

IOT BASED SHOOT AT SIGHT MISSILE

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Abstract: *As far as military applications are concerned many modern technologies and equipment's have been designed to provide the security over the borders, sea faces, aircrafts, etc. After a long research, it has been found that the ultrasonic radar based systems proves to be most useful, due to its highly accurate and optimized results. Also, the efforts are being made to avoid the actual presence of human intervention over such systems and to control them from anywhere around the world. Thus, this paper deals with a similar kind of system that tends to approach the today's need. Here, the robotic vehicle consists of a digital video camera used for live streaming of surveillance zone in control room, and then the ultrasonic sensor and a shooting missile are all built over a single bot. This not only helps to enter an area involving high risk but also to visualize the area and there by shoot whatever object user wants to. When the object enters the surveillance zone, then the robotic vehicle and hence the missile is adjusted via an android application in such a way that it targets the object. As it is an IOT based system, it can be controlled from anywhere, and beside this it allows us to take quick and immediate actions, without actually reaching and controlling the bot.*

Keywords: *PIC Controller, Internet of Things, Ultrasonic Sensor, Missile, Wi-Fi Module, Android Application, Dc Motors.*

I. INTRODUCTION

This innovative system is made for operations which involve high risk for humans to enter into the danger zones, especially for some criminal case, and may prove very beneficial in military areas not only for spying but also for shooting purposes. Human surveillance is achieved by deploying soldiers near sensitive areas to constantly monitor for changes. But humans do have their limitations, and deployment in inaccessible places is not always possible. There are also added risks of losing personnel in the event of getting caught by the enemy. With advances in technology over the years, however, it is possible to remotely monitor areas of importance by using robots in place of humans, thus saving their lives. Also this paper provides a key way to take the necessary actions such as shooting or not the desired objects along with spying the areas.

The backbone of this entire system is IOT which is nothing but a wireless communication for sending the commands from transmitter to the receiver end rapidly. Through IoT we can sense or control the objects remotely across any existing network, thereby creating a direct integration of the physical world into computer-based systems, which ultimately results into improved efficiency, accuracy and economic benefits in addition to reduced human intervention over a system. This IoT network technologies includes cellular, wi-fi, and Ethernet, as well as more specialized solutions such as LPWAN, Bluetooth Low Energy (BLE), ZigBee, NFC, and RFID used for transfer of data over different areas. Here the whole system is controlled via android application and a wi-fi module. The system in the control room sends control commands to the receiving circuit mounted on the vehicle through android device application. The receiving

circuit involves PIC microcontroller, ultrasonic sensor, relay, video camera, laser gun and a wi-fi module which receives commands sent by the Android app. The android application involves buttons A, B, C, and D for moving the vehicle and E, and F so as to control the Laser Gun (missile). Along with this, the object detection is also required for this autonomous robot. The robot gets the information from surrounding area through mounted sensor on it. Many sensing devices can be used for object detection like human body sensor, infrared sensor, ultrasonic sensor etc. But the Ultrasonic sensor is most suitable for object detection as it is of low cost and has high ranging capability.

Thus this system involves both missile and Robotic vehicle so that the system can be used to enter a high risk area and thereby take the necessary actions such as shoot, move and place whichever objects it wants to. Each and every movement of the vehicle will be recorded and can be viewed Live on a PC/LAPTOP wirelessly, as it includes night vision camera such as mini portable P2P WIFI IP web camera which will not only allow viewing whatever will be recorded in day time but also during the night.

II. LITERATURE REVIEW

Many research activities have been carried out in order to provide the security and gather the data from the critical zones where the human access is nearer to impossible.

