Original Research Paper

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Engineering

ALL TERRAIN SURVEILLANCE ROBOT FOR HUMAN DETECTION AND TRACKING

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ABSTRACT Countries like INDIA faces serious threat from its neighboring countries who encourages terrorism. Terrorist make advantages of hard terrains (forest and mountains) for crossing borders due to lack of efficient surveillance techniques . Drones and unmanned air craft system get stuck due to their inability to work on hard terrains .Hence need an effective surveillance techniques. The aim of project is to develop a low cost human body detection and tracking legged robot for close observation of a suspected spy, terrorist and in search of terrorist crossing borders via thick forest regions. Consist of a legged robot carrying a simple motion sensor and camera arrangement of human body detection and tracking .The two motion sensor fitted on the mobile robotic flat form detects the presence of human body and provide exact position (θ and r).After obtaining precise position the camera get positioned automatically to take pictures of detected individual and is transferred wirelessly

KEYWORDS : chassis ,motion sensor, detection, legged mechanism, low cost, stealth

INTRODUCTION

2019 Pulwama attack-on 14 February 2019,a convoy of vehicles carrying security personnel on the Jammu Srinagar national highway was attacked by a vehicle-borne suicide bomber at Lethpora in the Pulwama district ,Jammu and Kashmir ,INDIA .The attack resulted in the death of 40 central reserve police force personal.

Countries like INDIA faces serious threat from its neighboring countries who encourages terrorism .About 226 terrorist incidents are reported on 2017 in INDIA. Terrorist make advantages of hard terrains (forest and mountains) for crossing borders due to lack of efficient surveillance techniques .Militants find it difficult to track terrorist crossing borders .INDIAN boarder force uses unmanned aerial vehicles (Drones) or unmanned air craft system with advanced and high cost motion sensors .Drones and unmanned air craft system get stuck due to their inability to work on hard terrains.

In this paper , we develop a low cost human body detection and tracking legged robot for close observation of a suspected spy, terrorist and in search of terrorist crossing borders via thick forest regions.

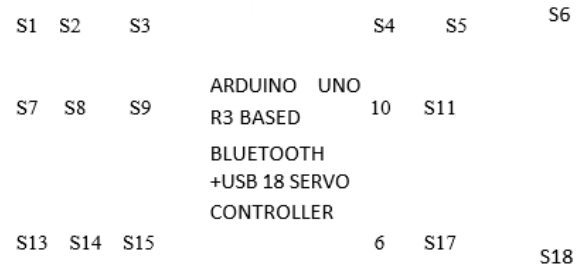
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MOBILE ROBOTIC PLATFORM

One of the most important part in selection ofrobotic platform is its chassis .There are several basic chassis-wheeled, legged ,tracked and their hybrids .Wheeled chassis are fast but not suitable for rough terrains. Tracked chassis are slower but more suitable for rugged terrain. Legged chassis are slow and complex but extremely good in rough terrains due to their legged mechanisms .Unmanned aircrafts and drones get stuck due to their inability to work on rough terrains under fast climate changes like wind speed ,rain ,storm.

Leg configuration- To make a leg moving at least two degrees of freedom are required, one for lifting and one for moving back and forth. In general, adding

BLOCK DIAGRAM



S-servos

degrees of freedom to a robots leg means increasing the mobility of the robot, the range of terrain on which it can travel and the ability to travel in a variety of gaits. But adding degrees of freedom causes also some disadvantages, because for moving additional joints and more servos are required, this increases the power consumption ,cost and the weight of the robot. Furthermore controlling the robot becomes more complex, because more motors have to be controlled and actuated at the same time

Hence here we propose a 18 DOF 6 legged(3 DOF each) intelligent robotic platform that can navigate with ease through rough terrains .Its small size allows it to get through any terrain like a small animal crawling through the jungle with very little noise. The robot uses a crawling mechanism to archive this task .The robot uses a microcontroller based circuit to control the motors and archive necessary movement .The robot consist of a microcontroller based circuit that receives commands from the user and then instruct the motors .

