PROJECT REPORT

ON

GESTURE CONTROL ROBOT

BACHELOR OF TECHNOLOGY
IN
ELECTRICAL ENGINEERING

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ABSTRACT

In today's era human-machine interaction is becoming widespread. So, with the introduction of new technologies the gap between machines and humans is being reduced to ease the standard of living. Gestures have played a crucial role in diminishing this gap. The goal of gesture recognition in Computer Science field has always been the minimization of the distance between the physical world and the digital world. The way humans interact among themselves could be implemented in communication with the digital world by interpreting gestures via mathematical algorithm. Numerous ways and algorithms have been proposed and implemented to achieve the goal of gesture recognition and its use in communicating with the digital world. Gestures can be tracked using accelerometers. Since modern Smartphone are equipped with an in-built accelerometer, gesture control using Smartphone can be easy to implement, cheap to provide and the output will be more intuitive. This project is a real time monitoring system by which humans interacts with robots through gestures. This is an immense aid for people for whom mobility is a great challenge. There is a dire need for vision based interface over speech recognition as it failed to mandate the robots because of modulation and varying frequency. The implementation is achieved by navigation of the robot through various gestures. In this wireless gesture-controlled robot project we are going to control a robot using hand gestures with the help of Bluetooth module. This is an easy, user-friendly way to interact with robotic systems and robots. An accelerometer is used to detect the tilting position of your hand, and a microcontroller gets different analogue values and generates command signals to control the robot. By the impact of this project, life of physically challenged people becomes less challenging. From further research it will benefit various areas including applications in military and high security bases.

1. INTRODUCTION.

Nowadays, robotics is becoming one of the most advanced in the field of technology. A Robot is an electro-mechanical system that is operated by a computer program. Robots can be autonomous or semi-autonomous. An autonomous robot is not controlled by human and acts on its own decision by sensing its environment. Majority of the industrial robots are autonomous as they are required to operate at high speed and with great accuracy. But some applications require semi-autonomous or human controlled robots. Some of the most commonly used control systems are voice recognition, tactile or touch controlled and motion controlled. A Gesture Controlled robot is a kind of robot which can be controlled by your hand gestures not by old buttons. You just need to wear a small transmitting device in your hand which included an acceleration meter. This will transmit an appropriate command to the robot so that it can do whatever we want. The transmitting device included a ADC for analogy to digital conversion and an encoder IC(HT12E) which is use to encode the four bit data and then it will transmit by an RF Transmitter module. At the receiving end an RF Receiver module receiver's the encoded data and decode it by and decoder IC(HT12D). This data is then processed by a microcontroller and finally our motor driver to control the motor's. Now its time to break the task in different module's to make the task easy and simple any project become easy or error free if it is done in different modules. As our project is already divided into two different part transmitter and receiver. The applications of robotics mainly involve in automobiles, medical, construction, defines and also used as a firefighting robot to help the people from the fire accident. But, controlling the robot with a remote or a switch is quite complicated. So, a new project is developed that is, an accelerometer-based gesture control robot. The main goal of this project is to control the movement of the robot with hand gesture using accelerometer. The robot is usually an electro-mechanical machine that can perform tasks automatically. Some robots require some degree of guidance, which may be done using a remote control or with a computer interface. Robots can be autonomous, semi-autonomous or remotely controlled. Robots have evolved so much and are capable of mimicking humans that they seem to have a mind of their own.

2. **BASED ON APPLICATIONS ROBOTS ARE CATEGORIZED INTO DIFFERENT TYPES AS FOLLOWS –**

- INDUSTRIAL ROBOTS: Repetitiveness, accuracy, endurance, speed and reliability are most needed in industries. As there is always a chance to commit errors, Robots can replace humans, which can do the job much better than humans can.
- MOBILE ROBOTS: Automated Guided Vehicles or AGV are the mobile robots used over large localities like container ports, hospitals, and warehouses for transporting materials. To sense the surroundings wires or markers are used. These are placed on the floor example lasers for vision.
- AGRICULTURE ROBOTS: There are various agriculture –purpose functioned robots that are in the experimental stages, which are being used. These robots can pick fruits, water fields according to the schedules, cut grown crop etc. Although the functionalities like ploughing fields, planting seeds, and gathering the harvest may be included in future with increasing technology.
- TELEROBOTS: Tele robots are useful where they can undertake operations that are potentially harmful for humans or handle hazardous material, which a human cannot handle. By being located at a distance, a human operator can control a tele robot action, with the help of space shuttle's arm. Nuclear power plants, land mine etc. are the places that are dangerous to humans and where the tele robots find the applications.
- SERVICE ROBOTS: These Robots are used for services, based on service category there are categorized into personal use and professional jobs and are used outside an industrial facility.

