International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 06 | June-2016 www.irjet.net p-ISSN: 2395-0072

FPGA based Robot used for Defense for India

Meenal D. Matale[1], Prof. Dr. M.P Satone[2]

[1]Student, Electronic & Telecommunication Department, K. K. Wagh College Of Engineering, Nashik, India meenalmatale12@gmail.com

[2]Prof. Electronic & Telecommunication Department, K.K Wagh college Of Engineering, Nashik, India mps.eltx@gmail.com

---

Abstract - *There is a big problem of the terrorism faced by each country. The terrorism is of many kind and the main reason for this activities is not same . The soldiers of the countries have more responsibilities on them to save citizens. The Indian government have many problems as there are more cross border terrorism activities taking place. There are various uneven ground present in India where it is difficult for the soldiers to reach. One of the solution to all these problems is to have an robotic system , which will help the soldiers to reach those places where it was difficult task.*

Many techniques have been developed in the robotics, but still there are not so effective as per the detection of terrorist activities. This paper gives an overview of the past few techniques in this field and presents a real–time system by which the robot will follow the object and videos will be send to the server. This technique is based on the Papilio Spartan3 FPGA and Android will be used by the soldiers for seeing the live videos.

Key Words*: *Papilio , Spartan3, FPGA, Android

1.INTRODUCTION

The impact of technology, particularly in communication technology combined with increase in the globalization, which result in the movement of people across borders means that terrorism in the 21st century has increase. The increase in this movement of people have resulted in move problems of the security of the country. The increase in the population and the weaker borders security is very dangerous [1].

Robotic applications are required in today's industrial world. In such a condition robotics have developed using various technologies. FPGA has the advantage over microcontroller due to its hardware based parallel architecture. Motors are one of the part of the Robots and controlling them with FPGA is difficult. The application is proposed wireless using FPGA [1].

The FPGA robot which uses the FPGA as Papilio Spartan3 is been developed by the Xilinx. It has I/O of 48 lines, USB with dual channel, JTAG programmer which is integrated, 4 power supplies, and a power connector. External hardware can be added directly using the provided "Wing" slots.

The stepper motors are electric motors that are used in safety applications such as auto, medical devices, and surgical robots which are very important application. The FPGA is used in digital control for stepper motors [4]. The motor is been used for the camera to move in the required direction to capture the video.

The Zigbee is a low data rate, power, and cost wireless networking protocol which is based on the IEEE 802.15.4 standard for wireless personal area networks (WPANs) [1]. It supports the frequency band of 2.4 GHz for worldwide[6][4]. The Zigbee is used to communicate between the server and the robot wirelessly. Zigbee transmitter and receiver is been used in the project.

The ultrasonic sensor will move in the direction of right, left and scan the values. If the object is detected the there will be action to follow the object in two ways that is automatic and manual way.

2. PROPOSED SYSTEM

The System will have the following main components.

2.1 *Robot Side Unit:*

The Robot will have the wireless camera, the ultrasonic sensor which will calculate the various values and according to it the robot will detect the object. The values then will be saved and the it will follow the object once detected. The object which is detected is two ways that is automatic or by the manual way.

2.2 *Server side unit:*

The real time videos which will be taken by the robot those videos will be given to the server. The videos will be saved in the server and these videos will be then used by the android application . The server will be present in the control room.

2.3 *Android unit:*

The android phone of the soldiers will have the application. Each and every soldiers will have the username and password. And region will be selected and the videos will be seen . The control action will be done in two automatic or manual.

2.4 System Overview**:**

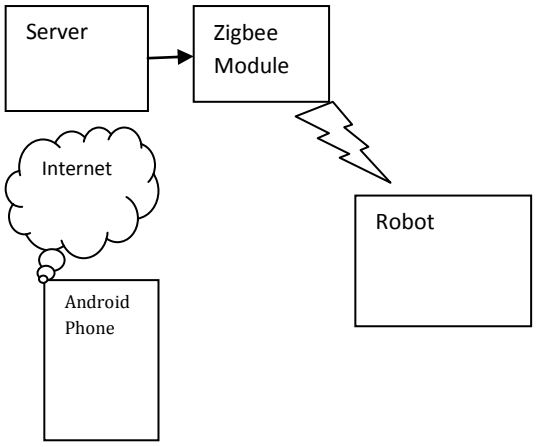

Fig-1 System Block Diagram

Fig.1 shows the overall block diagram of the proposed system .The three units that is the server side unit , the robot and the android phone is been present. The server and the robot unit will communicate with each other through the wireless communication unit Zigbee. The server and the android phone will communicate with each other by the internet connection.

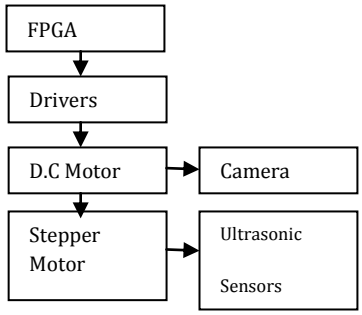

Fig -2 Block Diagram of Robot

Fig.2 shows the robot unit which has the Papilio Spartan3 FPGA which will be connected to the drivers present for the movement of the robot. The drivers will be connected to the D.C motor and the movement will be that way. The ultrasonic sensor are present which will take the values all the time the robot will move. The object when detected the action will be given by the server or the soldiers through the android application. The action will be in two ways one automatic and the other manual.

3. RESULTS

The proposed system have the android application design for the soldiers the snap shots shows the application design for the soldiers.

