ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 5, May 2017

Unmanned Gun Control Vehicle for Today's Army

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Abstract: **Nowadays robots play an important role in human beings day-to-day life. And Life is very important. Soldiers form the backbone for their country and they are very precious gem to their country. So soldier's life becomes more valuable. So here is a project which performs the functions of a soldier like firing, walking into the field. With the help of sensors and wireless camera the robots acts as a soldier and the commands are given to the robot through android app**

***Keywords*: PIR sensor, Proximity sensor, Clap switches, LED and Smart phone**

I. INTRODUCTION

Unmanned robot vehicles are increasingly being used in a variety of military missions. One such mission is that of Intelligence, Reconnaissance, and Surveillance. In these missions, unmanned robot vehicles collect sensor data and communicate it to ground, air, and space assets to support decision-making. The model comprises of an Android app controlled robot. Transmitter is the robot which provides the conditions of the surrounding environment and sends to the Android phone through Bluetooth module.

Receiver consists of Android phone with Bluetooth module through which the commands are send. The robot observes for any noise within its locality, if any sound like, firing towards the Tanker gets noticed a motor turned towards it which has got a rifle on it will start firing back towards the enemy region. Another DC motor has been fitted with wireless camera on it to observe the surroundings where the Tanker is moving.

Clap switch which senses any sounds around it will make its bit high and passes it to the microcontroller, the particular duration PWM signal will be sent to the servo motor which makes its shaft to rotate the firing point of the rifle towards the enemy and starts firing. Another servo motor will be controlled by the user so that he can adjust the direction of the camera and sense any foreign object. The movement of the robot is mainly based on the commands send through the Bluetooth of the Android smart phone.

II. LITERATURE SURVEY

While engaged in the Global War on Terror, our soldiers have discovered the need at the small unit level for a non-line of sight, man portable, lethal, unmanned device that could be used to gain entry into a building by blowing the door, kill enemy personnel or disable soft skinned vehicles without a soldier ever exposing himself to the enemy and while minimizing collateral damage. This capability could potentially save soldiers lives and increase the combat effectiveness of our units currently deployed in combat zones. Our project team will evaluate several alternatives and provide a recommended solution for such a device to provide these capabilities to the soldier on the ground. Currently, the US Army - specifically special operations command (SOCOM) and the US Marine Corps operate with small and unmanned surveillance equipment. None of these systems however have a lethal component. Additionally, they are currently all operated primarily at the company or battalion level. Other unmanned aerial vehicles are equipped with a lethal capability but they are too heavy and require too large a launch footprint to be effectively employed by small unit ground forces. FMI 3-04.155 (army unmanned aircraft system operations) is the current field manual which outlines the effective employment of current UAS in the inventory [3]. Currently, there is a noticeable capability void which can be best addressed by a system which incorporates the flexibility of a smaller man portable UAV with the lethality of one of the larger systems. Our study seeks to find a solution which will address this capability void [1].

In aerial photogrammetry, aerial photographs are acquired using aerial camera and light aircraft as a platform. The aerial photographs are usually processed for mapping such as for production of topographic map and other special purpose map known as thematic map. However, this method is expensive and suitable for large area but it is not practical for mapping small area. This study concentrates on the use of high resolution digital camera and a very light platform known as unmanned aerial vehicle (UAV) as data acquisition system in capturing digital aerial photographs. The acquired digital aerial photographs were processed using image processing software to produce digital map and digital orthophoto. The

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
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results showed that an accuracy of sub-meter can be obtained using the employed method. In Geographical Information System (GIS), it is quite common that topographic map and orthophoto are used as a base map. Hence, the findings from this study could also be used as an input for GIS. Not to forget, the photogrammetric technique could be used not only for mapping but it could also be used for any environmental protection and conservation [2].