3. **PROBLEM STATEMENT.**

The traditional wired buttons-controlled robot becomes very bulgy, and it also limits the distance the robot goes. The Wireless Hand controlled Robot will function by a wearable hand glove from which the movements of the hand can be used as the input for the movement of the robot. The basic idea of our project is to develop a system (Robot) which can recognize the Human Interaction with it to accomplish the certain tasks assigned to it. In our project we will design a wearable Hand Glove which will contain the sensors mounted on it to capture the movement of the hand and convert the raw mechanical data into electrical form. This data will be further processed and converted into an understandable format for the Lilypad mounted on

the Glove. This Lilypad will act as a transmitter of the data for wireless communication purpose. Once the transmitted data is received by the receiver module which will be connected to the Microcontroller, it will be processed and further sent to the Microcontroller. Microcontroller will deduce the commands and accordingly it will actuate the motor drivers to control the Motors for various tasks on the robot.

To design a human assistance robot suitable to work with four degrees of freedom, which is not too bulky and compatible to use and can be controlled by gestures. This robot should be communicated wirelessly over Bluetooth This robot should be re-programmable according to the applications to be used for.

4. GENERAL STATEMENT.

Robots find its application mostly in industries. Robots can be used to reduce monotonous work done by people there by reducing manual hard work and reduce human error.

5. OBJECTIVES.

The aim of the project is to develop a human machine interface used for control robot arm. Our objective is to make this device simple as well as cheap so it can be produced and used for number of purposes. The objective of this project is to build a car that can be controlled by gesture wirelessly. In this project user is also able to control motions of the car by wearing controller glove and performing predefined gestures. This can be also used in many potential applications such as wireless controller car racing etc.

6. SCOPE.

Wireless controlled robots are very useful in many applications like remote surveillance, military etc.

- Hand gesture-controlled robot can be used by physically challenged in wheelchairs.
- Hand gesture controlled industrial grade robotic arms can be developed.
- Entertainment applications – Most videogames today are played either on game consoles, arcade units or PCs, and all require a combination of input devices. Gesture recognition can be used to truly immerse a player in the game world like never before.

- Automation systems – In homes, offices, transport vehicles and more, gesture recognition can be incorporated to greatly increase usability and reduce the resources necessary to create primary or secondary input systems like remote controls, car entertainment systems with buttons or similar.
- An easier life for the disabled – One of the biggest challenges faced today is providing separate and equally non cumbersome services to the differently abled and handicapped. While there are special provisions around the world, there's still huge room for improvement to bring all lives on equal footing. Gesture recognition technology can eliminate a lot of manual labour and make life much easier for those who aren't as fortunate as most of us are. These are just a handful of the places and situations in which gesture recognition technology can be implemented, and as is evident, can totally change the way we interact with the world around us, not only at home, but in commercial venues as well. In fact, a South African company had come up with an innovative machine placed at the Tambo International Airport that detected travellers who yawned or looked sleepy and dispensed free cups of coffee. Although it used only basic facial and gesture recognition technology, it is nonetheless an interesting look into what can be done with this technology. Currently, there aren't too many gesture recognition applications available for public use, but interestingly, despite its potential for real world applications, gesture recognition technology is dominated by the videogame industry. Electronics giants Microsoft and Sony, makers of the Xbox and PlayStation line of consoles respectively, have incorporated gesture recognition to an extent into their entertainment systems, via extra hardware. Called 'Kinect' in the case of Microsoft and the 'PlayStation Eye/Camera' in the case of Sony, these amazing devices bring us one step closer to the future. While Microsoft in 2014 has gone ahead and included the Kinect 2.0 camera with the Xbox One, their latest gaming console and made gesture and voice control an integral part of it, Sony has left the PlayStation Camera as an accessory for the PlayStation 4, instead focusing on traditional input methods.

