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MILITARY SMART BOT

Prabaharan J[*1], Dr. S Usha[2], Aakash Singh[3] & AVINASH Verma[4]

[*1,2,3&4]Dept of Computer Science and Engineering, Rajarajeswari college of Engineering, Bangalore, India

ABSTRACT

Throughout time the way war is fought and winning the war is getting more difficult. In the effort to safeguard the country against the enemy attacks and terrorists, the defense forces have to be more powerful to fight back. Many technologies are included every year in order to protect our land. At present the military is driven by Technology. To contribute in this smart and faster military technology, we propose an efficient way to surveillance the enemy and track records of enemy. The Bot will be size of an insect to avoid any suspicious or clue about the surveillance. Many features like wireless camera monitoring, communication through the Bot by the military. Arduino Microcontroller and Node MCU will be used to operate the bot. A camera will be attached to the bot for the monitoring.

Keywords: *Arduino, Node MCU, Insect Bot, Wireless Camera, Microcontroller, Cloud data, Military Bot.*

I. INTRODUCTION

The effort is constant to safe guard the country against the terrorist and enemy, the deference forces have to be more advance and power full. Need for non-human war machines is getting into more demand. As less militaries required and less harm to the army. Nowadays terrorist attacks and enemy attacks are getting more of common and we see other rivalry military entering the Indian premises without any permission and knowledge and set up their base camps in remote areas. If any military people tries to enter then the war starts. To enter the premises of other base camps and other location this surveillance robot can be used to monitor and get information of the area. Microcontroller will be used to implement this robot, Arduino Nano and a Node MCU combined will be used for running camera module and other sensors like DHT or temperature sensor. Zigbee will be used for a long-range transmission of signals. Many tiny motors will be attached to the foot for the free movement of the robot. The Complete robot will be powered up using 200mah cells. The robot will be made remote controlled i.e. the bot will be controlled using a wireless remote with access to camera monitor, this feature allows the military to control the robot movement and other features.

The user controls the bot with the help of the small device or a computer , the device sends the signal to the bot through the transmitter the bots receives the signal with the help of its receiver and runs the part which user wants it to be processed. During the process the bot records the audio and the visual data and sends the data over internet to the server and so the user can collect the information about the surrounding .

The insect military bot can work in many different type of dense places without any trouble and can go on missions for many days because of it auto recharge feature with the help of solar panels.

The solar panels would be small in size but it would be effective to charge the battery on time for the operation.

The bot will give the advantage to the military and help them with their work in very intense places.

II. RELATED WORKS

Many other surveillance projects have been designed to overcome the security issues and safeguard of homes, but there is no surveillance bot compared to the size of insect to help the military persons and improve our military systems. Some of the paper attempts to provide home security system [4] but has many drawbacks, like the bot is permanently fixed on wall, it has lack of movements. The components used are very costly and the wireless

system must be upgraded every time, and the interface is via a web interface. Other surveillance bot is designed to be controlled manually and the purpose of the bot is to roam in the given environment with real time data (video transmission).

Table1: Comparison of existing wireless video streaming [5]

Current Method	Methods employed	Parameters considered	Limitation
WiMAXs based transmission	WiMAXs	WiMAXs T&R	Fixed radius of coverage
Real time transmission of video and voice over network using raspberry p	Wireless Network	Raspberry pi	Sd Card
Real time transmission of video and voice over network using mobile	Streaming of video	MPEG4 streaming	Low Quality of video and more memory required
Using WIFI technology	Android, Sql database	WIFI enabled devices	Very expensive

We will be designing a surveillance robot which will be of the size of an insects. The bot will be used for monitoring the surrounding areas also. Because the military force finds it difficult sometimes to enter some premises and monitor so instead this bot can be used to send inside any premises and monitor the area. This can be very helpful in military bases. We will be using a ATMEGA 328 or ATMEL AVR or PIC microcontroller which will be work as a brain for our insect robot. The microcontroller also helps the user to control and command the bot from the base.

