iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** IV **Month of publication:** April 2019

DOI: https://doi.org/10.22214/ijraset.2019.4575

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue IV, Apr 2019- Available at www.ijraset.com

A Design and Development of Surveillance Robot using NI-MyRIO

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Abstract: ***In recent days most of the Industry uses a surveillance robot for monitoring and control purpose. In industry, some of the hazardous and various work cannot be done by a human. Thus there is a need surveillance robot. Surveillance robot needs for defense medical and etc, This proposed system design is the development of surveillance Robot using NI-MyRIO using LabVIEW software. In this work, the robot can able to monitor and also find defects in risky places. In addition of manual mode, automatic mode is also included in which humans are not required to operate if this robot detects or finds any obstacles it automatically gives an indication to the main board and proceeds to the next step of the moment. This robot can be used in the hazardous gas field where humans cannot work in it.***
Keywords: NI-MyRIO, LabVIEW, DC motor and IR sensor.

I. INTRODUCTION

This project deals with the Manual and Auto control technique. The motion of the robot is being operated with the help of DC Motor and the detection of objects is detected using IR Sensor. In manual mode the robot is operated with four buttons control, two button control has the forward direction and two button control has a backward direction. In automatic mode the wheeled robot has automatic movement with the help of four IR sensor, the IR sensor is placed in front of the robot, when obstacles are detected automatically the robot will stop and turn left side using left- hand wall technique and find the next way to move, balance three has fixed right, left and bottom, works based on its condition[1][2]. When automatic mode compares to the manual mode as to be a little bit slower. The monitoring process is being done with the help of a camera surveillance system and camera fixed with MyRIO which can be viewed in the monitor as live. The program is designed with the help of LabVIEW software and the program is fused with MyRIO. This project is designed for security purpose. This type of robots is mostly used in surveillance, automation field etc. In this field types if robots are operated by manual mode humans cannot work in a normal state which leads to many types of disorders. There are many types of robots which can be operated only in automatic mode. This type of robots has a disadvantage that it can be operated only in manual mode or automatic mode.

II. RELATED WORK

This project is designed to develop a robotic vehicle using android application by remote operation attached with wireless camera for monitoring purpose [3]. It deals with a new optimized method of building an independent mobile robot with manual and automatic control techniques with wireless mode of control and monitoring, using LabVIEW [1]. Proposed that deal with human detection, fire, harmful gas, metal obstacles and send the information to main location. The main future of this robot differnating it from others is execution of versatile task in night and rough areas [8]. The machines are automatic and manually operated with remotes. The main objectives of the paper are used in android application, Control with wireless technology [9]. The robot is automatically operated by a fuzing logic method that mean left hand wall technique, in this paper obstacles detect and human detection. It's programmed with help of MATLAB and LabVIEW [2]. The surveillance robot serve as a security monitoring device which replace the human security at less critical areas where human are really not necessary [12]. The system of obstacles detection for intelligent vehicle based on the LabVIEW and laser measurement system. The system use as laser to detect the obstacles and obtain distance measurement, which is transferred to LabVIEW and is proposed to control intelligent vehicles [11]. That typical of wheel design is used to cross the obstacles present in the path of vehicle a camera is rotated with respect to wheel direction [5]. The robot has to design and build manually controlled surveillance system. The main purpose the system to be able to roam around given environment self controlled with wireless data transmission. The real time data controlled by human [13].

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ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue IV, Apr 2019- Available at www.ijraset.com

III. METHODOLOGY

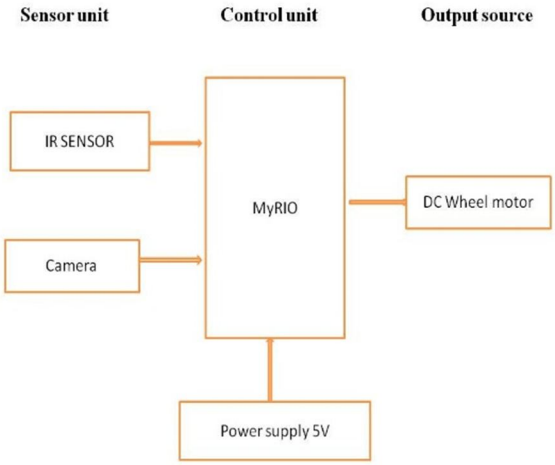


Fig.1 Block diagram of proposed system

A. LabVIEW

Laboratory Virtual Instrument Engineering Workbench is a system-design platform and development environment for a visual programming language from National Instruments. In which program is done in graphical form. It is used test, measure and design. LabVIEW consists of two windows front panel and block diagram. Front panel is the window through which the user interacts with a program. Block diagram window holds the graphical source code of LabVIEW VI.