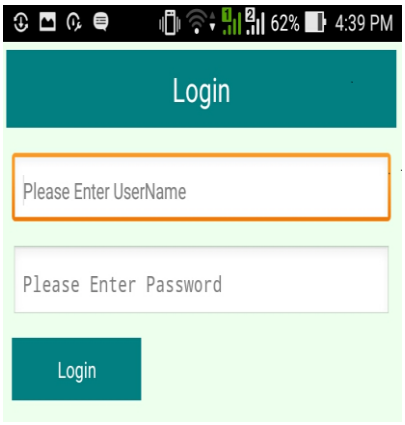

Fig-3 First window of the application

In the first screen we have the login window. Each soldier will have his own username and password.

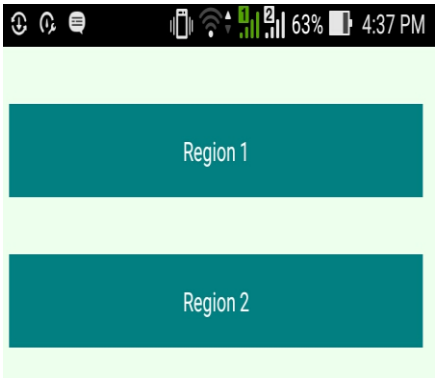

Fig-4 Second window of the application

In the next region the region where the soldiers are present are been given for the selection.

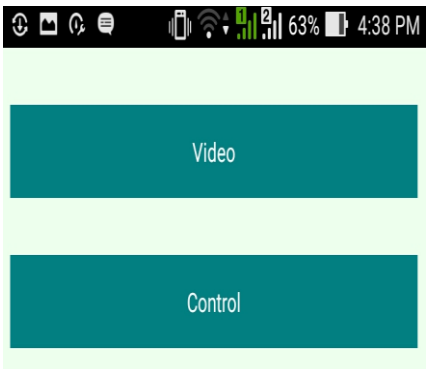

Fig-5 Third window of the application

The selection of the regions when is done by the soldiers then the robot which belong to the region will be able to see the video capture by the robot. If required then the control action will be taken by the soldiers.

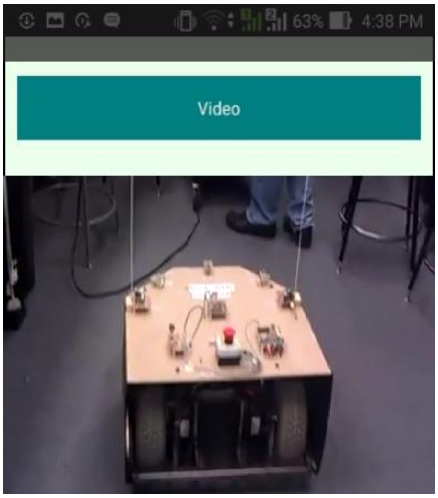

Fig-6 Fourth window of the application

The forth window gives the video which is taken by the robot when the video option is been selected. The Robot will give the video which is been capture by the robot.

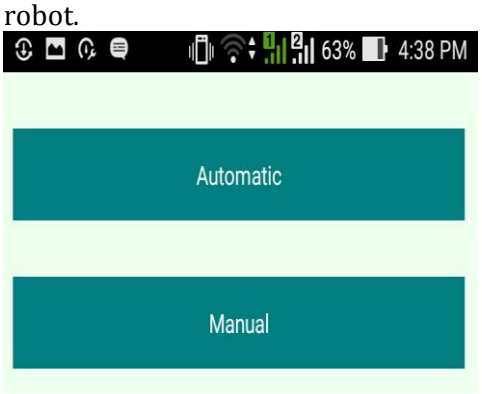

Fig-7 Fifth window of the application

The controlling action can be done in two ways that is the robot will follow the object which the robot will detect. The manual once selected will give you option of direction left or right.

4. CONCLUSION

In this paper, the easy way to look after those areas where the soldiers cannot reach is proposed. The working of the robot and the detection of the object and following the object is done in two ways which is the better option security wise. The Papilio Spartan3 FPGA which is develop by the Xilinx is giving the required results. The android application which is been developed for the soldiers is the easy way to look at all the regions where the soldiers cannot reach. The controlling action can also be done through the application.

5. REFERENCES

1. Javaid Khurshid, Hong Bing-rong, "Military Robots - A Glimpse from Today and Tomorrow", December 2004
2. S. Bergbreiter and K.S. j. Pister. CotsBots: An off-the-shelf platform for distributed robotics. In Proc. IEEE. Robot. Syst. (IROS), pp. 1637, Las Vegas, Neveda, 2003.
3. *Mohammed Mian and Divyabharathi. R,* "Design and Simulation of ZIGBEE Transmitter",IEEE transition vol 1, 2013.
4. Somya Goel1, Dr Ranjit Singh2, FIETE, "VHDL Based Design and Implementation of Zigbee Transreceiver on FPGA", International Journal of Innovative Research in Computer and Communication Engineering *Vol. 1, Issue 2, April 2013.*
5. Renuka A. Wasu, Vijay R. Wadhankar, "Design and Implementation of VGA Controller on FPGA",IJIRCCE, Vol 7, July 2015.
6. Carlos González, Sergio Bernabé, Daniel Mozos, and Antonio Plaza, "FPGA Implementation of an Algorithm for Automatically Detecting Targets in Remotely Sensed Hyperspectral Images",IEEE, June 2015.
7. P. Rajesh Kumar and K. Sridharan," VLSI-Efficient Scheme and FPGA Realization for Robotic Mapping "IEEE September 2014.