

Military Surveillance Robot

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Abstract:- The main objective of this project is to design a system that will be useful in military real time applications. The proposed Raspberry-pi based robotic vehicle system is designed to save the precious human life in some dangerous fields such as military during hostage situations. During war or when military people enter uncharted territory (hostage situations) they will sometimes become victims of surprise enemy attack. This robotic vehicle is a new method to trace out the enemies and use that information to make a tactical move. It is having all the necessary accessories to trace enemies like: long range camera which captures and live streams the video to the control station, sensors to detect the presence of human being and GPS/GPRS system to determine and transmit the position of the enemy targets. The system can substitute the soldier in border to provide surveillance as well for reconnaissance circumstances.

Keywords:- Robot, Arduino Uno, Raspberry Pi, Camera, Sensors, Android smartphone.

I. INTRODUCTION

Military personnel face many unique challenges on a daily basis in their work compared to civilians. Many of these challenges can be aided or overcome by having more information at the right times. Intelligence is generally gathered in many ways including covert operations, communication interception, interrogation, aerial surveillance, and ground surveillance. All of these techniques help gather intelligence that can promote successful missions and save the lives of troops on the ground. One of the most direct and relied upon forms of this intelligence is ground surveillance. Ground surveillance is so key because there is no more reliable intelligence that a person on the ground having visual confirmation of a target. Unfortunately, ground surveillance can also be the most dangerous form of intelligence gathering because of the proximity to the target that is required by the personnel on the ground. Covert operations are designed to be secretive, interrogation doesn't involve risk to the personnel conducting it, and aerial surveillance

can now be easily done by unmanned drones. Ground surveillance however typically requires a soldier or reconnaissance team to physically see target, putting them at risk. This creates a need for an unmanned device that can be used on the ground to perform the reconnaissance without the need of a human being with it.

II. RELATED WORK

J. Azeta, C.A. Bolu, D. Hinvi, A.A. Abioye, H. Boyo, P. Anakhu, P. Onwordi [1], "An Android Based Mobile Robot for Monitoring and Surveillance", *Procedia Manufacturing*, vol. 35, pp. 1129, IEEE 2019. They developed a sustainable surveillance robot that is cost effective using an Arduino microcontroller together with a motor shield and an Android smartphone that runs the Operating System. The robot consists of a video camera and Wi-Fi robot link. Smartphone come with superb hardware that satisfies the above needs. This can be leveraged upon through the use of APIs (Application Programming Interfaces) that is provided for the operating system.

Harindravel, Letchumanan [2], "Mobile Robot Surveillance System with GPS tracking" 2013. GPS (Global Positioning System) is satellite based navigation system which provides global coordinates of current location of autonomous robot. The user gets current coordinates of robot using GPS and provides the coordinates of final location where robot has to reach with minimum distance coverage and collision with nearby objects.

Mubarak Shah, Omar Javed, Khurram Shafique [3]. The AVSS comprises of object detection, object tracking, object classification, behavior analysis, and action tasks. The object detection task detects the object such as a person, vehicle, or an animal in digital images and videos. Object tracking task is used to generate the trajectory of an object over time. Object classification task is used to label the detected object as a person, a group of person, vehicle, or an animal.

Deepika R, Prathyusha K, Amulya P [4]. This paper shows the framework on vision based interface that has designed to instruct a humanistic robot through gestures using image processing. Image predefining and blob detection techniques are used to obtain sign language. Then we evaluating the images to recognize the gesture given by the user in front of a web camera and take relevant movements (like clicking picture, moving bot, etc). The application is developed using Open CV libraries and Microsoft Visual C++. The movements obtained by processing the live images are used to command a humanistic robot with simple capabilities. A commercial robotic human toy robot Robosapien was used as the o/p module of the system. The robot was consolidate to

computer by USB-UIRT (Universal Infrared Receiver and Transmitter) module.

K. Shantanu [5], explained the design and implementation of a wireless robot. This robot is controlled by the internet and it uses the PIR sensors for detecting the living bodies. Also, the robot is equipped with a camera which is controlled through a web page.

P. Surendra [6], Designed a video surveillance robot for monitoring purposes. The robot is able to detect human movement. They proposed a low cost four wheels surveillance robot by using Arduino microcontroller and ZigBee technology. The system is very suitable for monitoring especially in areas where there is no internet.