B. IR sensor

An IR Proximity sensor works by applying voltage to pair of IR light emitting diodes which in turn, emit infrared light. Has Three pins in which 1st pin is input voltage, 2nd is ground and 3rd pin is output. It requires input voltage of 5V, has 2 light in which one is transmitter and another one is receiver. This light propagates through the air and once it hits an object it is reflected back towards the sensor by which the digital output of IR sensor is connected to MyRIO as digital input.

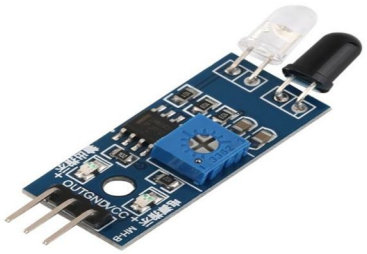


Fig.2 IR Sensor

C. Camera

Live surveillance camera is being used for surveillance by which they are monitored in LabVIEW. Surveillance cameras are similar to video cameras used for the purpose of observing an area. It can used for monitoring an area which is supervised by the operator.



Fig.3 Camera

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D. MyRIO

MyRIO is a real time embedded evaluation board developed by National Instruments. It is used to develop application that utilizes its onboard FPGA microprocessor. It has 10 analogue inputs, 6analogue outputs and 40 digital input output lines. it has three ports. Program is circuited with LabVIEW and fused with MyRIO which can be operated by wireless mode.



Fig.4 MyRIO

E. Dc Wheel Motor

A DC motors are any of class rotary electrical machines that converts the direct current electrical energy into mechanical energy. The most common types rely on the forced produced by magnetic field. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of the current flow in part of the motors. DC motors were the first type widely used, since they could be powered from the existing direct current lighting power distribution systems. A DC motors speed can be control over a wide range, using either a variable supply voltage or by changing the strength of the current in its field windings. Small DC motors are used in tools, toys and appliances. The universal motors can operated on direct current but is a light weight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevators and hoists, or in drives for steal rolling mills. The advent of the power electronics has made replacement of DC motors with AC motors possible in many applications.

IV. RESULTS AND DISCUSSION

The whole operation of this work is controlled and operated manual as well as automatic with help of MyRIO. For surveillance purpose, a surveillance camera is used for lived tracking system, in automatic mode IR sensor is used to detect any obstacles, four IR sensor is placed by which one at the front, two at both sides of right and left and another one at the bottom of the robot. When the first front IR sensor or bottom IR sensor gets detected the movement of robot gets stop and moves backward at particular distance and turns to the left direction, by the same way when the object is detected in the right or left one side of the wheel gets to stop and makes the robot to turn the opposite direction this process is done vise versa, and these type of operation are done based on left-hand wall technique.

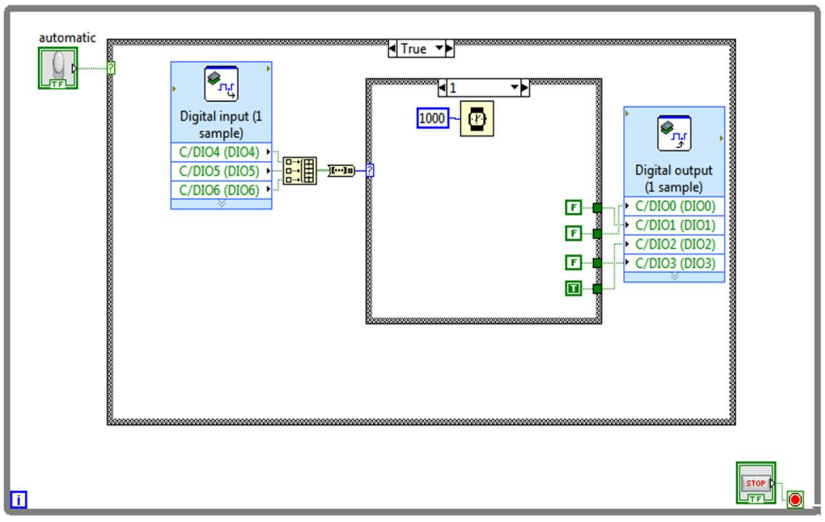


Fig.5 Block diagram window in LabVIEW

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In manual mode moment of the robot is operated with the help of a switch, four switches are used, two for the forward direction and two for the backward direction. As well as right and left turn of the robot is operated when one switch is at on state another one is off state. And the overall movement is moved with the help of two dc motor. The monitoring of the objects in front of the IR sensor is done by surveillance camera which is mounted in the front beyond the IR sensor.

