

On Board Controller For Small ROV Operation

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ABSTRACT

In recent years there has been an increasing attention on robotic technology thanks to lot of commercial automation applications and it's currently an exciting and highly researched focus. At this when machines are taking up the routine jobs of humans like packaging, manufacturing and computing, it's essential that we discover applications for machines in places where human life is threatened. We must check out the broader picture and understand the vast uses to which these machines are often put so as to save lots of human lives from getting endangered. With this concept in mind, we began to develop a UGV which will perform duties of a people. This robotic vehicle has ability to substitute the soldier at border area provide surveillance. The robotic vehicle works both as autonomous and manually controlled vehicle using internet communication medium. This multisensory robot wants to detect presence of enemy capture it privately and provides the live streaming to the authorized person.

Keyword: IOT technology, Rasp Robotics, military robot.

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• INTRODUCTION

Surveillance is major thing once we are going to secure anything because it is tedious job peoples are becoming boarded due to that it'll might risky to observing all this thing, we are getting to make a robot which is continuously monitor thing. This robot continuously watches and sending a live streaming of it to a licensed person. due to that monitoring the work are going to be somewhat easy and it'll be making accurate due to technology.

The implementation of this project to resolve the matter of replacing human to surveillance robot, due to this we reduce harm of human resource. Robot are usually miniature in size in order that they are enough capable to enter in tunnels, mines and little holes in building and even have capability to survive in harsh and difficult climate for all times while without causing any harm. Military robots were designed from previous couple of decades.

Nowadays, most of the system uses a mobile robot with a camera for surveillance. The camera mounted on the robot can move to different locations. These sorts of robots are more flexible than the fixed cameras. In it's as long as mostly used surveillance robots are wheel robot. The wheel-based robots are more suitable for flat platform. With the event in wireless communication and internet, the videos captured by wheel robot are often seen remotely on computer or laptop.

ROV provide governmental and enforcement officials with the power to visually inspect areas of interest from a foreign location. ROVs are intended to be complementary to the utilization of public safety and military dive teams. they will be utilized in conjunction with Multiple, or as a replacement to them, when the operations environmental conditions allow. Factors to think about choose which capability to use should include, but not be limited to, the mission objective, degree of accuracy required, current threat level, on-scene conditions, and therefore the amount of your time plus

resources available. As Homeland Security operations involve Land Surveillances, light-duty operations from small platforms. Experience has shown that personnel from electronics backgrounds are excellent candidates for assignment because the primary ROV operator. Operation and maintenance of the ROV require a mean level of electronics and situational awareness skill and knowledge that fit well with the background of most electronics and dive team personnel. the utilization of volunteer or administrative personnel also helps to scale back impacts to the departments operational schedule, as many enforcement personnel aren't assigned to dedicated 24/7 security duties. the essential idea of our project is to develop a system which will control & sense the varied Sensor data and generates feedback to Master system (MCS). MCS can give command to the ROV, ROV has got to hear the MCS continuously and perform the specified task. System which will be controlled and monitored from remote location.

The uses of this technique may include:

- Military Surveillance & reconnaissance:

Unmanned ground vehicles have allowed the troops to peek round the corners and investigate suspected bombs, they will discover many explosives, the military can send unmanned

- Robotics

To look at the terrain, If the bomb is found and can't successfully defuse the bomb, UGVs are often wont to detonate the explosive.

- Space Exploration:

Landing Rovers, Mining rovers, etc.

- Agriculture:

Unmanned harvesting tractors, sprayers, threshers, etc.

- Manufacturing:

Transporting heavy parts.

- Mining:

UGVs are often wont to traverse and map mine tunnels.

- Emergency response:

UGVs are utilized in many emergency situations including Urban search and rescue, firefighting, and nuclear response.

- Security Surveillance:

Patrolling Industrial complexes, Important establishments, Solar Parks, Military Camps etc.

- Police:

Day & night patrolling and securing certain parameters to make sure safety of citizens.

- Bio/ Chemical/ Nuclear Hazard:

UGV are often wont to handle/ dispose hazardous substances carefully without risking human life. Ex. Fukushima nuclear crisis, Japan.

- Survey and Mapping:

Autonomous UGV can make 3D map of any surface, building, tunnel, etc. Also useful in ground survey in small,

unreachable, dangerous locations like volcano, caves, Hostile area, etc.