III. METHODOLOGY

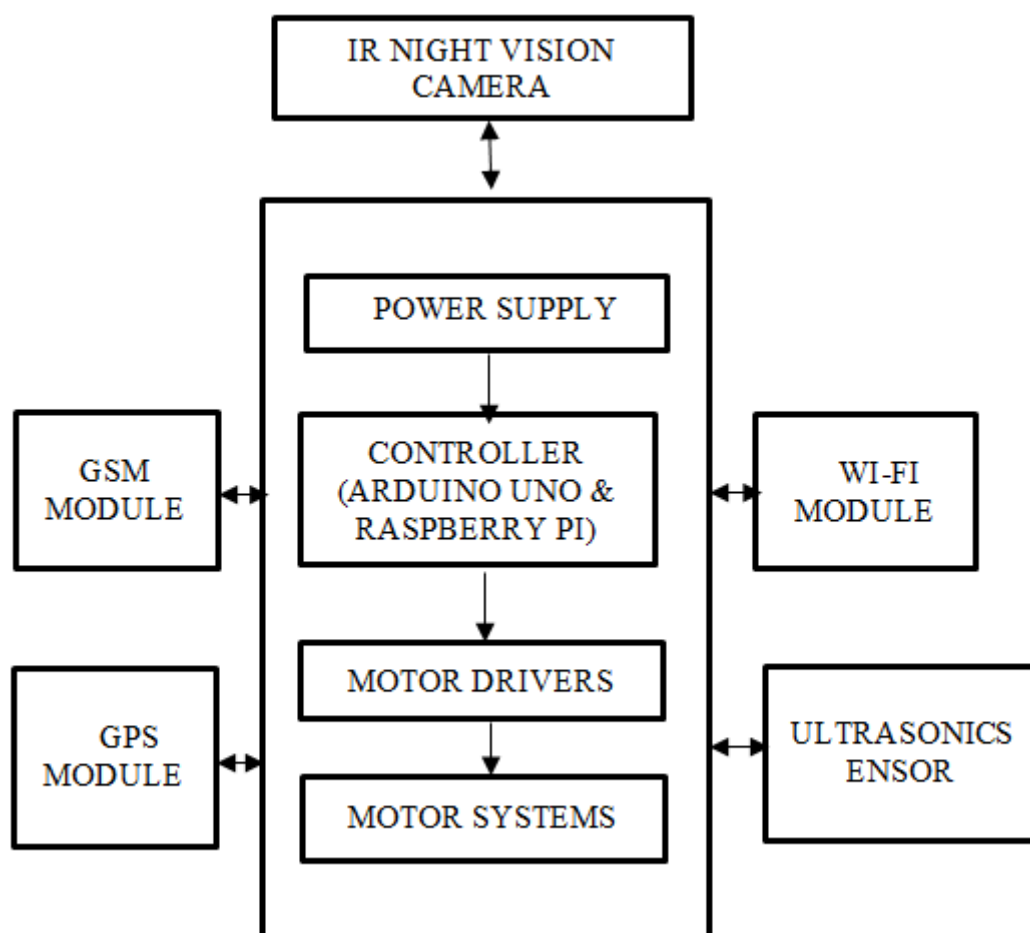


Fig 1:- System Architecture

The Robot is controlled by Arduino Uno and Raspberry Pi. The Arduino Uno controls the Motor system and Raspberry Pi controls the Visual system.

Motor drivers acts as an interface between the motors and the control circuits. Motor system is used to move a robot with a desired speed and the Ultrasonic

sensor is used to measure the distance from robotic vehicle to an obstacle. Wi-Fi module is used for communication between robotic system and control unit. GSM and GPS modules are used to determine and transmit the position of the enemy targets and long range camera will captures and live streams the video to the control station.