7. OVERVIEW OF THE PROJECT.

The project aims in designing a Robot that can be operated using Android mobile phone. The controlling of the Robot is done wirelessly through Android smart phone using the Bluetooth feature present in it. Here in the project the Android smart phone is used as a remote control for operating the Robot. Android is a software stack for mobile devices that includes an operating system, middleware and key applications. Android boasts a healthy array of connectivity options, including Wi-Fi, Bluetooth, and wireless data over a cellular connection (for example, GPRS, EDGE (Enhanced Data rates for GSM Evolution), and 3G). Android provides access to a wide range of useful libraries and tools that can be used to build rich applications. In addition, Android includes a full set of tools that have been built from the ground up alongside the platform providing developers with high productivity and deep insight into their applications. Bluetooth is an open standard specification for a radio frequency (RF)-based, shortrange connectivity technology that promises to change the face of computing and wireless communication. It is designed to be an inexpensive, wireless networking system for all classes of portable devices, such as laptops, PDAs (personal digital assistants), and mobile phones. It also will enable wireless connections for desktop computers, making connections between monitors, printers, keyboards, and the CPU cable-free. The controlling device of the whole system is a Microcontroller. Bluetooth module, DC motors are interfaced to the Microcontroller. The data received by the Bluetooth module from Android smart phone is fed as input to the controller. The controller acts accordingly on the DC motors of the Robot. The robot in the project can be made to move in all the four directions using the Android phone. The direction of the robot is indicated using LED indicators of the Robot system. In achieving the task the controller is loaded with a program written using Embedded ‘C’ language.

8. PURPOSE.

The purpose of our research is to provide simpler robot’s hardware architecture but with powerful computational platforms so that robot’s designer can focus on their research and tests instead of Bluetooth connection infrastructure. This simple architecture is also useful for educational robotics, because students can build their own robots with low cost and use them as platform for experiments in several courses. The main purpose of this project is to develop a remote user interface to control a robot via a wireless technology. There is a need to

communicate with the robot remotely in order to control the robot movements and pass critical data both ways. The current IR controls are not good enough because the robot does not have an IR transmitter but only a receiver, meaning that the communication is one way. The IR communication works only in line of direct sight and any objects in the way will obstruct the communication. Bluetooth communication will enable us to control the robot up to 100 meters without the need for direct sight which means that the robot could be located behind a wall, or some other object and the communication would not be lost.

9. EXISTING SYSTEM.

Gesture control robot can be made of many materials like steel, iron, titanium, aluminum, also with plastic or wooden sheets that are easily accessible and of low cost. The control circuit and the actuators are also accommodated in the design.3-axis accelerometer and five flex potentiometric sensors are adjoined on the robot for controlling the movement of the bot. The accelerometer gives output based on the tilt and flex sensors give based on the bent of the arm and fingers respectively. After constructing the bot, the entire bot is attached to the chassis, which is made of plastic .Then, the ZigBee transmitter is mounted on the sender side and ZigBee receiver on receiver side connected wirelessly to send and receive data .It can be explained that when the user makes gestures by moving the fingers of then hand, sensors mounted to the electronic glove calculates the tilt, bend and converts into analog values of voltage based on it. These values are processed to the existing Analog to Digital Converter of the microcontroller. Using the Zig Bee transmitter module, the processed digital signals are forwarded to the robotic arm control circuitry. The forwarded values in digital format are acknowledged by the ZigBee receiver servomotor will be invoked by using these values as input to it. Then the servers operate the robot in order to replicate gestures of the user