II. LITERATURE SURVEY

[1] Yasser M. Ahmed, Omar Yaakob Jurnal Teknologi 69(7), Design of a new low cost ROV vehicle, July 2014.

In this research work a low cost ROV unit has been designed and constructed at University Technology Malaysia (UTM). The ROV was constructed by low cost material like commercial grade PVC (PVC) pipes. The low cost ROV is provided with a network camera and manoeuvred by three motors through 12 volts battery power supply. The ROV is controlled by joystick controller through network cable and is during a position to submerge up to 20meters into water to perform underwater observation operation.

[2] Sainadh jasth, Mrs. ponnammal p, akhil cherukuri, aditya shashank neti, unmanned ground vehicle for military purpose, International Journal of Pure and Applied Mathematics, 2018

In this paper they made Unmanned ground vehicle (UGV) which also called as self-controlled robot which play an important role in military purposes, However the demand for manual robots are on rise. UGV add more efficient thanks to counter terrorism and in far fields. Unmanned ground vehicle support and augment soldier's life in battle fields. The capability of this robot mainly depends on protecting the soldiers or a minimum of reduce the death tolls in wars. Many researches are extensively administered in major parts of the planet to develop this prototype which work more efficiently in military activities and in counter terrorism. This Unmanned ground vehicle effectively works within the fields of patrol, surveillance and in war combats. This UGV mainly works in two different modes, Automatic or self-mode and Manual or in coordination with humans. In self-mode, UGV is tasked to surveillance the border between the 2 areas without the human instructions. This feature is often attained by implementing GPS, compass to live the turning angles and adjust the route avoiding the obstacles like mountains, trees and rivers. This path planning strategy is that the key program basic to figure the robot within the self-controlled mode.

[3] U Bharavi Rao M Sukesh, Design and development of GSM& GPS Tracking Module, IEEE, 2017

In This Paper the integrated GSM and GPS module will be made using SIM808 by SIMCom which has both GPS and GSM engines. Schematic of different parts of module are designed. The circuit design of Regulator, SIM card interface, Antenna interface, USB interface, Indicator circuit and other parts are done using ISIS schematic tool of Proteus Design Suite v8.3.

[4] In-Soung Jung, Jung-Moo Seo, -Han Joo Kim, Se-Hyun Rhyu, Development of slotless type brushless DC motors and planetary gear heads for robot, IEEE, 2012

This paper presents the event results for slotless type brushless DC motors and epicyclic gear heads for service and special purpose robot applications. The designed slotless BLDC motor features a hexagonal winding shape, and thus the developed motor sizes are 22, 32, and 40mm with the outer diameters. The developed gear heads are planetary type, and thus the gears are manufactured by the powder injection molding (PIM) method to increase the gear strength and to decrease the backlash. The output performances of the motors and kit heads are tested in various conditions.

[5] Hema Kumbhar, Wireless sensor network using Xbee on Arduino Platform: An experimental study, IEEE, 2016

This paper presents experimental setup from creating wireless sensor network using Arduino and Xbee module. This study will function a model for nearly all sensor network that one would really like to create. This is to make setup which can allow to read temperature value from inexpensive temperature sensor placed apart at various location that are mesh networked to collect a stream of input and send to base station.

[6] Chinmay Kulkarni, Suhas Grama, Pramod Gubbi Suresh, Chaitanya Krishna, Joseph Antony, Surveillance Robot Using Arduino Microcontroller, Android APIs and therefore the Internet, First International Conference on Systems Informatics, Modelling and Simulation, 2014

In this paper they proposed a cost-effective four-wheeled surveillance robot using an Arduino UNO microcontroller and a smartphone running the Android Operating System. Surveillance robots typically contains a video camera, a GPS module, and GSM radios. Android smartphones accompany excellent hardware satisfying the above needs. This can be leveraged and used to advantage through APIs (Application Programming Interfaces) provided for the Android operating system. Moreover, the value for building said robot employing a smartphone is mitigated to an excellent extent. The robot is often controlled remotely from a PC using the web and a microcontroller-smart phone interface residing on the robot. To capture and archive the important time video from the robot, the inbuilt camera input of the phone is employed. The robot is often controlled supported visual feedback from an equivalent smart phone. Four motors help achieve a zero turning radius. The camera is attached to a stepper motor which makes it feasible to capture the scene or object of interest. The captured video is often enhanced and made intelligible using further image processing on the remote PC thereby eliminating the need for extra DSP hardware on the robot.