Unmanned aerial vehicles are increasingly being used in a variety of military missions. One such mission is that of Intelligence, Reconnaissance, and Surveillance. In these missions, unmanned aerial vehicles collect sensor data and communicate it to ground, air, and space assets to support decision-making. The ultimate purpose of the research reported in this paper is to define the requirements for a new unmanned aerial vehicle that improves the existing Intelligence, Surveillance, and Reconnaissance System-of-Systems. This paper describes the modeling approach, validation, and sensitivity results for performance of a single new unmanned aerial vehicle supported by other assets, as well as reliability, robustness, and baseline performance for an entire set of unmanned aerial vehicles [3]

This paper investigates the feasibility of using commercially available, low-cost IR reflective sensors for micro- to sub-micron scale position measurement and control. These sensors are typically used as optical switches; however, their application for detecting fine motion, such as the movement of a piezoactuator, has not been investigated. Five IR sensors were evaluated to determine their range, resolution, linear distortion, noise characteristics, and bandwidth. Experimental results show that the performance of the IR sensors compares well with a commercial inductive sensor that costs significantly more. For example, the measured resolution was within several hundred nanometers over a plusmn200 mum range and the linear distortion was significantly lower than the inductive sensor. A selected IR sensor was used in the design of a state-feedback control system to compensate for hysteresis and creep in an experimental piezopositioner. Compared to the open-loop system, by using the IR sensor in feedback, the output hysteresis was reduced by over 95 %. These results show the potential of such sensors in the design of low-cost micro precision mechatronic positioning systems. [4]

The paper describes developments in the field of infrared road traffic sensors. It first discusses active and passive vehicle sensors. It then discusses pedestrian sensing systems and how they may be used to extend crossing time at a controlled crossing. [5]

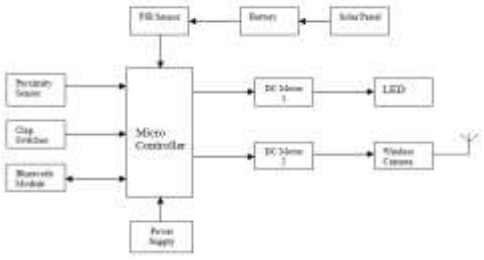
III. OBJECTIVE OF THE PROJECT

To design and analyze a monitored unmanned vehicle. Implementation of pc based control unit for unmanned vehicle with automatic firing. Ground vehicle movements are controlled through an app in Android phone. Efficient design of driver circuit which sense the obstacles and capturing the images of the surroundings.

IV. PROGRAM FORMULATED

Keeping in view, the area of responsibility given to Army and availability of man power, sometimes it is not at all possible to guard some vulnerable point round the clock, at that time it becomes imperative to develop and electronic system through which the weapon can be operated remotely or automatically. To overcome this problem we have designed a unique system that is an auto firing device, which senses any obstacle/object in its way and fires towards it. The device picks up any high intensity sound around its area and fires back in the same direction. This device can also be used as a spy ground vehicle as it comprises of a web camera which continuously gives the video of the surrounding areas onto the TV monitor.

V. IMPLEMENTATION



Transmitter section block diagram

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 5, May 2017

The transmitting section is nothing but the vehicle which mainly consists of a microcontroller along with the sensors. The sensors provide the information about the surrounding environment where as the wireless camera provides the display of the environment around the robot which is movable.

Clap Switch

The clap switch circuit is a circuit which operates by clapping from a remote point. When a person claps once, the first output of the circuit is turned on. If there is another clap, the second output is switched on and then another one will cause to energize the third output. Whenever there is any such noise, it is picked up by the clap switch and the rifle which is attached to the module, turns towards the direction of the noise with the help of the servomotor and fires.

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IR sensor

The IR sensors are generally used for object detection. The output of these sensors is in analog voltage format. It varies with Distance from Object. It is easily available in the market and it is easy to interface. It is highly influenced by Environmental Noises like Ambient light, radiations etc.

Servo Motor

Servos are DC motors with built in gearing and feedback control loop circuitry and no motor drivers required. Servos are extremely popular with robot, RC plane, and RC boat builders. Most servo motors can rotate about 90 to 180 degrees. Some rotate through a full 360 degrees or more. However, servos are unable to continually rotate, meaning they can't be used for driving wheels (unless modified), but their precision positioning makes them ideal for robot arms and legs, rack and pinion steering, and sensor scanners to name a few. Since servos are fully self contained, the velocity and angle control loops are very easy to implement, while prices remain very affordable.

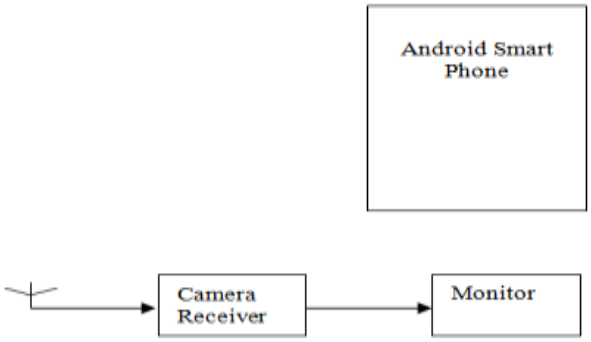
Two servo motors are used in this model. One servo motor is used for the rotation of the camera to capture the surrounding images and transmit to the PC, while the other servo motor is mounted with a rifle and this servo motor is used to turn the rifle in the directions of the high intensity sound and fire in the same direction.