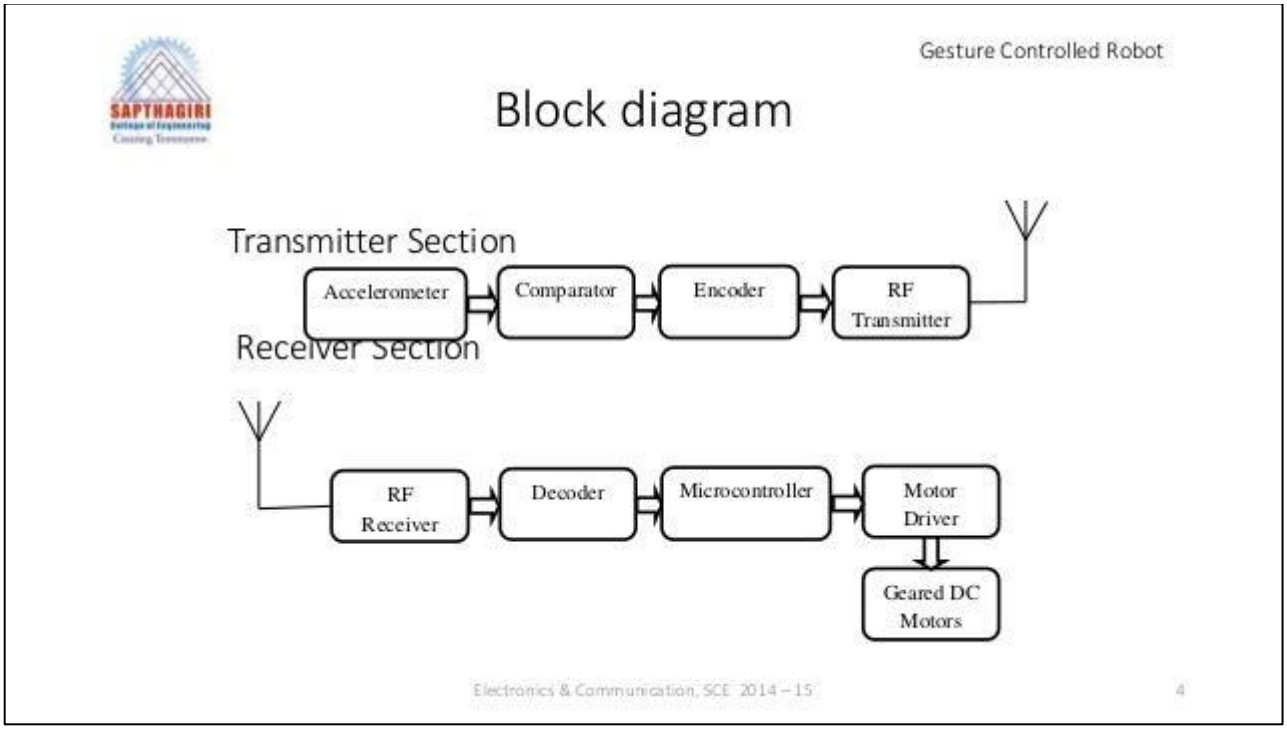

Fig 1: - Block Diagram of Gesture Contol Robot.

10.Methodology.

Methodology for communication signal Transmitter Module an RF transmitter module is a small PCB i.e., printed circuit board sub-assembly capable of transmitting a radio wave and modulating that wave to carry data. Transmitter modules are usually implemented alongside a micro controller which will provide data to the module which is transmitted. RF transmitters are usually subject to regulatory requirements which dictate the maximum allowable transmitter power output, harmonics, and band edge requirement. Receiver modules An RF Receiver module RF433-RX is 433 MHz radio receiver receives the modulated RF signal, and then it demodulates. There are two types of RF receiver module. Super-regenerative modules are usually of low cost and low power designs using a series of amplifiers use to extract modulated data from a carrier wave. Super-regenerative modules are generally imprecise as their frequency of operation varies in a fair amount with temperature and power supply voltage. Super heterodyne receivers having a performance advantage over super-regenerative; they offer increased an accuracy and stability over a large voltage and temperature range. This stability comes from a fixed crystal design which in turn leads to a comparatively more expensive product. Radio receiver which receives the transmitted coded from the remote place these codes are converted to digital format and output is available to the pin no 2 of the ic2

master microcontroller; this is the pin of inbuilt art of the microcontroller. We Based on the input codes master will give command to slave microcontroller and robot will behave as follows.

Moves in forward direction

Moves in reverse direction,

Speed controls in both the direction.

It can even turn left or right while moving forward or in reverse direction.

In case of bump, moves reverse turn left or right and wail for the next instruction.

On the spot left or right turn to pass through the narrow space.

We have also added head light, back light and turning lights to leave a right.

Methodology for Motion Control L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers as they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors. L293D contains two inbuilt H-bridge driver circuits. In common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state. This project controls a remote robot through RF. The ordinary 433 MHz RF modules are used in this project. AT89C51 microcontroller is used in this project. This robot can perform their operations without direct human guidance. They are used basically for industrial applications and can be made laser guided. Navigation is achieved by one of the several means, including following a path defined by buried inductive wires, surface mounted magnetic or optical strips: or alternatively by the way of laser guidance. This is an improved version of my previous robot which we designed years ago. Intelligent spy robot project has been designed for the spying purpose .it is radio controlled and can be operated at a radial distance of 100m radius. Most probably our army youth need to venture into the enemy

