IOT Based Surveillance Robot for Defence

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Abstract—Nowadays, robots are playing very important role in the automation of the companies. This is to diminish the human mistake and also to increase the efficiency. This is one of the methods to enterprise the Robot for the surveillance persistence in the battle area. We are using the mobile in this project to switch the robot using IOT technology. For controlling the robot, the signal is transmitted through the IoT using computer or Mobile phone. This signal is received by the IoT module and through the level converter interfacing circuit; we can send the signal to the pic microcontroller, which is a programmable IC, where we can program it to control the motors according to the signal from the computer. The motor driver circuit improves the current capacity of the microcontroller. The microcontroller is also programmed to control the point gun mechanism according to the signal from the computer through internet of things. We are also program the IC to sense the signal from the Metal Detector and PIR sensor to senses the metals & motion detection. Thus we can monitor the situation and can control the robot for surveillance from remote place and avoid the unauthorized person entry.

Keywords—Surveillance, IoT, PIR Sensor

INTRODUCTION

Technology has brought a dynamic and tremendous change in robotics and automation field which ranges in all kinds of areas. Surveillance is the process of close systematic observation or supervision maintained over a person, group, etc. especially one in custody or under suspicion. Thus surveillance is mainly required in the areas such as border areas, public places, offices and in industries. It is mainly used for monitoring activities. The act of surveillance can be performed both indoor as well as in outdoor areas by humans or with the help of embedded systems such as robots and other automation devices. A robot is nothing but an automatic electronic machine that is capable of performing programmed activities thus replacing human work, providing highly accurate results and easily overcoming the limitations of human beings. Thus replacing humans in the surveillance fields is one of the great advancement in robotics.

The robot consists of PIC microcontroller which acts as the heart piece of the robot. This robot also consists of DC motors, wheel chassis, battery, WiFi module and various types of sensors such as ultrasonic sensor for obstacle detection, PIR sensor for detecting pits. The robot can be either operated automatically or manually. User end communicates with the robot by implementing the concept of Internet of Things. This can be achieved through CAYENNE software, which is used for IOT developing projects.

The commands are sent to the robot by means of CAYENNE software and they are received by PIC microcontroller via Wi-Fi module since both are interfaced with each other. Thus the robot can be controlled in a wireless manner. In this project, we use wireless transmitting camera that provides audio and video information that can be received at the user end.

SYSTEM ANALYSIS

Proposed System

This project presents an intelligent unmanned secured robot using IOT, which is highly flexible and low cost effective. This Robot can go wherever the client wants. Mainly these securities Robot are placed in the border to detect the intruders from other countries. The highly flexible micro controller is connected to this robot. So the client can sends the commands to this micro controller and operate the robot. And another main specification of this robot is Metal detector. This metal detector can detect the landmines buried under ground or placed in the objects. Whenever the robot is detects the landmine or bomb the normal level of the signals are rise to high level and sends the alert message to PIC microcontroller which is a programmable IC where we can program it to control the motors according to the signal from the computer. Thus we can monitor the situation and can control the robot for surveillance from remote place and avoid the unauthorized person entry.

Advantages

- By interfacing IOT module with PIC, we can get unlimited range of operation.
- Robots can be operated in both manual and automatic modes.
- By using PIC microcontroller, the cost and complexity can be reduced.
- The communication with the robot occurs in a more secured manner.
- Wireless surveillance system can be useful in situations where it is difficult to lay cables – Museums, Heritage buildings, Industrial plants, etc.
- Wireless surveillance system is cost effective (when compared to wired networks involving Fiber Cables, Trenching, etc) to install and maintain.
SYSTEM DESIGN

Block Diagram

![Block Diagram of IOT based surveillance robot for defence]

WORKING PRINCIPLE

The input 230V AC voltage applied to Switched mode power supply. We are using the mobile in this project to control the robot using IOT technology. For controlling the robot, the signal is transmitted through the IoT using computer or Mobile phone. This signal is received by the IoT module and through the level converter interfacing circuit we can send the signal to the microcontroller, which is a programmable IC where we can program it to control the motors according to the signal from the computer. We are also program the IC to sense the signal from the Metal Detector and PIR sensor to senses the metals & motion detection. Thus we can monitor the situation and can control the robot for surveillance from remote place and avoid the unauthorized person entry.

SYSTEM REQUIREMENTS

Hardware Requirements
- Pic microcontroller
- Metal detector
- PIR sensor
- DC motor
- Relay
- LCD display
- IOT module
- Level convertor

Software Description

MP Lab

MPLAB is a proprietary freeware integrated development environment for the development of embedded applications on PIC and ds PIC microcontrollers, and is developed by Microchip Technology MPLAB X is the latest edition of MPLAB, and is developed on the NetBeans platform. MPLAB and MPLAB X support project management, code editing, debugging and programming of Microchip 8-bit, 16-bit, and 32-bit PIC microcontrollers.