III. SYSTEM DEVELOPMENTS

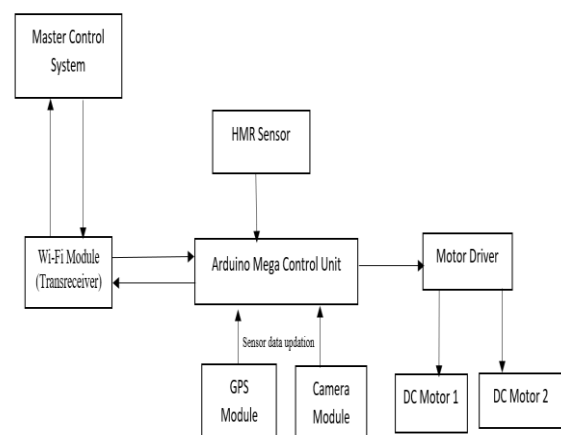
A. SOFTWARE

Arduino IDE
Proteus 8 professional
HyperTerminal
Python

B. HARDWARE REQUIREMENTS

Arduino Mega 2560 Board
GPS Module
HMR 3000 Sensor
Camera Module
Sabretooth Motor Driver
DC Geared motor
Wi-Fi Module
DC To DC Converter
Battery

3.2 BLOCK DIAGRAM



A. Arduino Mega 2560 Board:



Arduino board is an Open Source microcontroller board which is based on Atmega 2560 microcontroller. It is an open source electronics platform supported easy-to-use hardware and software. This Board is in a position to read inputs-light on a sensor, a finger on a button or a twitter

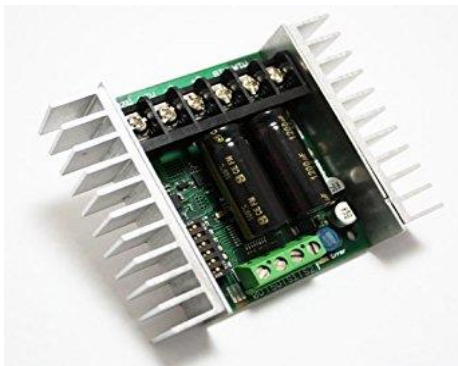
message and switch it into an output-activating motor, turning on LED, publishing something online. We can program Arduino using Arduino IDE software by using c, c++ programming languages. It is inexpensive, open source and extensible hardware.

B. GPS Module :



GPS module makes use of signals sent by satellite in space and ground stations on earth to accurately determine its position it's on earth. The GPS module for Arduino is a small electronic circuit that permits to attach to your Arduino board to urge position and altitude, also as speed, date and time on UTC (universal time coordinated).it uses the standard NMEA protocol to transmit the position data via interface.

C. Sabertooth Motor Driver :



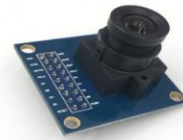
Sabertooth may be a dual channel motor driver capable of supplying 25 Amps to 2 motors, with peak currents up to 64 amps per motor.it are often operated for radio control, analog, TTL Serial or USB inputs. It uses regenerative drive and braking for efficient operation.

D. DC Geared Motor :



A gearmotor is an all-in-one combination of an electric motor and a gearbox. This makes it an easy, cost-effective solution for high-torque, low-speed applications because it combines a motor with a gear reducer system.

E. Camera Module:



A camera Module is a picture detector integrated with a lens, control electronics, and an interface like CSI, Ethernet or plain raw low-voltage differential signalling

F. Wi-Fi Module



Wi-Fi module is used for communication between master control station and ROV over wireless media. Outdoor range up to 1-mile (1.6 km) line of sight and indoor range up to 300 feet (90m).

IV. CONCLUSION

Military personnel are putting their lives on line to gather information in enemy territories. Surveillance and reconnaissance are crucial elements of every military operation. To avoid any casualties and for more efficient operation we implement this system. The Remote Operated Vehicle (ROV) allow troops to peek around the corners and investigate suspected sites, they can discover hostile targets, explosives. The military can send unmanned robots to examine the terrain before the operation. ROV can save countless soldiers life and operate without human intervention. It transmits real-time visuals and exact location to control centre. Inducting this system in military will reduce casualties, avoid surprise attacks and ambush, help to gather Intel.

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