area just to track their activities. Which is often a very risky job and may cost precious life? Such dangerous job could be done using small spy robot all the developed and advance nations are in the process of making it, a robot that can fight against enemy. Our robot us just a step towards similar activity. This robot is radio operated which is, self-powered, and has all the controls like a normal car. A laser gun has been installed on it so that it can fire on enemy remotely whenever required; this is not possible until a wireless camera is installed. Wireless camera will send real time video and audio signals which could be seen on a remote monitor and 224 action can be taken accordingly. Being in size small of it, will not be tracked by enemy on his radar. Robot silently enter into enemy canopy or tent and send us all the information through its' tiny camera eyes. It can also be used for suicide attack, if required. Heart of our robot is microcontroller 8051 family, we are using at89C51 In two microcontrollers where first microcontroller which acts as master controller, decodes all the commands received from the transmitter and give commands to slave microcontroller. Slave microcontroller is responsible for executing all the commands received from the master and also generating pulse width modulation pulses for the speed control driver circuit which drives 4 nos. of motors. Two no bumper switch is added bmp 1 and bmp2 so that in case of accident our battery dose not drains out. Both the motors will stop instantly and after few second robots will move in opposite direction take turn to left or right direction and stops and stop. Navigation and Dead Reckoning, Tilt Compensation in inertial sensors, 3D-Gaming. transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps10Kbps. The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitted. Transmission through RF (Radio frequency) is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is stronger and more reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources. This RF module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (TX/RX) pair operates at a frequency of 433MHz an RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission

occurs at the rate of 1Kbps-10Kbps. The transmitted data is received by an RF receiver operating at the same frequency as that of the tran

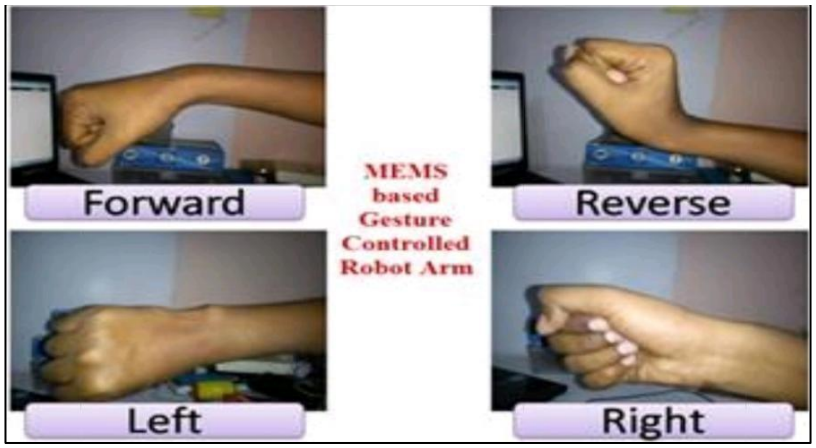

Fig 2: - Movement Signs.

11.LITERATURE REVIEW.

Moniruzzaman Bhuiyan and Rich Picking in Centre for Applied Internet Research (CAIR), Glyndŵr University, Wrexham, UK,proposed a review of the history of Gesture controlled user interface (GCUI), and identifies trends in technology,application and usability. Their findings conclude that GCUI[1]affords realistic opportunities for specific application areas, and especially for users who are uncomfortable with more commonly used input devices. They have tried collated chronographic research information which covers the past 30years. They investigated different types of gestures, its users, applications, technology, issues addressed, results and interfaces from existing research. They consider the next direction of gesture controlled user interfaces as rich user interface using gestures seems appropriate for current and future ubiquitous and ambient devices. Moniruzzaman Bhuiyan, Rich Picking of Institute of Information technology, University of Dhaka, Dhaka, Bangladesh; Centre for Applied Internet Research, Glyndwr University, Wrexham, United Kingdom on September 2011 in Journal of Software Engineering and to meet the challenges of ubiquitous computing, ambient technologies and an increasingly older population, research-ers have been trying to break away from traditional modes of interaction. A history of studies over the past 30 years reported in this paper suggests that Gesture Controlled User Interfaces (GCUI) now provide realistic and affordable opportunities, which may be appropriate for older and disabled people. They have developed a GCUI prototype application, called Open Gesture, to help users carry out

