www.ijecs.in
International Journal Of Engineering And Computer Science ISSN:2319-7242
Volume 4 Issue 4 April 2015, Page No. 11642-11645

Wireless Surveillance Robot Using Wireless Network

Kiran Gautam, Pranit Chettri, Ravindra Singh Negi, Rangpo, Majhitar, Prerna Rai

Computer Science and Engineering Department, Sikkim Manipal University
Computer Science and Engineering Department, CCCT,
Chisopani,South Sikkim

kiran.gautam.cse@gmail.com
praneet.chettri07@gmail.com
ravi17.negi@gmail.com
pthulung@gmail.com

***Abstract*—The objective of this paper is to develop a WI-FI controlled surveillance robot using wireless Network. We are trying to develop a robot that can transfer a video captured in its camera to nearby laptop that is connect with it via wireless network. This type of robot is mainly used for security purposes like in coal mines and tunnels where human intervention is impossible. This robot can be navigated through the server system via wireless network. The purpose of this surveillance robot is to navigate and deal with multiple-angled monitoring towards the environment with inexpensive hardware and free software cost. This Robot is configured with the IR sensors to enhance its ability to detect and avoid the collision.**

keywords— *Surveillance, Microcontroller, Motor Driver, PIR Sensor, Stepper Motor.*

I. INTRODUCTION

The security through Camera-based surveillance has been used for security and observation purposes and which has come up to be most efficient and more safety to us. In ealier days surveillance cameras are mainly fixed or stationary at a known positions and cover a limited area defined by the fields of view of the cameras as the degree of movement of fixed camera are limited. Humans have performed reconnaissance for centuries in military and other applications in order to inspect the terrain and identify and classify activities in the environment. A design implementation of a wireless surveillance robot issues a make a revolutionary change in advancement of technology. Previously the same operations of surveillance were carried out by robots integrated with wired technology and with the limited technological features in them which may not yield the desired application output. This project describes the results of that effort and illustrates features provided by modern technology.

In this project we are trying to develop sensory capabilities of surveillance with the mobility of reconnaissance by mounting a laptop on mobile robotic platforms. This surveillance robot will provide information about the activities happening in the environment. The server system will be directly interact with the client system via wireless network and the transfer of information between two system are made. The system is equipped with a wireless camera that continuously gathers the vision signals and transmits those signals to control station, where from the controller processes these information and make a decision over the next event to be performed. This total system is equipped over a mobile vehicle which progress according to the signals obtained from the base station(User). This type of robot can find applications in various fields like in coal mines, tunnels, military applications etc. It can also be used for household purposes and local surveillance in desired areas like malls, museums, hotels etc.

II.ORGANIZATION ARCHITECTURE

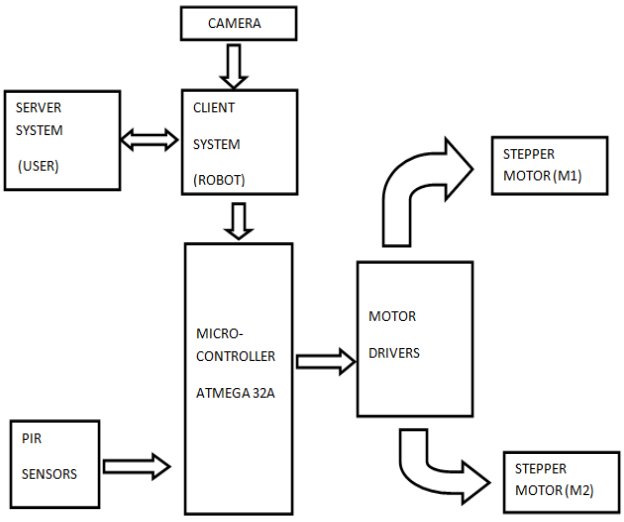

Fig 1. Block diagram for architecture.

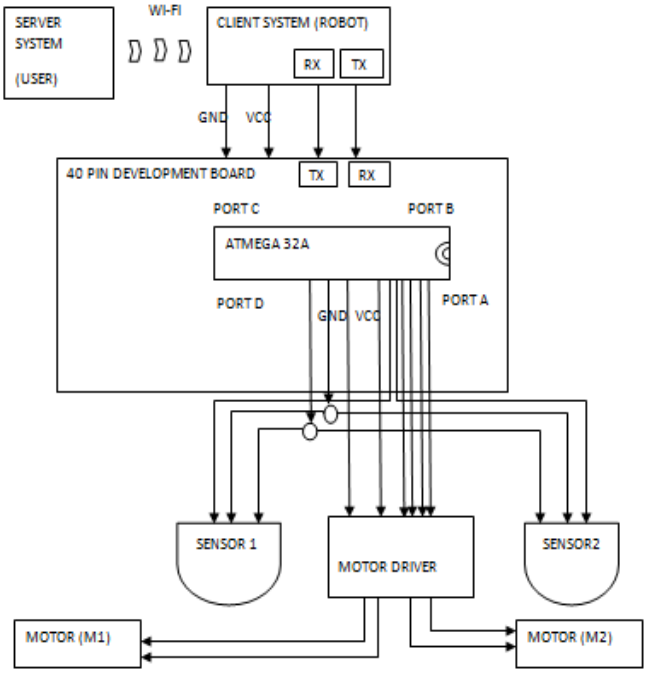

Fig 2: Circuit Diagram

The system architecture is shown in Fig. 1. The system consists of a microcontroller (ATMega 32A) that controls all major operations of the robot including locomotion, personnel detection and path illumination etc. Several sensors are employed to achieve various functionalities which are all monitored by the onboard ATMega 32A chip. Apart from the sensors a camera is mounted on a robot's chassis that transmits video feed to an off board monitor (server system) through WI-FI. The robot function is divided into two main categories, perception and navigation