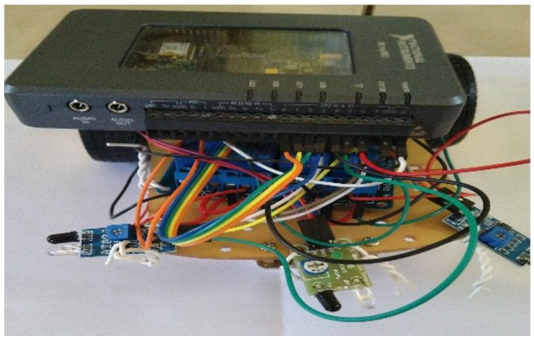


Fig.6 Hardware setup with NI-myRIO

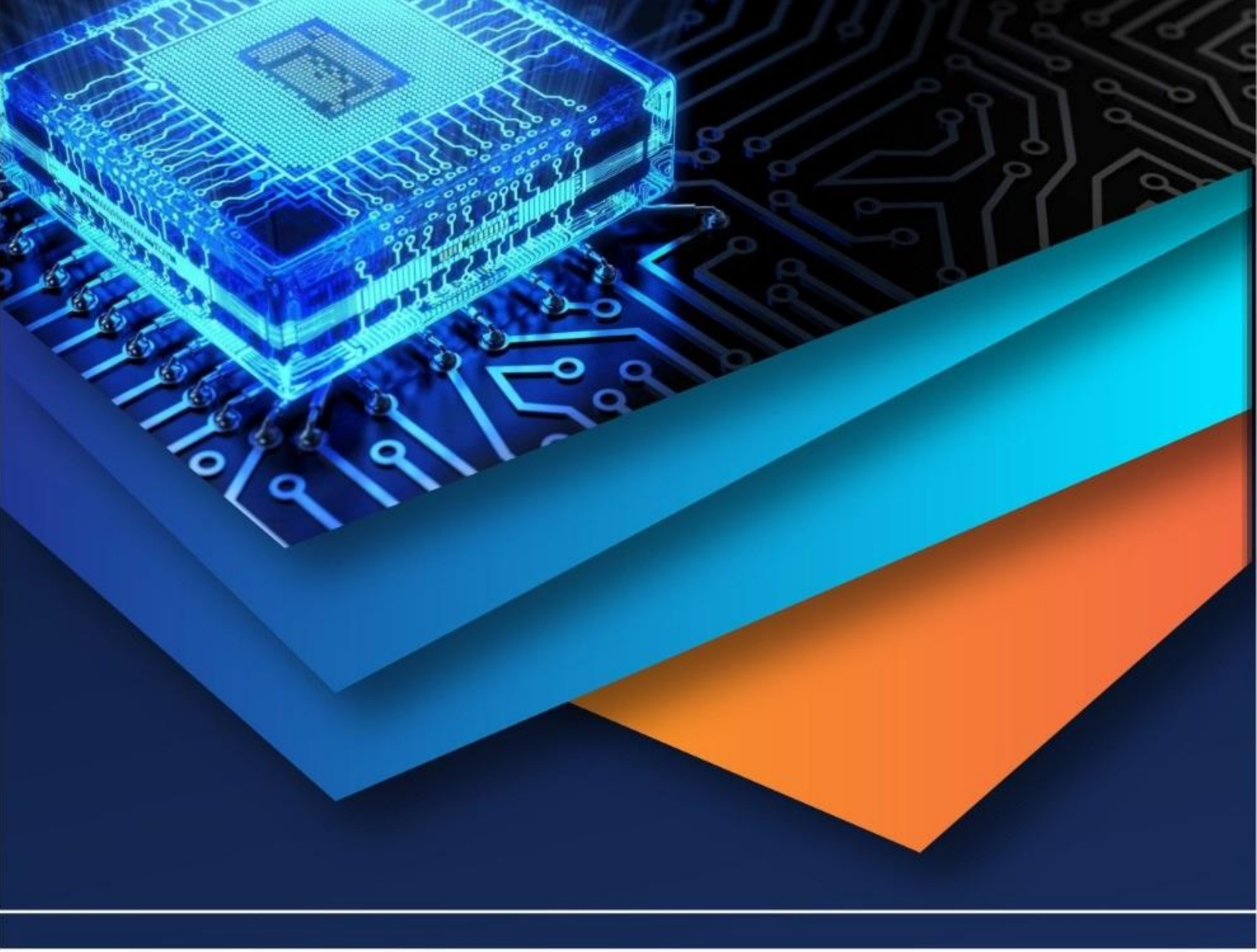
V. CONCLUSION

Today the major challenge for industrial monitoring and control in risky places. In this work has been successfully developed for monitor and also find defects in risky places using wireless technique, LabVIEW software and NI-myRIO. This surveillance robot can be used in places where a human cannot reach. This system can be adding more features like gas sensor, thermal image sensing, connecting robotic arms and can be used in pick and place purposes, etc.

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