everyday activities such as making phone calls, controlling their television and performing mathematical calculations. Open Gesture uses simple hand gestures to perform a diverse range of tasks via a television interface. They describe Open Gesture and reports its usability evaluation. They conclude that this inclusive technology offers some potential to improve the independence and quality of life of older and disabled users along with general users, although there remain significant challenges to be overcome. Stefan Waldherr, Roseli Romero, Sebastian Thrun describes a gesture interface for the control of a mobile robot equipped with a manipulator. The interface uses a camera to track a person and recognize gestures involving arm motion. A fast, adaptive tracking algorithm enables the robot to track and follow a person reliably through office environments with changing lighting conditions. Two alternative methods for gesture recognition are compared: a template-based approach and a neural network approach. Both are combined with the Viterbi algorithm for the recognition of gestures defined through arm motion (in addition to static arm poses). Results are reported in the context of an interactive clean-up task, where a person guides the robot to specific locations that need to be cleaned and instructs the robot to pick up trash.

12. SYSTEM REQUIREMENTS.

Hardware Requirements:

1. Arduino nano

2. bts 7960

3. hc o5

4. Smart phone

5. arduino app

Software Requirements.

1.Arduino IDE

Hardware Requirements

1.Arduino Nano

● Arduino Nano is a small, compatible, flexible and breadboard friendly Microcontroller board, developed by Arduino.cc in Italy, based on ATmega328p (Arduino Nano V3.x) / Atmega168 (Arduino Nano V3.x).

● It comes with exactly the same functionality as in Arduino UNO but quite in small size.

● It comes with an operating voltage of 5V, however, the input voltage can vary from 7 to 12V.

● Arduino Nano Pinout contains 14 digital pins, 8 analog Pins, 2 Reset Pins & 6 Power Pins.

● Each of these Digital & Analog Pins are assigned with multiple functions but their main function is to be configured as input or output.

● They are acted as input pins when they are interfaced with sensors, but if you are driving some load then use them as output.

● Functions like pinMode() and digitalWrite() are used to control the operations of digital pins while analogRead() is used to control analog pins.

● The analog pins come with a total resolution of 10bits which measure the value from zero to 5V.

● Arduino Nano comes with a crystal oscillator of frequency 16 MHz. It is used to produce a clock of precise frequency using constant voltage.

● There is one limitation using Arduino Nano i.e. it doesn’t come with DC power jack, means you can not supply external power source through a battery.

● This board doesn’t use standard USB for connection with a computer, instead, it comes with Mini USB support.

● Tiny size and breadboard friendly nature make this device an ideal choice for most of the applications where a size of the electronic components are of great concern.

● Flash memory is 16KB or 32KB that all depends on the Atmega board i.e Atmega168 comes with 16KB of flash memory while Atmega328 comes with a flash memory of 32KB. Flash

memory is used for storing code. The 2KB of memory out of total flash memory is used for a bootloader.

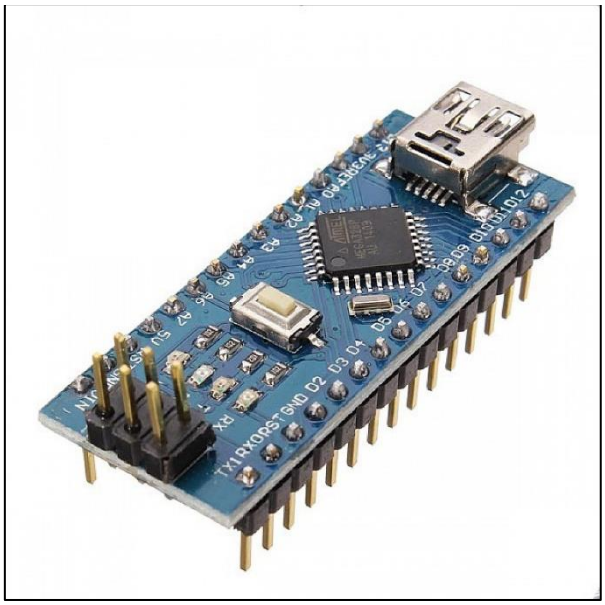

Fig 3: - Arduino Nano

●Following figure shows the specifications of Arduino Nano Board.

Microcontroller	Atmega328p/Atmega 168
Operating Voltage	5V
Input Voltage	7 – 12 V
Digital I/O Pins	14
PWM	6 out of 14 digital pins
Max. Current Rating	40mA
USB	Mini
Analog Pins	8
Flash Memory	16KB or 32KB
SRAM	1KB or 2KB
Crystal Oscillator	16 MHz
EEPROM	512bytes or 1KB
USART	Yes

Table 1: - Specification of Arduino Nano.