SERVO CONTROLLER HARDWAR



1.	USB Connector for connecting USB Cable to PC
2.	Power Connector 5 - 7.5 V DC
3.	Switch for Switching Between Bluetooth and USB Mode. (Must be on USB Side for RKI-1251)
4.	Bluetooth Module (Only with RKI - 1252)
5.	Bluetooth Status LED
6.	LED on Pin 13 of Circuit Board as in Arduino
7.	Reset Switch

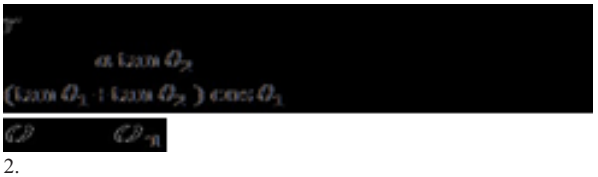
SERVOCONNECTOR



COMBINED CAMERA AND MOTION SENSOR SYSTEM

Consist of two PIR motion sensor separated by a known distance „ ‟.PIR motion sensors are fitted to respective servo motor MG 995 s for 360 rotation .Once human body is detected, the accurate position of human is obtained from formula

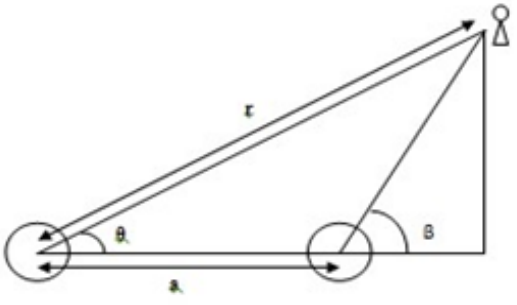
1.

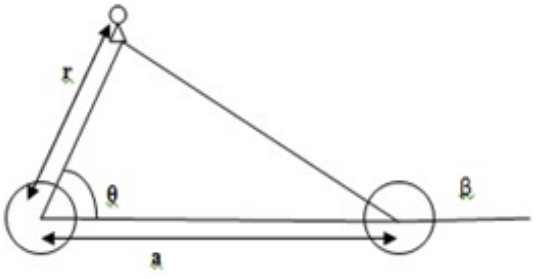


2.

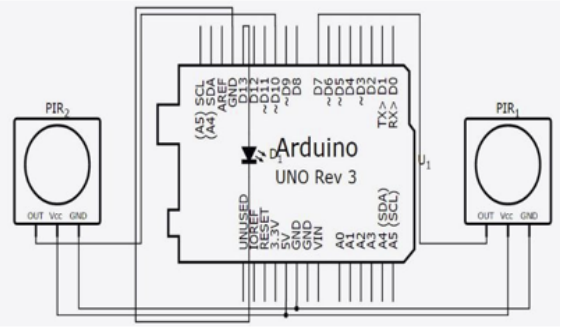


θ1 and θ2 are corresponding servo angles.





CIRCUIT DIAGRAM



OBJECTIVE

- To design a simple low cost and also effective human body detection and tracking 18 DOF 6 legged intelligent hexapod system for military applications to reduce terrorists penetration to Indian soil.
- To develop algorithm for less noise and stable locomotion of robot.
- Should also be used as a spying robot.
- Pictures of detected individual, accurate position are transferred wirelessly to military office.
- Uses processing to get a visual output.

CONCLUTION

- Designed a low cost human body detection and tracking legged robot for close observation of a suspected spy, terrorist and in search of terrorist crossing borders via thick forest regions .The intelligent robotic platform has been found stable from engineering point of view and able to navigate with ease through rough terrains .Developed algorithm for less noise and stable locomotion of robot. Pictures of detected individual, accurate position are transferred wirelessly to military office. Uses processing to get visual output. Hence provide a good surveillance method for military.

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