In [1], the author has presented one of the simplest methods used for the surveillance purpose. Here a predefined range is stored in microcontroller in which if the object enters then it gets first detected by ultrasonic sensor, and then a SMS is sent to a concerned person using GSM and also a camera is used to capture the image of that object. The drawback found here was that the user cannot take an immediate action as he/she must reach that spot to check the camera footages each time, as the image cannot be sent over the GSM. Also this system is limited to small scale applications only, such as home or bank security

Another system based on the same ultrasonic radar technique is proposed by author in [2] which describes that if the intruder enters the surveillance zone then it gets first detected by ultrasonic sensor, then the arduino measure the distance and position of the object detected and further sends it to another defensive vehicle, which marches in the direction of intruder and explodes reaching near to it. But this system has got two major drawbacks, first is that the system is bit complex and bulky and another is that as the data is passed between two systems, the exact position and distance of the detected target may get altered due to the various electrical noises, which will ultimately result in launching the missile in wrong directions. For this the human control over the system is essentially required, which is not provided in this system.

With the advancement in technology smart phones are being used most widely today in many fields. One such technique of controlling the bot for war field operations is presented in [3], where the robotic vehicle comprises of a camera interfaced with raspi for surveillance purpose, and also it supports other applications such as fire extinguisher etc. This bot is controlled by an android application. Also the system is solar powered. Beside this numerous features it has got some limitations.

As the raspi is a mini computer and it needs to handle all the robotic operations along with providing the live streaming , it actually becomes very difficult to have a better quality video streaming, a high resolution images, which is very much essential in handling critical military operations especially for night vision purpose, and sometime the blur images are also obtained due to noise and in case of certain cameras such as Microsoft Live Cam HD-3000 that is interfaced with raspi, the video quality obtained is good but, its resolution is limited to a short

range ie 160x120 only [8]. This happens because raspi may not provide the sufficient power to camera and also interfacing the camera may create connection issue when the bot moves. This may sometime cause the improper functioning of raspi as it cannot support such heavy loads i.e camera and entire robotic operations. Thus in our proposed model , a low cost PIC controller is used that controls all the required operations of robotic vehicle(including shooting), and a separate high quality wireless video camera such as mini portable P2P WIFI IP web camera is used for live streaming. Due to this, there will be no compromise between vehicle operation and streaming.

Now as far as the security of android device which controls the bot is concerned, nowadays many smart phones have an inbuilt feature of fingerprint scanner. So, in our proposed model we have used the fingerprint scanner technique, rather than using a database to create a login id and password, as it can be hacked somehow. And in the case for multi user access, a strong database must be used such as SQLite and also technique such as 2FA (Two Factor Authentication) [7], must be used for a higher security purpose.

III. PROPOSED METHODOLOGY

Figure 3.1 Transmitter Section

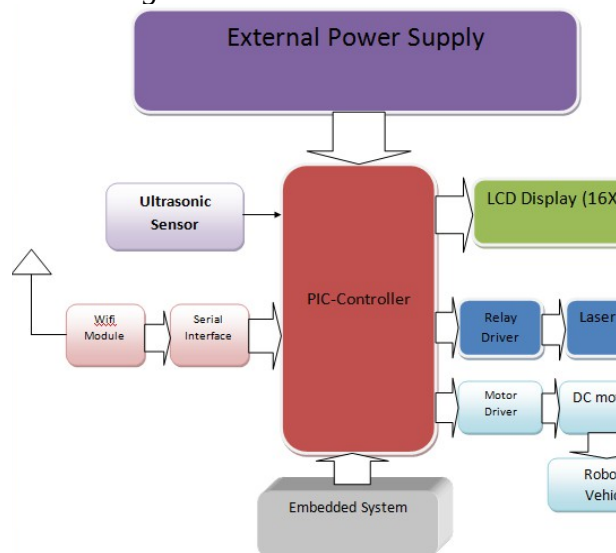


Figure 3.2 Receiver Section

Power Supply:

As the bot is going to be operated in the critical areas where the human access is very rare, there should be a continuous power supply fed to the entire system. One way to do the same is that making the bot solar operated, where a high solar energy trapping panels will be mounted above the bot. The trapped solar energy is divided into 3 parts: major part is provided for the functioning of bot (this can be done by using suitable voltage divider circuit), 2nd part of energy is stored in one battery for night operation and third small part of energy will be continuously fed to the another battery during the day time, so that it can be used in worst case when there is no sunlight. Solar tracking system can be used in order to store maximum energy as described in [2].