Fig.1. Some Microcontrollers (ATmega328 , ATMEL AVR, PIC)

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The robot can be controlled via wireless transmitter and receiver or through cloud servers. We are using cloud system for better performance because the range of the Transmitter and Receivers lies within the line of sight so to maximize this range we can use radio boosters or we can go for the cloud server connection, so with the help of the cloud server connection we can control the bot from any base in the globe.

III. SYSTEM MODEL

System modeling is a process of development of abstract model of a system; each model presents a different perspective of that particular system. System model is generally representation of the system in some graphical notation. In this part we will explain the system models and the architecture model for the Implementation of the robot.

A. Robot onboard System

The onboard robot system will consist of:

- Pixy CMUcam5 Image Sensor
- Black Bird2 3D FPV Camera
- Obstacle Detection Laser sensor
- Microcontroller
- Transmitter
- Mic

The image taken from FPV camera will operate at certain clock input. The clock for the camera will be generated by the microcontroller. There are three synchronization phases, namely FSYNC (frame sync), LSYNC (line sync), PXCLK (pixel sync). The FSYNC will notify the start of a new frame and it remains high as long as the camera is accepting pixels in the frame. The pixel starts to read in the horizontal manner i.e. pixel of one line is read at first and then followed by the transition in LSYNC.

The Obstacle Detection laser sensor will work for detection of the edges on the surface. We are going to place the sensor below the robot so if the robot is moving toward the edge it will be notified and will stop the movement towards the direction. This process can be done manually or automatically, We can simply write the algorithm if the distance below the bot is greater than 10inch then stop the process else continue the process.

We are using obstacle sensors for the safety of the bot so it will prevent our bot from falling from the heights.

The Small Microphone is used to record the available voice of the surrounding and transmits the recorded voice to the base camp with the help of microcontroller.

Transmitter is used for transmission of voice and video data to the base.

Servos are also connected to the body of the bot for the movement purpose.

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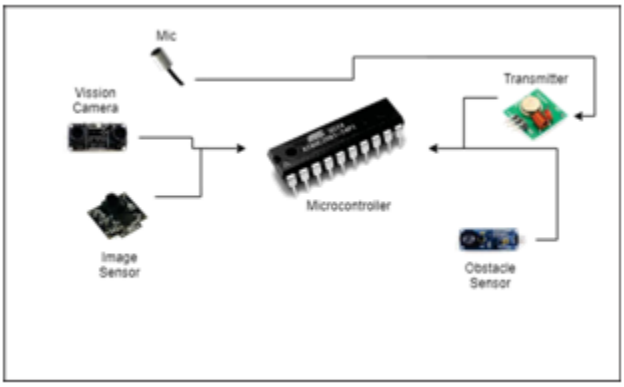

Fig.2. Robot on board system

B. Image Sensors and cameras

The Black Bird FPV camera by default takes 2048x1536 pixel images out of which we are interested only in 48x48 pixels. And the processed image or video recording will be transmitted to the monitoring device through antenna transmission. The onboard microcontroller Atmega 328, for maximum throughput for running the controller at 16 MHz.

The Black Bird2 3D FPV Camera generates the stereoscopic analog video in real time using the powerful FPGA chip

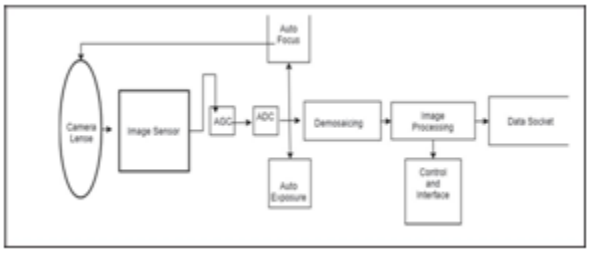

Fig2. Camera

C. Video transmission

Video transmission is the core element in the surveillance it acts as a video proof and we are able to see the video captured. In this the bot transmits the video wireless. The transmission is divided into two parts, the transmitter and the receiver, each of them is explained in detail below.