III.PERCEPTION

The various devices that we have employed for the robot perception systems are:

a) PIR

Passive Infrared Sensors (PIR) is deployed in robot's body to detect the obstacle that comes in the range of its contact. PIR sensor detects the infrared radiation that is emitting from the object in its proximity. When PIR sensor detect such radiation it send the signal to the microcontroller that is connect with it that something has come by in its way so as per information microcontroller controls the motor to stop and avoid the obstacle.

b) Camera

The Camera is deployed for the capturing of video/image of its current environment and send it to the receiver on the other end for feedback. The camera is mounted on the robot's chassis. The camera has been great use in the field of surveillance and is efficient to use.

IV.NAVIGATION

The robot chassis is fully locomotive and is capable of taking sharp turns as well as smooth turns. This Robot employs three wheels, two standard wheels for rare part of the robot and is bidirectional and one castor wheel at the front which is omnidirectional.

a) Motor Driver

The motor Driver controls the velocity of the robot all the times. The microcontroller is interfaced with the two stepper motors (M1, M2) with the help of the motor driver.

b) Wireless Network

We has employed the Wireless network to make interfacing between the sever system and robot. Firstly, we create a hotspot between the server system(User) and client system(Robot) for the transmission of video and signal between them. The range of the WI-FI is about 20m, so we can navigate the robot within the range of it. The TCP socket is used for the transmission of the ASCII value as signal between the server system (User) and the client system (Robot). The buttons W,S,A,D and Q are used for Forward, Backward ,Left , Right and Stop movements respectively.

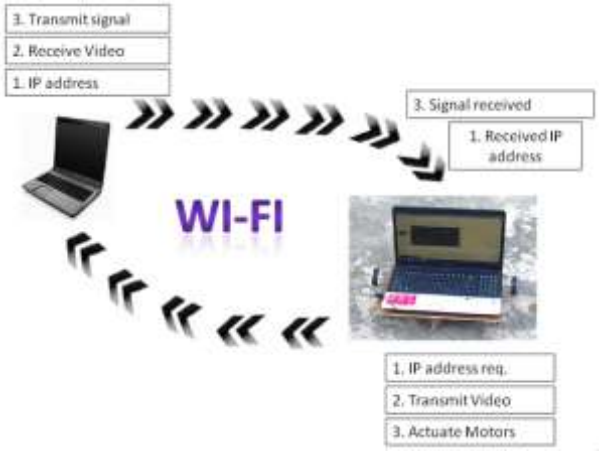

Fig 3: Total implementation scenario.

Fig 4:Real-time implementation.

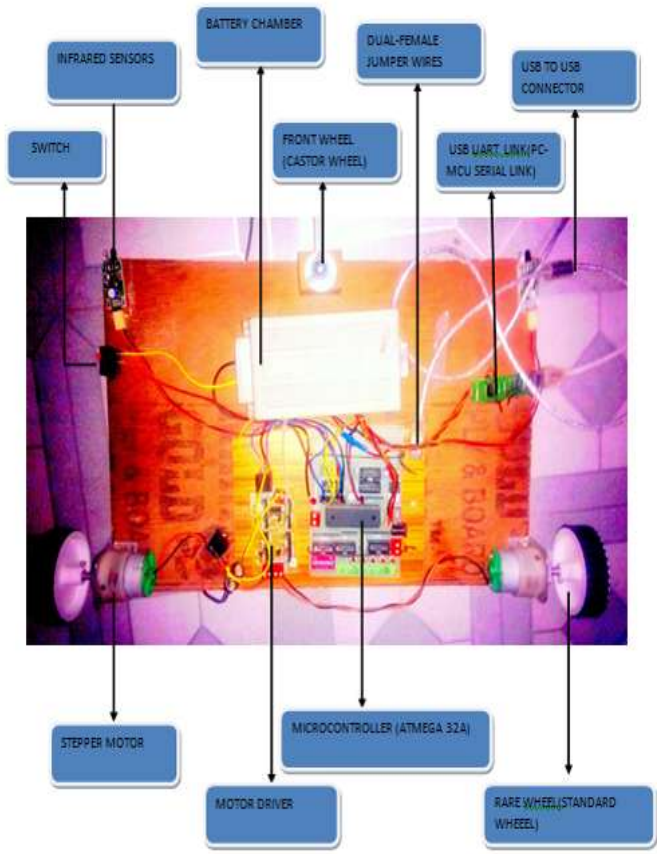

Fig 5: Real-time implementation of circuit diagram.