● It is programmed using Arduino IDE which is an Integrated Development Environment that runs both offline and online.

● No prior arrangements are required to run the board. All you need is board, mini USB cable and Arduino IDE software installed on the computer. USB cable is used to transfer the program from computer to the board.

● No separate burner is required to compile and burn the program as this board comes with a built-in boot-loader.

● Arduino Nano Pin Configuration Following figure shows the pinout of Arduino Nano Board.

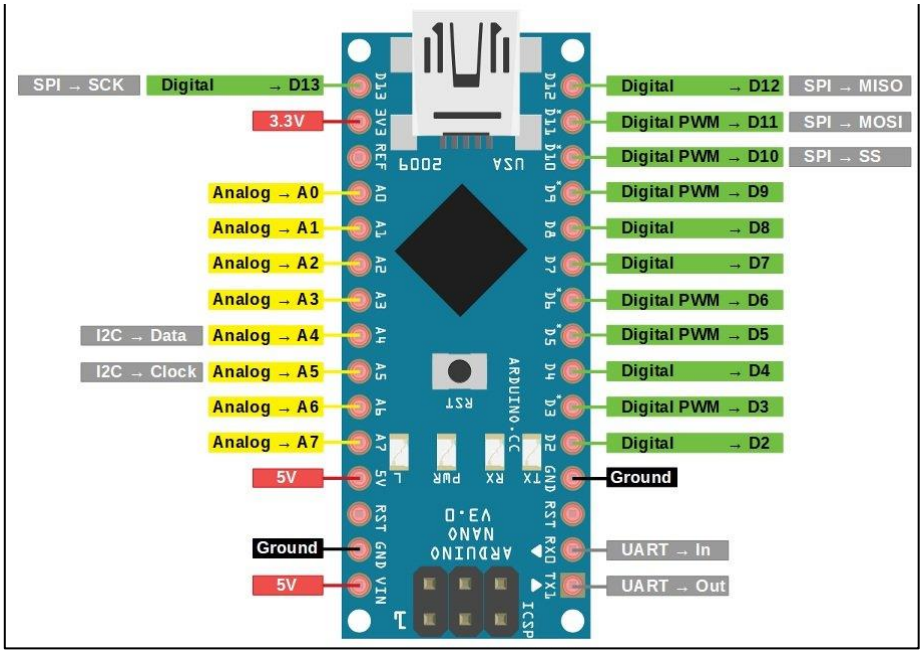

Fig 4: -Arduino Nano Pin Configuration.

● Each pin on the Nano board comes with a specific function associated with it.

● We can see the analog pins that can be used as an analog to digital converter where A4 and A5 pins can also be used for I2C communication. Similarly, there are 14 digital pins, out of which 6 pins are used for generating PWM.

13. SIMULATION WORK.

1. RF pair

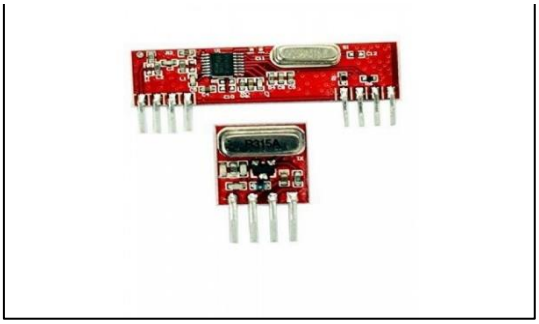

Fig 5: - Picture of Object.

A gesture controlled robot is controlled by using hand in place of any other method like buttons or joystick. Here one only needs to move hand to control the robot. A transmitting device is used in your hand which contains RF Transmitter and accelero-meter. This will transmit command to robot so that it can do the required task like moving forward, reverse, turning left, turning right and stop. All these tasks will be performed by using hand gesture. Here the most important component is accelerometer. Accelerometer is a 3 axis acceleration measurement device with +-3g range. This device is made by using polysilicon surface sensor and signal conditioning circuit to measure acceleration. The output of this device is Analog in nature and proportional to the acceleration. This device measures the static acceleration of gravity when we tilt it. And gives an result in form of motion or vibration. According to the datasheet of adxl335 polysilicon surface-micromachined structure placed on top of silicon wafer. Polysilicon springs suspend the structure over the surface of the wafer and provide a resistance against acceleration forces. Deflection of the structure is measured using a differential capacitor which incorporate independent fixed plates and plates attached to the moving mass. The fixed plates are driven by 180° out-of-phase square waves. Acceleration deflects the moving mass and unbalances the differential capacitor resulting in a sensor output whose amplitude is proportional to acceleration. Phase-sensitive demodulation techniques are then used to determine the magnitude and direction of acceleration.

