76JZF-S processor, videocore IV graphics processing unit (GPU), and RAM. It has a level 1 (L1) cache of 16 KB and a level 2 (L2) cache of 128 KB. The level 2 cache is used primarily by the GPU. The SoC is stacked underneath the RAM chip, so only its edge is visible. The 1176JZ (F)-S is the same CPU used in the original iPhone, although at a higher clock rate, and mated with a much faster GPU. The Raspberry Pi 3+ uses a Broadcom BCM2837B0 SoC with a 1.4 GHz 64-bit quad-core ARM Cortex-A53 processor, with 512 KB shared L2 cache.[8]

B. POWER SUPPLY

An AC adapter, AC/DC adapter, or AC/DC converter is a type of external power supply, often enclosed in a Case similar to an AC plug. Other common names include plug pack, plug-in adapter, adapter block, domestic mains adapter, line power adapter, wall wart, power brick, and power adapter. External power supplies are used both with no other source of power and with battery-powered equipment, where the supply, when plugged in, can sometimes charge the battery in addition to powering the equipment. The advantages of these designs can be increased safety, since the hazardous 120- or 240-volt mains power is transformed to a lower, safer voltage at the wall outlet and the appliance that is handled by the user is powered by this lower voltage.

C. L298N DRIVER IC

The operating supply voltage up to 46v. The total DC current up to 4 A. Low saturation voltage. Over temperature protection. Logical "0" input voltage up to 1.5 (high noise immunity). The L298 is an integrated monolithic circuit in a 15-lead Multiwatt and powerS020 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and

drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the input signals. The emitters of the lower transistors of each bridge are connected together and the corresponding external terminal can be used for the connection of an external sensing resistor. An additional supply input is provided so that the logic works at a lower voltage. L298N is the most convenient motor driver for this prototype. It contains all three of driver logic, interlock, and power transistors featured in one package. Moreover it also has thermal-shutdown safety feature where it slows down and stops if overload. Per channel of L298N can handle up to 2A at 45V. Although using an aluminium heat sink for L298N, it can easily drive the 12v actuators used without any stress.

D. DC MOTOR

A DC motor is any of a class of rotary electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the force produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor.

E. METAL DETECTOR

A metal detector is an electronics instrument which detects the presence of metal nearby. Metal detectors are useful for finding metal inclusions hidden within objects, or metal objects buried underground. They often consist of a handheld unit with a sensor probe which can be swept over the ground or other objects. If the sensor comes near a piece of metal this indicated by a changing tone in earphones, or a needle moving on an indicator.

F. IP CAMERA

An Internet Protocol camera, or IP camera, is a type of digital video camera commonly used for surveillance, and which, unlike closed-circuit analog television cameras, can send and receive data through a network of computers and the Internet. Although most cameras that do this are webcams, the term IP camera or net cam generally applies only to those that are used for surveillance that can be accessed directly through a network.[6][7]

G. KINECT SENSOR

Kinect is a line of motion sensing input devices that was produced by Microsoft. This camera captures the movements of any person in broad daylight or during night time. Enemy interpretation can be easily surveyed.



Fig (iii). KINECT SENSOR

V. SOFTWARE USED

A. Lab VIEW

Laboratory Virtual Instrument Engineering Workbench (Lab VIEW) is a system-design platform and environment for a visual programming language from National Instruments. It is a software application which is used to control any device from anywhere by using a communication device. Here Zig-bee is used and the robot movements are controlled using Lab VIEW.[3][4]

B. PYTHON

Python is an interpreted, high-level, general-purpose programming language. The raspberry pi is incorporated with this language and the simple robot functions can be realized using python commands. The python has been used for generating programs for different sensor so that interfacing with the raspberry pi will be easier.

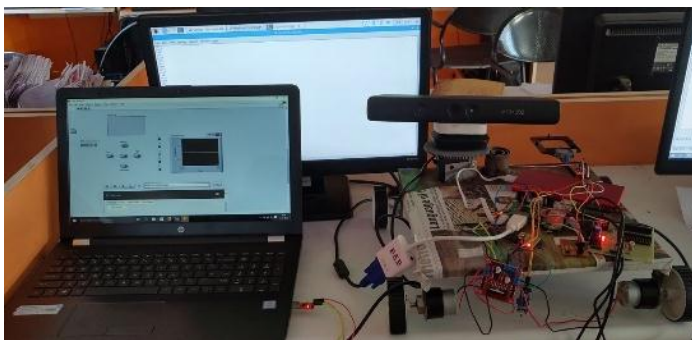


Fig (iv). OVERALL PROJECT SETUP

VI. CONCLUSION

An automatic robot is designed and it can reach any corner with absolute stealth. This vehicle equipped with different on board sensors, actuators, camera and Raspberry Pi to accomplish the security activity. Raspberry Pi monitors the controlling action of the robot which is programmed with LabVIEW for efficient interaction and presentation. The Kinect sensor additionally provides visual interpretation of the enemy

movements. This BOT can be equipped with weapons to neutralize the enemies behind the borders.

VII. REFERENCES

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