

# Implementation of Graphic Simulator Based 3 Axis Robot

Miss R. Priyadharshini and Mr B. Arivu Selvam

**Abstract** - Robot, which reduces the mechanical actions of the human, are widely used in industrial and military applications. There are many ways for controlling the robot using serial and wireless communication. Traditionally, much technical knowledge are required for controlling the robot. For making the controlling of robot easier, user friendly is proposed. As only roboticist has a detailed knowledge of how to communicate with robots in their language, in this paper a graphical user interface that allows easy, real-time control of robots is proposed. In this method, the graphic simulator is developed, which is considered as GUI for user, is used to command and control the robot wirelessly. GUI is operated by a mouse. By moving the mouse, the corresponding command leads to movement of robot such as go forward, go backward, left turn, and right turn which is connected through wireless communication. Graphic simulator is developed as a 3 Dimensional picture in the LABVIEW software environment.

**Keywords:** GUI (graphical user interface), virtual robot, microcontroller, receiver, transmitter, Labview, virtual instrument(VI)

## I. INTRODUCTION

A robot is a mechanical or virtual artificial agent, usually an electro-mechanical machine that is guided by a computer program or electronic circuitry. Robots have replaced humans in the assistance of performing those repetitive and dangerous tasks which humans prefer not to do, or are unable to do due to size limitations.

Robotics area has been important grown in last decades. Different kinds of robotics mechanism have emerged to perform a wide variety of task. Inside this developed, articulated robot begin to play an important role on different applications, for example: manufacture process, especially in research and teaching process. The interest on development of these robots is supported besides on electronics and computation grown. Particularly, computer graphics allow the user to build realistic environments for every problem that we wish. These changes could not be made at profitable costs and timely results without the use of computer simulation tools, since not only the robots, but also the environment must be setup several times to the desired initial conditions to repeat the experiment.

Due to the process results, an original environment could be non-reconfigurable without human intervention (e.g. drilling a piece, moving parts to another place). One solution to the depicted issue is to account on graphical (morphological) and mathematical models to determine the interactions between robots and its external environment and then execute a desired task with intelligent (reactive or planned) obstacle avoiding in the trajectory.

A graphical user interface (GUI) that allows easy, real-time control of robots. The user uses the mouse to move the robot. i.e. Rather than typing to get the robot to move, the mouse can be used [6].

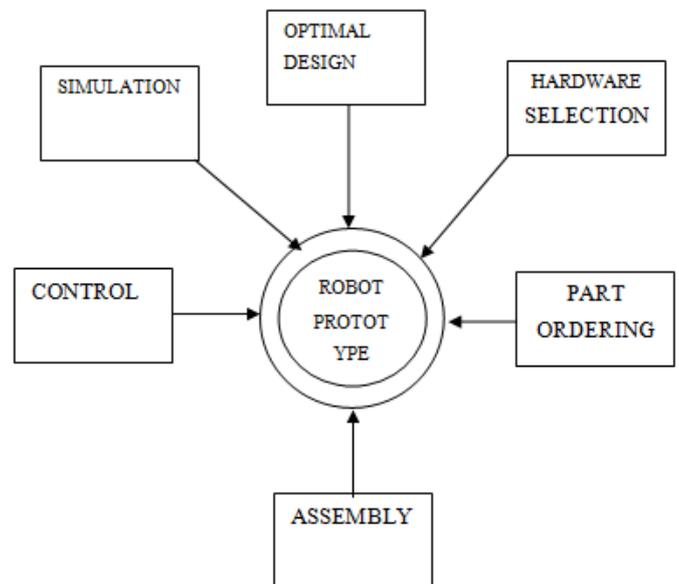


Fig. 1 Schematic view for Robot prototype

User friendly graphical interface complete with windows, menus, icons and so forth. As well as standard window technique the geometry of the model is visualized in interactive 3D viewers [3]. Using interaction with the 3D viewers the objects can be selected and manipulated. Manipulation options range from geometrical placement of the objects to adjusting the parameters of the objects.

With the help of Graphic simulator, 3D-map representation is transparent to the user, who only must concentrate the effort on its own application. Hence, the user leaves the usually graphical part which acts as a true virtual cell with robots reflecting the actions of user's application.

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## II. EXPERIMENTAL SETUP

### SOFTWARE:

Labview ties the creation of user interfaces (called front panels) into the development cycle. Labview programs/subroutines are called virtual instruments (VIs) [8]. Each VI has three components: a block diagram, a front panel and a connector panel. The last is used to represent the VI in the block diagrams of other, calling VIs. Controls and indicators on the front panel allow an operator to input data into or extract data from a running virtual instrument. However, the front panel can also serve as a programmatic interface. Thus a virtual instrument can either be run as a program, with the front panel serving as a user interface, or, when dropped as a node onto the block diagram, the front panel defines the inputs and outputs for the given node through the connector panel.

Labview used here is to create the 3D picture of the robot which is going to be controlled [1]. When the 3D image is operated by the mouse in the transmitter side, the command is given to the micro controller through the serial communication, which in then rotates the motor driver in the receiver side.

Robotics simulation programs in Labview include the following items:

**Robotics simulator:** The simulator reads and displays simulation scenes which was designed by calculates realistic, physics based properties of simulated components as they interact, an advances the time in the simulation. Start the simulator in a VI.

