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Wireless Multipurpose Military Spybot

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Abstract- **Recent scenario in military has faced many loss of human life. In order to reduce the human loss, a camouflaged robot can be used. For the purpose of surveillance without manpower, this remote controlled robot is used. This is a surveillance spying robot using an Arduino UNO and a remote control, which is cost effective. This surveillance robot consists of GPS, Mobile camera, Metal detector, Gas sensor. This mentioned hardware satisfies the above needs. The robot can be controlled remotely using the IR remote control series. To capture and archive the real time video from the robot, the mobile camera is utilized. Live streaming of the video can be monitored through internet and it also can be recorded for further purposes. Two gear motors are used to control the movement of the robot. Metal detectors along with the gas sensor can be able to find any metal components on the way in which the robot moves. Location of the robot is also been monitored using GPS. This robot moves in all the direction also it monitors the area by providing live video streaming through internet and the location of the robot is noted. The robot senses for the metal explosives using the sensors and metal detector.**

Keywords- Surveillance, Live streaming, location.

I. INTRODUCTION

Surveillance is the process of monitoring a situation, an area or a person. This generally occurs in a military scenario where surveillance of borderlines and enemy territory is essential to a country's safety. Human surveillance is achieved by deploying personnel near sensitive areas in order 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 possibly to remotely monitor areas of importance by using robots in place of humans. Apart from the obvious advantage of not having to risk any personnel, terrestrial and aerial robots

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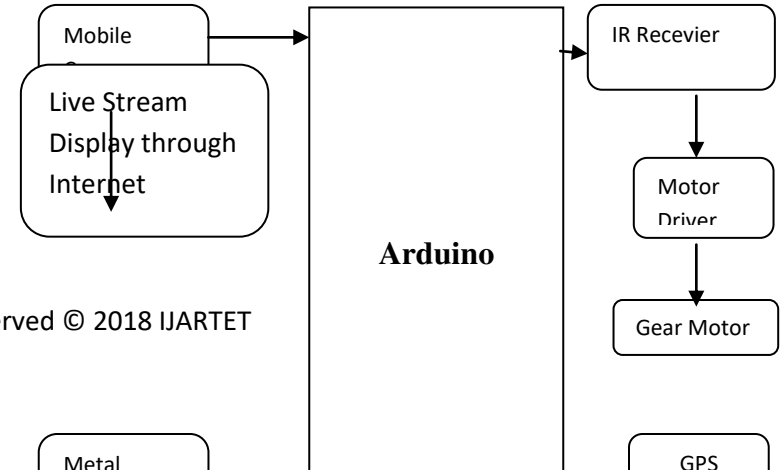
can also pick up details that are not obvious to humans. By equipping them with high resolution cameras and various sensors, it is possible to obtain information about the specific area remotely. Satellite communication makes it possible to communicate seamlessly with the robots and obtain real-time audiovisual feedback. Thus, in recent times, surveillance technology has become an area of great research interest. However, building a small robot for testing and research purposes proves to be extremely expensive. Primarily because a security robot would require certain components such as a GPS module (Global Positioning System), High resolution cameras, etc. Each of these components is quite expensive and piecing them together for the purpose of a robot is a very costly and time consuming affair. Moreover, a lot of time is wasted in writing driver code to interface all these components. The solution to this dilemma is quite simple. It is our aim to build a fully-featured surveillance robot using an easily available mobile camera, sensors, etc. which can be remotely controlled.

II. RELATED WORKS

The field of surveillance robots is quite popular. A lot of work has been done in navigational algorithms and control system of wireless surveillance robots. A common theme is also the use of a camera on the robot in order to receive live video feedback. Wireless robots made using the Arduino microcontroller have been implemented, but wireless communication occurs using the self programmed protocol, which may cause to loss of the robot. A robot which performs live streaming using the camera through internet using mobile camera has also been implemented. However, this method is limited by the processing power of the phone, a problem that we have addressed by remotely performing all processing operations on a different computer, after transmitting the camera's feed. Our project is rather unique in the sense that it is a low-cost solution that offers the ability to remotely control a robot, also offering video feedback.

III. SYSTEM DESCRIPTION

Our system consists of a remote control and a robot. The robot is controlled by a using remote. The robot consists of a mobile camera; an Arduino microcontroller to control the robot's motion, and the requisite hardware (motors, chassis, power supply, etc.), metal detector and sensors. The user controls the robot by sending control signals using the remote. The IR remote control series then forwards these signals to the Arduino Microcontroller, which then moves the robot in the required direction. The camera on the Android smartphone is used to send video feedback to the remote user simultaneously over the internet. This enables the user to navigate the robot remotely. Additional processing can be performed on the video feed on the remote computer. A visual representation is shown below.