IV. FLOW CHART AND WORKING

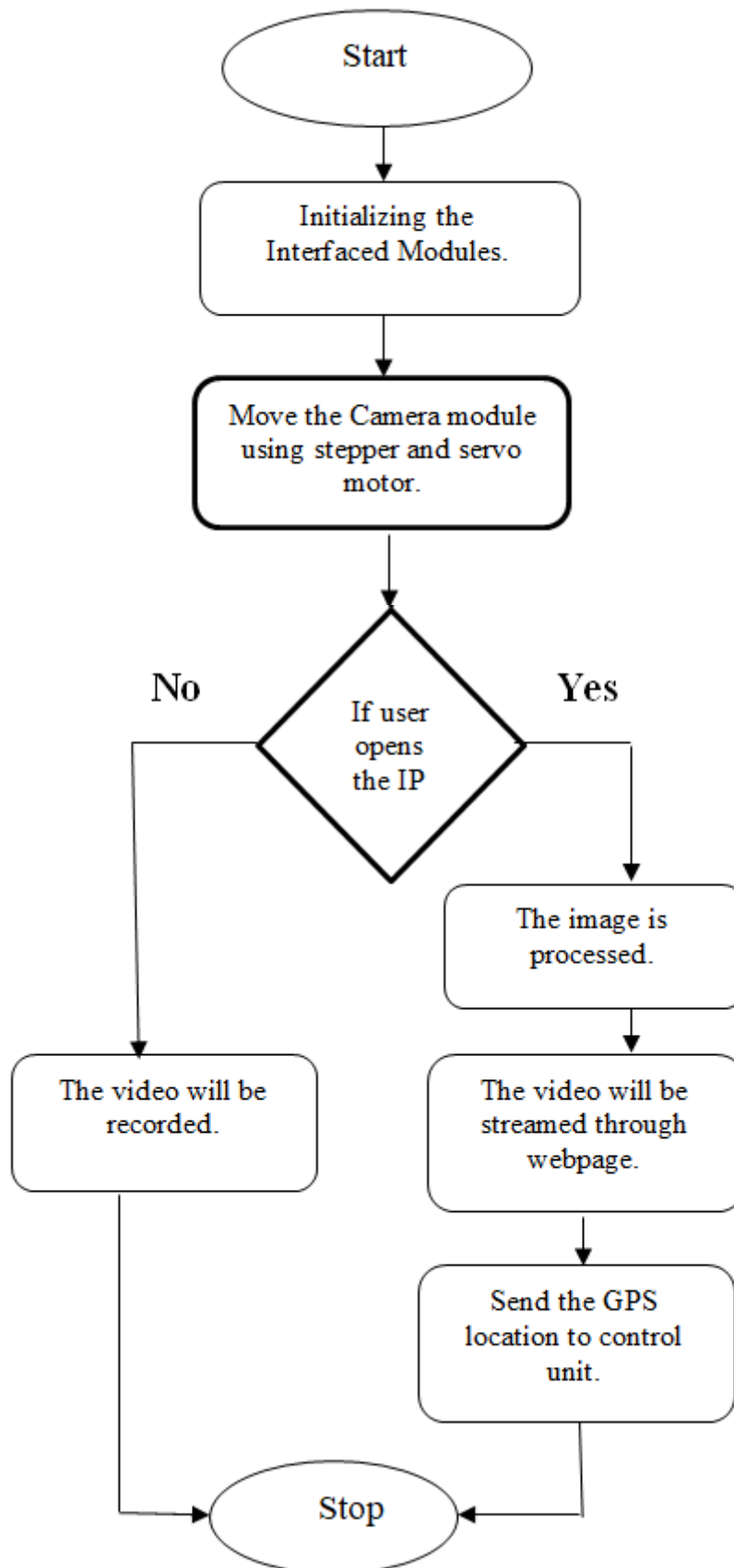


Fig 2:- Data flow diagram

This project presents a modern approach for surveillance at remote and border areas using multifunctional robot based on current IOT used in defense and military applications. The robotic vehicle works both as autonomous and manually controlled vehicle using internet communication medium. The system consist of Raspberry-pi/Arduino Uno microcontroller, Node MCU Wi-Fi, motor drivers for Stepper motor which is used for the movement of the robot, stepper motor system with drivers to accurately position the long range high resolution camera, independent of the movement of the robot, to capture images and ultrasonic sensor to find the distance of the object from the camera. GPS/GSM system is used to get location details of the enemy target. The communication between the base station and the robot happens through modern Wi-Fi module. Communication between the camera and its Graphical interface is done serially. Camera is used to take real time video and the captured images are compared with the images stored in the database. After verifying the captured images with the data base, appropriate commands are issued to the robot using the GUI.

V. CONCLUSION

The “Military Surveillance Robot” is a highly helping system with the help of cell phone or laptop through Wi-Fi medium and can get the live streaming of video over areas such as border areas, multinational companies and in industries. The robot will roam around and capture videos from the surrounding to keep a record of details of incident happened. With the help of this robot we can know the real time condition of border area without using any human source. The robot gives us the live steaming video according to that we give the command.

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