

# Two Module Approach for Surveillance Robots for Better Reusability

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**Abstract** – In the modern world, human life is considered very precious in almost all parts of the world. Pre-modernization this was not a common scenario. People had to risk their lives for menial tasks which are now handled by robots. Robots have replaced humans in many fields which can be either good or bad. Bad – people consider machines have made them jobless by replacing them. Good - machines can work in dangerous situations instead of humans so many lives are saved from being endangered.

Surveillance is one such scenario where many spies had to endanger their lives to get Intel on enemy forces. This task is handled mostly by a country's intelligence agency and it is considered as one of the most important functions for that agency. Moving robots with a camera can be always better than stationery cameras which are easy to find and disable. Also, if the robot is streaming the live to the source, then even if the robot is found by enemies, the footage is safe at the receiver's side. If the video is streamed over a wireless network then it is independent on internet availability. This project uses a Raspberry Pi Camera to capture the video and an Arduino UNO to control the motors to move the robot using a L293D H-bridge motor driver.

**Keywords** – Camera, Surveillance, Security, Controller, Raspberry Pi, Wi-Fi, Arduino, Robot, PC.

## I. INTRODUCTION

Surveillance is used to observe a location, a person, an activity or just regular observation for security and ease of catching a perpetrator. It is mostly done with permission from higher authority by police or the military. Even some households, businesses and public places like gardens have surveillance mechanism installed. Some companies use surveillance to monitor employees to improve productivity.

In this project, we have aimed to develop a robot with the intention of improving Intel gathering process and also to survey inaccessible places in case of an emergency. This is achieved because the robot is smaller than human body so can fit in narrow tunnels, cracks in old buildings or even in bore-well holes.

The robot is divided in two modules, one, the lower movement module and two, the upper camera module. The lower module uses an Arduino UNO with an HC-05 Bluetooth chip to control the motors whose rotation will decide the direction in which the robot moves. The upper module uses a Raspberry Pi board with a camera mounted on it to connect to the wireless Wi-Fi network and stream the video through the network. Any device connected to the network can access the live video so the network needs to be protected. Any new features that need to be added are added to the upper module.

The reason to divide the module in two parts is so that the movement module can be changed as per the terrain

effortlessly. Like, in water, the movement module can be made using thrusters.

## II. EXISTING SYSTEM

Existing robots are made as a whole and not as separate modules. They are controlled with a remote. This approach makes the robot less flexible for modification. Also, the security is compromised and lesser efficiency is obtained. Current systems are also very expensive to build and maintain.

Here are some of the papers which we have used as a reference:

Jonathan Garcia et.al has done a work on robot for security patrolling assistance. The robot was designed with flipper arm mechanism, camera, Wi-Fi module and some sensors like ultrasonic, thermal and sound sensor.

Widodo Budiharto et.al have designed a surveillance robot using neural network. Here, they have done experimental work on robot with shaft encoder.

Tarunpreet Kaur et.al have made a wireless robot for military application. The robot is operated using Dual Tone Multi Frequency, which can be controlled by mobile.

Anas f. Ahmed et.al have done a work on a robot for surveillance using ATmega328. The connection here, between the GUI and controller is made possible due to the usage of MT7620 integrated circuit, which helps to monitor the location.

### III. PROPOSED SYSTEM

This system will comprise of two modules: (1) the lower, movement module and (2) the upper, camera module. The lower module will be comprised of motors that have wheels connected to them and a belt over these wheels for extra grip. These motors will be controlled with an Arduino UNO programmed with C language. The Arduino cannot drive these motors by itself, so an L293D motor driver is used to power the motors. Any H-bridge motor driver can be used instead of L293D. A 12V battery is power the L293D motor drivers but any voltage from 9V to 24V can be used. The commands are given to the Arduino by an HC-05 Bluetooth module. An ESP8266 Wi-Fi module can also be used in place of the HC-05. The upper module has a Raspberry Pi Model B+ with a 5MP Pi-Cam attached to it on board. The video captured through the camera is streamed through a Wi-Fi network to which the Raspberry Pi is connected. The Raspberry Pi is programmed using Python and has on board Wi-Fi and Bluetooth. It also has a socket to attach the camera. It is loaded with a 16GB SD card with Raspbian OS installed on it. The Raspbian is a Debian based OS that was made for the Raspberry Pi.

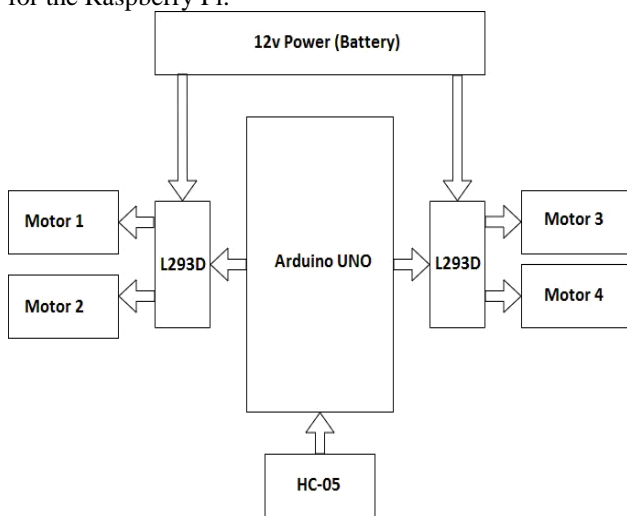


Fig.1. Lower Module Block Diagram.

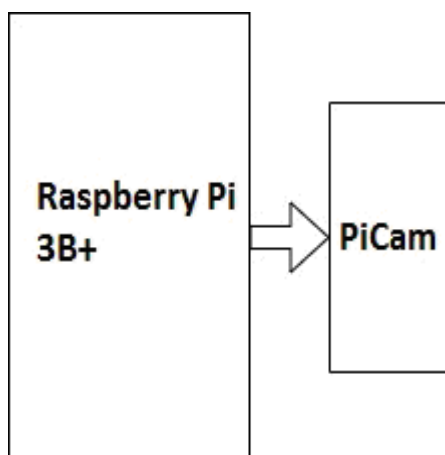


Fig.2. Upper Module Block Diagram.

#### 1. Applications:

- The robot is small in size so can be used for spying.
- This robot can be used in the borders for disposing hidden land mines.
- The robot can be used for surveillance or reconnaissance.

### IV. CONCLUSION

Smart phone or an android device can develop effective remote control program. At the same time, this program uses Bluetooth connection to communicate with robot. It has proven to allow for meaningful two-way communication between the Android phone and the robot. The Multi-Purpose Military Service Robot has been designed in such a way that it can fulfill the needs of the military, the police and armed forces. It has countless applications and can be used in different environments and scenarios. For instance, at one place it can be used by the armed forces, military purposes, while at another place it can be used for spy purposes.

### V. ACKNOWLEDGMENT

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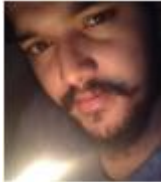
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