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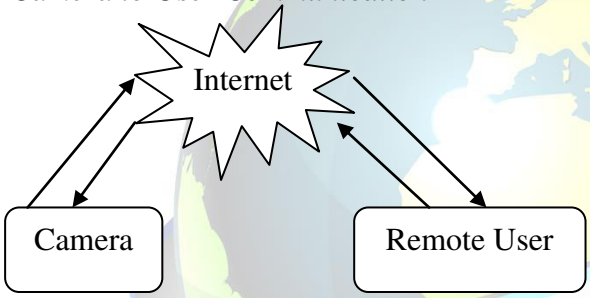
Block Diagram depicting the function of Military Spybot

IV. MODULES AND INTERFACES

1. Camera to User Communication



Block diagram for user communication

Surveillance of the location takes place with the help of mobile camera. Live video streaming, video recording are some of the possible tasks performed using the camera. One of these is for transmitting the video feed to the remote computer. For this purpose, we have used a freely available Android app called IP Webcam. The ability to save and play back the video feed has also been implemented. Navigation of the robot based on the video feed is implemented using the remote control.

2. Arduino to Remote User

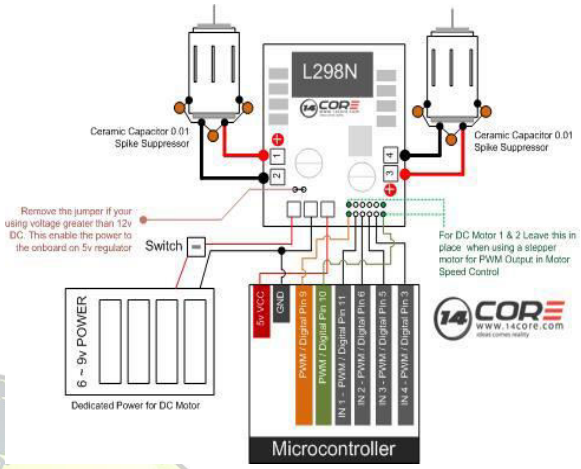


Fig. Circuit diagram for motor Driver IC

The Arduino is connected with the IR remote control series through which the movement of the robot is controlled. The Driver IC makes the gear motors work and makes the chassis wheel to rotate in the required direction. The circuit diagram for the driver IC is given below,

3. Arduino Implementation

In our system, we have used an Arduino Uno Microcontroller. The Arduino project provides an integrated development environment (IDE) based on Processing, and programming is done using a language based on Wiring, which is very similar to C++.

The Arduino microcontroller is configured to receive serial input from the IR remote control series and subsequently control two DC motors (2 rears). Upon receiving the hexadecimal codes from the IR sensor, the Arduino generates two control signals per

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DC motor. For e.g, on receiving 0x00 to indicate a forward motion, the code on the Arduino sends one HIGH and one LOW on each pair of control signals. A backward motion would involve inverting of the same, and so on. Since the Arduino cannot directly power a DC motor due to insufficient current, motor drivers, with their own power supply are used. Each motor driver is capable of controlling 2 DC motors. Hence, two motor drivers are used. In our implementation, the Arduino sends the control signals to one L298n motor drivers each powered by a 12 volt battery. The metal detector senses for any metal substances in the path in which the robot moves, in case of finding any metal substance, robot indicates it with the help of LEDs.

V. RESULT

This robot is configured using arduino UNO and its movement is controlled using the motor driver IC. The overall robot is provided with a power supply of 12V rechargeable battery. The gas sensor and the metal detector together sense for any harmful explosives in its path and make a warning using the LED. IR remote controls the movement of the robot. The mobile camera fixed in the robot does the surveillance and provides live streaming of the robot's location through internet. Using the recorded video can be further used for verification purposes.

VI. SCOPE FOR FUTURE WORK AND CONCLUSION

This project offers a lot of scope for adding newer features since all processing is done remotely; there are no resource constraints apart from the bandwidth of the network. We can program the robot such that it can detect objects and reach them on its own. Thus, we can make it completely autonomous. Also, with the presence of GPS navigation and mapping software, the robot has the capability of finding the best route possible to reach a certain location. Also, by making it sturdier and giving it extra protection, we can make it an all-terrain robot, which would make it ideal for a surveillance robot. There is also the option of adding sound processing to the remote computer, thus giving it greater surveillance capabilities. The possibilities are endless. This robot in its current state provides a platform for further research into improving its capabilities.

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