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VR Controlled Robot with Bluetooth based Motion

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ABSTRACT
VR CONTROLLED ROBOT WITH BLUETOOTH BASED MOTION is simply a bluetooth controlled robot that is integrated with the VR technology. Here we have two modules the first one is a VR Controller. The VR controller consists of a raspberry pi 3 and pi camera modules for the VR implementation. The pi modules are so programmed that they will work as UV4L streaming server that transmits real time audio and video captured by the camera and microphone module to the VR application. In the project we use google lens based VR glass which we found to be cheaper and more efficient. Also we utilize the motion of our head to control the motion of the camera. This motion control of the pi camera is implemented using the gyroscope data from an android mobile phone using the application.We are using an arduino based Bluetooth controller, and the circuit consists of an arduino nano board and Bluetooth module. Here we also use a dual axis joystick to control the motion of the robot.
Keywords – VR, Robot, Bluetooth, Arduino, UV4L.

I. INTRODUCTION

Virtual Reality as a whole is rapidly finding its feet in various fields of electronics and also entertainment. Virtual Reality (VR) literally makes it possible to experience anything, anywhere, anytime. It is the most immersive type of reality technology and can convince the human brain that it is somewhere it is really not. Head mounted displays are used with headphones and hand controllers to provide a fully immersive experience [1]. Here in this paper we will explain how we obtained the Bluetooth based motion and also about the VR controller that we developed using arduino UNO board.
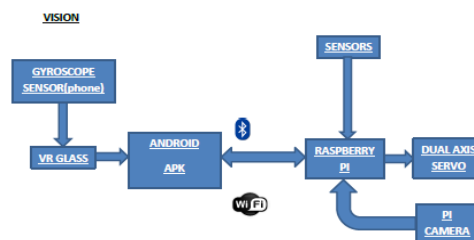
II. BLOCK DIAGRAM

There are two block diagrams, one for the motion and other for the vision.

Fig 1 : Block diagram of motion

Fig 2 : Block diagram of Vision system

Basically there are two main boards used in this project, the first one is arduino uno board which does all the function in the robot motion and then there is the raspberry pi controller which helps in the overall VR vision. Here we use a dual axis joystick in different directions to produce different values, these values are analog in nature and is converted into digital format using ADC in arduino and is transmitted through bluetooth module. This data is received by the Raspberry pi Bluetooth controller in the robot and is used to drive the motors.

III. WORKING

Here the mode of control is done through both robot vision and Bluetooth motion. Here the joystick used is the Xbox 360 dual axis controller. It is used for the motion of the robot. The motion includes front, back, right and left. X Axis include right and left motion. Y Axis includes front and back motion. Joystick is connected to Arduino Nano and this is used an ADC to convert the analog acceleration and joystick data to digital. We will be

using a 10 bit ADC and data is sent to a HC 05 Bluetooth module for transmission. A 9 V battery is used to power the Arduino. The motor driving is done with the help of a LT93D IC. The robotic vision consists of an accelerometer sensor; here we use an MPU-6050 6 axis gyro plus accelerometer sensor. It is used for sensing the head movement and the calibration is done through a program. Also we will be using android application with a multi browser window that displays real time camera footage from pi camera. This app is used to access mobile phone based accelerometer and gyroscope data and it displays the sensor data from the robot. Video streaming and data display is done through WiFi and motion control using Bluetooth module. We can use this in applications like inspection of tunnels, medical applications, military applications and simulations.
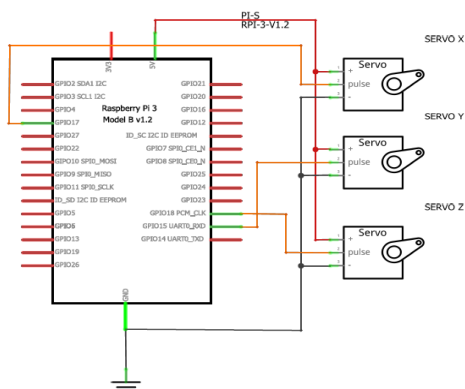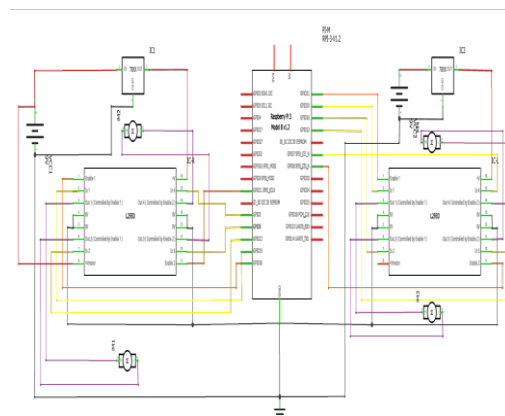

Fig 4: Motor Motion using L293D.

Journal Papers:

[1] Nadine E Miner, Sharon A Stansfield,"*An interactive virtual reality simulation system for robot control and operator training*",1994 *IEEE International Conference on Robotics and Automation.*

Fig 3: VR Controlled servos.