PIC Controller:

PIC16F877 is one of the most widely used microcontrollers along with arduino and raspi, especially in automotive, industrial, appliances and general user applications. Both the PIC and Arduino functions very similar to each other, but the main reason of using PIC is that its high operating speed ie 20 MHz and that of arduino it is 16 MHz. As this bot is to be used in military applications, there should be a quick and rapid response, which will be possible only when we go for a controller with a higher operating speed. Hence in the current system we have selected PIC as the controlling chip. It takes the necessary inputs from ultrasonic sensor and wi-fi module (i.e controlling commands) and as per that it controls the directions of robotic vehicle and also the shooting action of missile.

Ultrasonic Sensor:

The main purpose of using the ultrasonic. Sensor is to set a particular range for the surveillance zone and also to detect the exact position of the object, which is very much essential before launching the missile. Even though it is possible to see the object through video cam, but in that case we are not able to set a surveillance range and also to get the exact object position. Other sensors such as IR sensor, Human detector sensor, etc. can also be used. But the main purpose of selecting ultrasonic sensor is that it provides us with a long-range object detection facility and also it is possible to get the accurate object position. Its compact size, higher range and easy usability make it a handy sensor for distance measurement and mapping. Here we have used HC-SR04 ultrasonic sensor which has the detection range from 10cm to 400cm.

Wi-Fi Module:

The controlling commands that are given to bot from android application are through this long range wi-fi module. This is a low cost module that is easy to use and reliable based on ESP8266 chipset to be used along with a microcontroller PIC that configures and communicates through AT commands. Till now the cost of embedded Wi-Fi solutions was too high so as to implement. This module is changing the trend rapidly. It gives excellent working range and opening wide array of applications. Through this module we can communicate over a distance of 400 meters. For increasing the range say up to 2 Km, wi-fi module of qca9531 chipset can be used and so on.

Power Relay:

A relay of the type, Miniature Power PCB Relay T7N/T7N-WG SPDT is used here. It activates the missile on receiving the commands through android application via wi-fi module and PIC.

Motor driver Circuit and DC Motors:

This motor driver is implemented using H-bridge driver in IC-1293. This is basically meant for driving the motors in required direction. The motor used here are 12-volt DC motor with gear mechanism having typical features such as ,30-rpm speed with 2kg torque ,12 volt 250 mA operating voltage and current, High torque and the Voltage tolerance is up to 20 volts.

System Operation:

In this proposed model, the entire system comprises of a transmitter and a receiver section. In transmitter side we have an Android application device which comprises of 4 keys A, B, C and D in order to move the bot forward , backward , left and right, and 2 keys for launching the missile. The access to this App. is restricted to a single user as it based on finger print scanner technique. Also in this section we have used a PC or Laptop for live streaming of the entire surveillance zone.

At receiver side we have a robotic vehicle that is placed at the desired location i.e near borders , sea faces , critical zones etc. Now as it is possible to see the object live over the PC in control room, if the detected object by ultrasonic sensor is an intruder, then first the commands are given to the robotic vehicle to get set into the exact direction of the detected object and then by pressing ON key the missile is launched.

IV. FUTURE SCOPE

- Further a 360 degree rotating missile can be built over the robotic vehicle along with 4 ultrasonic sensors arranged in a square manner in order to shoot the object in any direction. Also a 360 degree spy camera can be used for streaming entire area around the bot.
- Metal detector can also be used in order to sense any hidden bombs and landmines.

CONCLUSION

The main objective behind the design of this system was to avoid the actual presence of human over the critical areas and to control all the necessary action from the control room itself with the help of android application. Also the special components used here such as wi-fi module esp8266, PIC controller, ultrasonic sensor, high quality video cam , enhance the performance of the system, thereby overcoming the limitations of other designs.

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