**Simulation program:** Create programs to run in the simulator. These programs contain the following components:

**Manifest file:** After designing a simulation environment and components, save their definitions in a .xml file, called a manifest file. The simulator reads from manifest files to render the components they define.

**Simulation scene:** Each manifest file defines one simulation scene, a combination of simulated components and their properties.

**Environment:** Each simulation instance must have an environment that describes the ground and any attached features. The environment also has associated physical properties, such as the surface material and force of gravity.

**Robots:** Robots can contain the base and the joints

**VIs:** Write VIs to control the simulator and simulated components. The VIs contain the same code to control simulated robots that embedded applications running on real robots might contain.

**Display window:** When starts the simulator, the simulation displays in the 3D picture control

### HARDWARE:

Basic elements of this project are as follows: Microcontroller, Encoder, RF transmitter, Decoder, RF receiver [5].

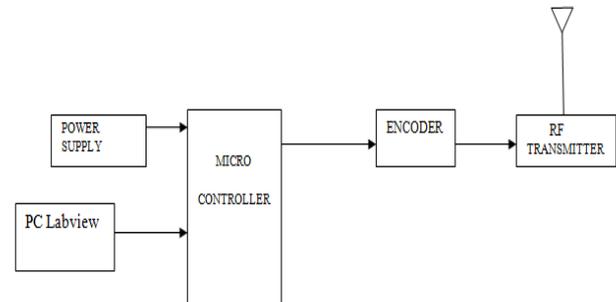


Fig .2(a):Transmitter section

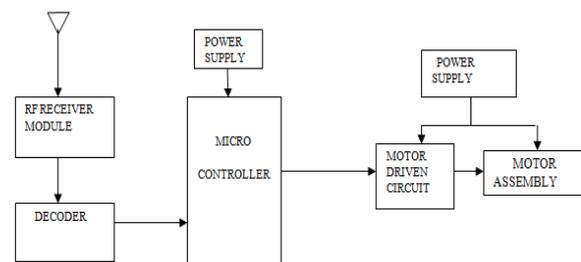


Fig. 2(b): Receiver section

**Transmitting Section:** After proper signal conditioning the microcontroller gives its output to port no.P0. Then these output signals behave as a feeder to relays. This is driver for operational four relays. This IC act as a source to drive the relay parts and finally the signal is transmitted through, transmitting IC. This IC provides proper modulation to our control signal to be transmitted through max proper; here the crystal oscillator is used as a source of carrier generator

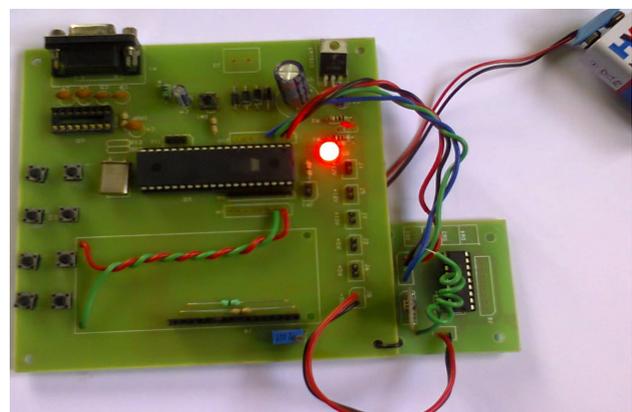


Fig 3: Modulation section

Receiving Section: Receiver IC receives the control signal and this IC provides the demodulation of carrier signal. Then again the output of receiver is amplified and filter up to the proper dc level. The signal acts as a source for the DC motor to provide the control movement. Then the whole process governs in this way.

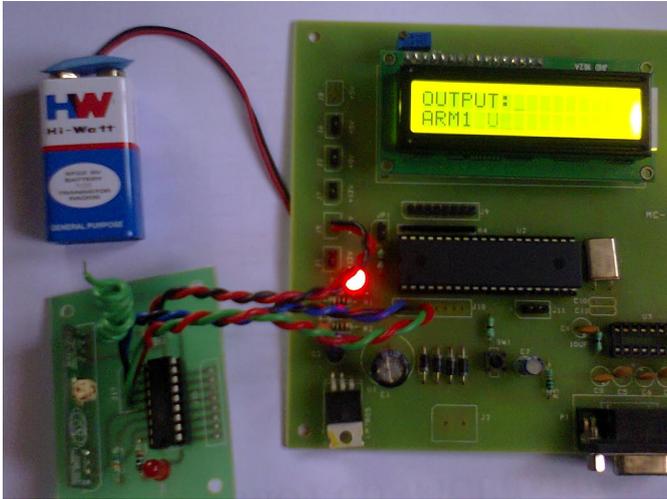


Fig 4: Demodulation section

The main aim of the project is to provide the data transmission from the GUI and microcontroller through serial communication and to provide the data transmission between the GUI and Robot wirelessly [2].

The main task of this project is two parts: (1) to program the microcontroller on both the transmitter section and the Robot interfaced to the radio packet controller module which would enable us to wirelessly control the Robot; (2) to program the GUI Application which would enable us to serially control the transmitter section.

### III. CONCLUSION AND FUTURE WORK

The graphic simulator was developed by creating the 3D picture control in Labview environment. This graphic simulator is able to control the 3 axis robot wirelessly by the user control.

The group of robots will be developed as 3D image and controlled wirelessly.

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