LED

Light emitting diodes, commonly called LEDs, are real unsung heroes in the electronics world. Basically, LEDs are just tiny light bulbs that fit easily into an electrical circuit. But unlike ordinary incandescent bulbs, they don't have a filament that will burn out, and they don't get especially hot. They are illuminated solely by the movement of electrons in a semiconductor material, and they last just as long as a standard transistor.

RECEIVER SECTION

The command to control the motion of the ground vehicle is done with the help of the android app. The app used to interface the ground vehicle with the android is Blynk. To move the ground vehicle forward UP arrow key is used, to bring the ground vehicle back the DOWN arrow key is used and the LEFT and RIGHT arrow keys are used to control the motion of the ground vehicle in the left and right directions respectively.



Receiver section block diagram

Bluetooth Module

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup.

Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm. Hope it will simplify your overall design/development cycle.

Go shopping Serial Port Bluetooth Module (Master/Slave): HC-05 (IM120723009)

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 5, May 2017

VI. HARDWARE FEATURES

- Typical -80dBm sensitivity
- Up to +4dBm RF transmit power
- Low Power 1.8V Operation, 1.8 to 3.6V I/O
- PIO control
- UART interface with programmable baud rate
- With integrated antenna
- With edge connector

VII. SOFTWARE FEATURES

- Default Baud rate: 38400,
  Data bits: 8,
  Stop bit: 1,
  Parity: No parity,
  Data control: has.
  Supportedbaudrate: 9600, 19200, 38400, 57600, 115200, 230400, 460800.
- Given a rising pulse in PIO0, device will be disconnected.
- Status instruction port PIO1: low-disconnected, high-connected;
- PIO10 and PIO11 can be connected to red and blue led separately. When master and slave are paired, red and blue led blinks 1time/2s in interval, while disconnected only blue led blinks 2times/s.
- Auto-connect to the last device on power as default.
- Permit pairing device to connect as default.
- Auto-pairing PINCODE:"0000" as default
- Auto-reconnect in 30 min when disconnected as a result of beyond the range of connection.

VIII. TECHNICAL SPECIFICATIONS

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
LED_BUILTIN	13
Length	68.6 mm
Width	53.4 mm
Weight	25 g

IX. APPLICATIONS

- **Detecting bombs**
  By using Proximity Sensor, it will emits electromagnetic radiations continuously and looks for a change in the radiation of the refected signal. If there is any change in the radiation of the refected signal, then the bomb will be detected easily.
- **Saving human lives**
  The presence of lives can be detected by using a passive infrared sensor, which is used to measure the infrared radiation that is emitted by living beings.
- **Visiting places where humans cant reach**.
  For example going to unknown waters where humans would be drowned. And also give us information that humans can't get

X. FUTURE SCOPE

In future,this vehicle can be used by RFID. It can also used to safe grounding the boundaries in any weather condition.

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During the battle in harsh condition the area where army person can't afford the suituation due to the low temperature and high altitude snow in that condition automatic weapon or may be used to protect the area. Which are work when any person come inside the boundary it detect and shoot the target.

Going a step forward, it is also required to safe guard the people who are guarding our boundaries and we need to take care of the issues that re faced by them.

XI.CONCLUSION

The main application in mind during the design of the project is to use it for Defense Organizations, The Army, The Navy, BSF and Air force. Loss of lives of tanker operators can be prevented which are used in war fields. It acts like a geographical explorer to survey the places where human presence is inhospitable; one can use it to excavate resources. It can also be used for remote sensing with some additional features to sense resources.

The system can be operated remotely within distance of 20 meters. It can move 22.5 degrees left and 22.5 degrees right (total 45 degrees) from centre position. It is fully electromechanical system. It can be used to deceive the enemy during war time. The system is very useful for fixed line firing. It is unmanned and easy to operate. It will fire automatically, when there is an attack. It can be used as home security system without rifle. We can monitor the activities in PC through wireless spy camera which is mounted on vehicle. It can also be used as a spy ground vehicle.

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