MPLAB is designed to work with MPLAB-certified devices such as the MPLAB ICD 3 and MPLAB REAL ICE, for programming and debugging PIC microcontrollers using a personal computer. PIC Kit programmers are also supported by MPLAB.

MPLAB X supports automatic code generation with the MPLAB Code Configurator and the MPLAB Harmony Configurator plugins.

Microchip has a large suite of software and hardware development tools integrated within one software package called MPLAB Integrated Development Environment (IDE). MPLAB IDE is a free, integrated toolset for the development of embedded applications on Microchip's PIC and dsPIC microcontrollers. It is called an Integrated Development Environment, or IDE, because it provides a single integrated environment to develop code for embedded microcontrollers.

MPLAB IDE runs as a 32-bit application on MS Windows, is easy to use and includes a host of free software components for fast application development and super-charged debugging. MPLAB IDE also serves as a single, unified graphical user interface for additional Microchip and third party software and hardware development tools. Moving between tools is a snap, and upgrading from the free software simulator to hardware debug and programming tools is done in a flash because MPLAB IDE has the same user interface for all tools.

The MPLAB IDE has both built-in components and plug-in modules to configure the system for a variety of software and hardware tools.

Project Manager: The project manager provides integration and communication between the IDE and the language tools.

Editor: The editor is a full-featured programmer's text editor that also serves as a window into the debugger.

Assembler/Linker and Language Tools: The assembler can be used stand-alone to assemble a single file, or can be used with the linker to build a project from separate source files, libraries and recompiled objects. The linker is responsible for positioning the compiled code into memory areas of the target microcontroller.

Debugger: The Microchip debugger allows breakpoints, single stepping, watch windows and all the features of a modern debugger for the MPLAB IDE. It works in conjunction with the editor to reference information from the target being debugged back to the source code.

Execution Engines: There are software simulators in MPLAB IDE for all PIC micro MCU and dsPIC DSC devices. These simulators use the PC to simulate the instructions and some peripheral functions of the PIC micro MCU and dsPIC DSC devices. Optional in-circuit emulators and in-circuit debuggers are also available to test code as it runs in the applications hardware.
Proteus Software
The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards. It was developed in Yorkshire, England by Labcenter Electronics Ltd and is available in English, French, Spanish and Chinese languages.

Product Modules
The Proteus Design Suite is a Windows application for schematic capture, simulation, and PCB (Printed Circuit Board) layout design. It can be purchased in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation. All PCB Design products include an autorouter and basic mixed mode SPICE simulation capabilities.

Schematic Capture
Schematic capture in the Proteus Design Suite is used for both the simulation of designs and as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations.

Microcontroller Simulation
The micro-controller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control, temperature control and user interface design. It also finds use in the general hobbyist community and since no hardware is required, is convenient to use as training or teaching tool. Support is available for co-simulation of:
- Microchip Technologies PIC10, PIC12, PIC16, PIC18, PIC24, dsPIC33 Microcontrollers.
- Atmel AVR (and Arduino), 8051 and ARM Cortex-M3 Microcontrollers
- NXP 8051, ARM7, ARM Cortex-M0 and ARM Cortex-M3 Microcontrollers.
- Texas Instruments MSP430, PICCOLO DSP and ARM Cortex-M3 Microcontrollers.

CONCLUSION
In this system Interface sensors with PIC Microcontroller, Interface actuators(Motors) with PIC Microcontroller, Communication using IOT Module, many sensors are embedded on the PIC which sends notification through Wi-Fi and forwards it to the cloud. Using this robotic system a remote area can be monitored easily from remote end. One can easily monitor as well as control the activity of the robotic unit. This system can be used any conditions and areas where it is difficult for the security forces to reach.

FUTURE WORK
We can further extend this project by adding some more features which can make it more efficient and security oriented. Increase the level of sensors to accurate results and we can add some more arms to robot to injure the persons. And also increase the efficiency of the robot to move fast from one place to another and we can make these robot with heavy metals to so it can go under any hectic temperature and find landmines and bombs. We can use different types of sensor so that we can use robot in different field i.e. Temperature Sensor, Pressure Sensor, Heat Sensor, Position Sensor. A multipurpose robot can be made by wireless network, ranging from surveillance and home security to industrial applications where the user need not be present at the work place in person but can do it from his home itself. We can use this system for military applications installing suitable sensors.

REFERENCES