Transmitter

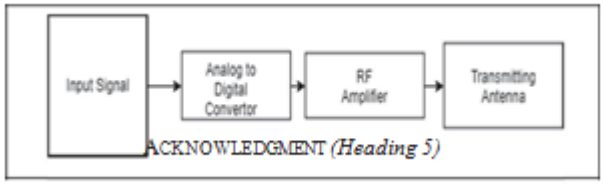

Fig 4. Transmitter block diagram

a. Input signal: Camera is used as input signal; the camera gives natural analog signal. The analog signal is then passed on to A to D converter.
b. Analog to Digital Converter: This is used to convert the analog signal to digital signal i.e. a binary form.

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c. Radio-Frequency: It amplifies all the high frequency signals used in the radio communication.
d. Transmitting antenna: This is a device which converts the signal into waves and transmits

Receiver

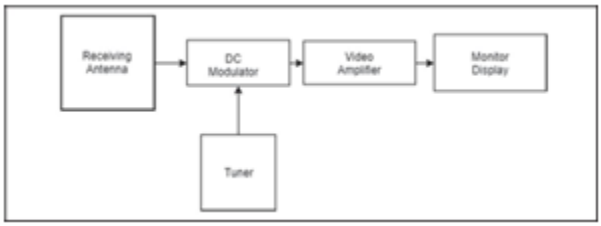

Fig 5. Receiver Block diagram

a. Receiving antenna: This is an antenna which receives the wave signals transmitted by the transmitter.
b. Dc modular: it provides correct amount of voltage in order to amplify the video streaming.
c. Video amplifier: This removes and filters all unwanted pixels and improves the quality of signal.
d. Monitor: Electronic device used to display the video streaming.

IV. SYSTEM ARCHITECTURE

The system architecture for the flow of process and the backend flow contains different modules and a live server for monitoring the bot.

All the components are driven by the Microcontroller. Based on the video processing the motor driver is controlled if there is no one to operate the robot. The process is divided into the phases. – Recording or input stage, -Processing stage, - action phase.

The recording or input phase gathers all the basic surrounding details and also transmits the video stream to the monitor. The Processing stage performs set of algorithms on the video to understand the situation and lists all possible actions that be taken. The action stage performs the actions will be given to the bot.

The data transmitted from the bot is received by the receiver present at the base, the audio and the video file get stored on the server automatically while doing live recording of audio and video.

The bot can also be used as a tiny bomb while doing the process it can self destruct itself and can make a small but effective flash effect for some time or making the bot to store some poisonous chemicals.

The Mic records the available voice in the current location and transmits it to the user.

The robots legs are controlled remotely by the user for the movement of the bot in different directions.

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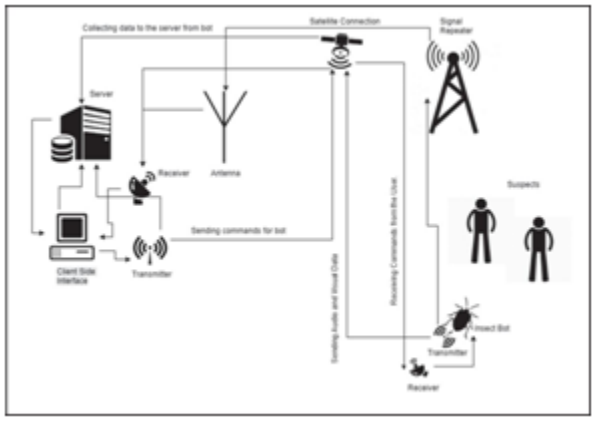

Fig 6. System Architecture

V. FLOWCHART

At first the Microcontroller checks if all the sensor is working, once it receives a positive reply then it indicates through controller and then the robot is controlled through the remote place. The bot can be used to monitor any human or place without letting them know, This bot can be used to enter remote areas and premises where no humans can enter.

Once the bot starts its process it records audio and visual data and sends it to the user through remote communication line of sight or through cloud server

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Fig 7. Flow Chart

VI. CONCLUSION

This surveillance can prove boon to the military and Army service. This robot is controller based so that it can be controlled by the soldiers. And there is no need for any training required to use this robot. This project is developed by aiming to help the military and police forces in order to maintain peace and security in the country. The bot is easy to use and handle, client and server side process both are user friendly.

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