V.IMPLEMENTATION DETAIL

For this project we have implemented three layers of programming that are as follow
:

1. Application layer
   This is upper most layer that perform operation of sending and receiving of video/images.The server system(User) will authenticate itself with the client system(Robot) providing client's IP address. After authentication, the Client (Robot) will start sending the video/images to the server system(User) that is perceived by its camera.

2. Interface layer
   In this layer we have created client-server environment using TCP protocol between user system(User) and client system(Robot). The client(Robot) sends authentication request to the server(User). After authentication is verified by the server system(User), then server will start sending the navigation signal to the client system and client(Robot) will received the navigation signal. This layer provides the interface with the embedded layer. This layer send the signal to the microcontroller. The client initiates the program and then when a key is pressed by the server the ASCII of the key is generated and the signal is send to the client machine thereby producing the key at the client end**.** The key we have used is W, A, S, D and Q that is forward, left, stop, right and stop respectively.

3. Embbeded layer
   This layer is responsible for receiving the signal send by the interface layer to microcontroller that is embedded on the robot's chassis. when signal is received by microcontroller it will send signal to the motor driver and motors will perform operation as per the signal that is send by the server system. The IR sensors are also embedded on the robot's chasiss. The signal transmitted by the sensor are directly received by the microcontroller.

VI. APPLICATION

We can deploy this technology in various field,Such as in Military application for patrolling purpose ,for excavating coal mines and tunnels where human intervention is impossible, for security proposes in private places, offices, bank, malls, hospitals etc and also in disaster areas for rescue proposes.

VII.CONCLUSION

From this project we conclude that with the above mentioned ideas, wireless surveillance can be carried out with a certain degree of efficiency. This can be done using various platforms and can be deployed in different environments. Surveillance is increasingly becoming one of the most important subjects when it comes to security.

In this project, we have tried to design a robot which is potable, economical and which is capable of doing its task efficiently in the field of surveillance. Since we have used infrared sensor the robot that we design in unable to work in the sunlight, Further, we can use ultraviolet sensors (UV) that can make this robot to work more efficiently in sunlight and if we use the radio waves (Long range waves) inspite of WI-FI ,we can perform the surveillance task to wider range by using this robot. In other hand, We have also concluded that if we collaborate the Adhoc-Network with this project we can overcome the problem of accessing the limited range of WI-FI(WI-FI range of approx. 20m), we can do this by introducing the second robot which will act as a intermediate system(Robot 2) between server system(User) and client system (Robot 1).If the client system (Robot 1) goes away from the range of the server system(User) then the intermediate system(Robot 2) will be introduced between them, then the client system(robot 1) will sent the video to the intermediate system(Robot 2) and intermediate system (Robot 2) will sent it to server system(User).And it will be same in the case of signal transmission, the server system(User) will sent signal to the intermediate system(Robot 2) and intermediate system(Robot 2) will sent it to client system(Robot 1).

VIII.REFERENCES

[1] M. A. Meor Said, M.A.Othman, M.M.Ismail, H.A.Sulaiman, M.H.Misran, Z.A. Mohd Yusof, "Wireless Controlled Omnidirectional Monitoring Robot With Video Support", International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 2, Issue4, July-august 2012, pp.2228-2232

[2] Navneet Mishra, Nitin Kumar Yadav, Nitish Verma, Saurabh Juyal, Shashank Srivhastava," Microcontroller Based Surveillance Robot", 2nd National Conference in Intelligent Computing & Communication Organized by Dept. of IT, GCET Greater Noida, INDIA.

[3] Mr. Sreejith K G , Mr. L Raja," A Surveillance Robot for Disaster Sites", 1KSR College of Engineering, Tiruchengode, PG Student(Embedded System Technologies).

[4] Gyula Mester," Intelligent Mobile Robot Motion Control in Unstructured Environments", Department of Informatics, Robotics Laboratory, University of Szeged Árpád tér 2, H-6720 Szeged, Hungary.

[5] Yu Zhou," Distributed Control of Multi-Robot Deployment Motion", State University of New York at Stony Brook,The United States.

[5] Kota Sandeep , Kakumanu Srinath , Rammohanarao Koduri ," surveillance security robot with automatic patrolling vehicle", ECM Department, K. L. University, A.P., India,Internationl Journal Of Engineering Science and Advanced Technology, ISSN: 2250–3676, Volume-2, Issue-3, 546 – 549.

[6] Laura Ray, James Joslin, John Murphy, Jon Barlow, Devin Brande, and Devin Balkcom," Dynamic Mobile Robots for Emergency Surveillance and Situational Awareness", Dartmouth College 8000 Cummings Hall, Hanover NH 03755.

[7] Gyula Mester, Aleksandar Rodic," Sensor-Based Intelligent Mobile Robot Navigation in Unknown Environments", University of Szeged, Department of Informatics Robotics Laboratory H 6720, Arpad ter 2, Szeged, Hungary, University of Belgrade, Mihajlo Pupin Institute Robotics Laboratory Volgina 15, 11060 Belgrade, Serbia.