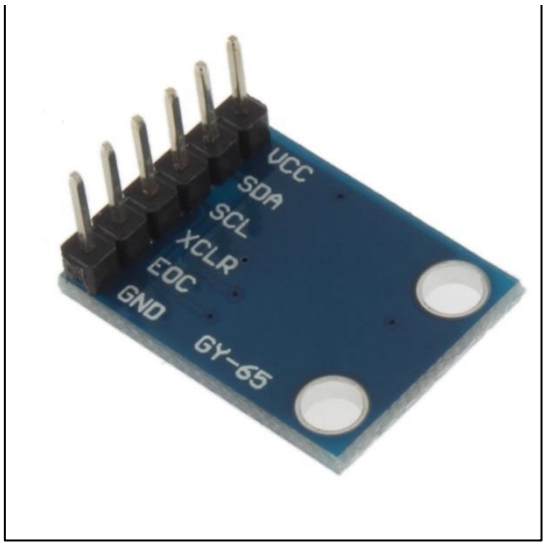

Fig 6: - Accelerometer.

14. Pin Description of accelerometer

- Vcc 5 volt supply should connect at this pin.
- X-OUT This pin gives an Analog output in x direction
- Y-OUT This pin give an Analog Output in y direction
- Z-OUT This pin gives an Analog Output in z direction
- GND Ground
- This pin used for set sensitivity of sensor

15. Circuit Diagram and Explanation

Gesture Controlled Robot is divided into two sections:

1. Transmitter part

2. Receiver part

In transmitter part an accelerometer and a RF transmitter unit is used. As we have already discussed that accelerometer gives an analog output so here we need to convert this analog data in to digital. For this purpose we have used 4 channel comparator circuit in place of any ADC. By setting reference voltage we gets a digital signal and then apply this signal to HT12E encoder to encode data or converting it into serial form and then send this data by using RF transmitter into the environment. At the receiver end we have used RF receiver to receive data and then applied to HT12D decoder. This decoder IC converts received serial data to parallel and then read by using arduino. According to received data we drive robot by using two DC motor in forward, reverse, left, right and stop direction.

16. Working of Model.

Gesture controlled robot moves according to hand movement as we place transmitter in our hand. When we tilt hand in front side, robot start to moving forward and continues moving forward until next command is given. When we tilt hand in backward side, robot change its state and start moving in backwards direction until other command is given. When we tilt it in left side Robot get turn left till next command. When we tilt hand in right side robot turned to right. And for stopping robot we keeps hand in stable.

1. Transmitter Circuit.

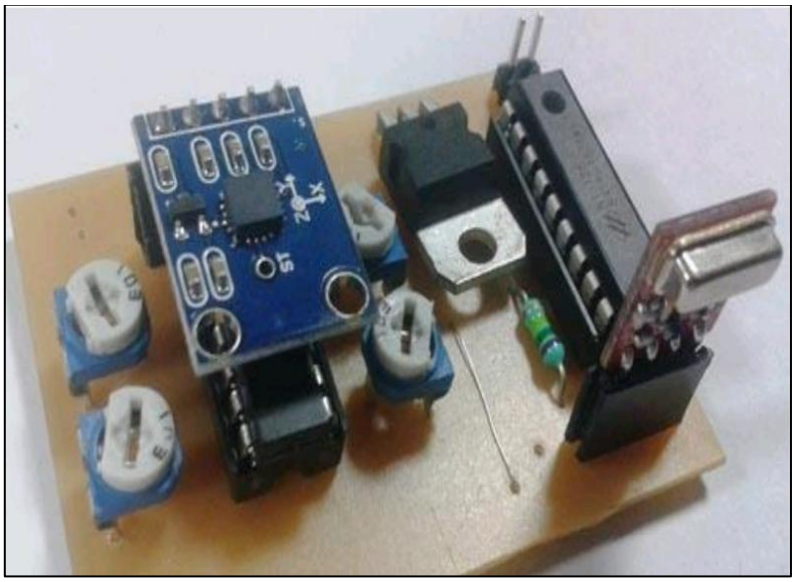

Fig 7: - Transmitter.

2. Receiver circuit.

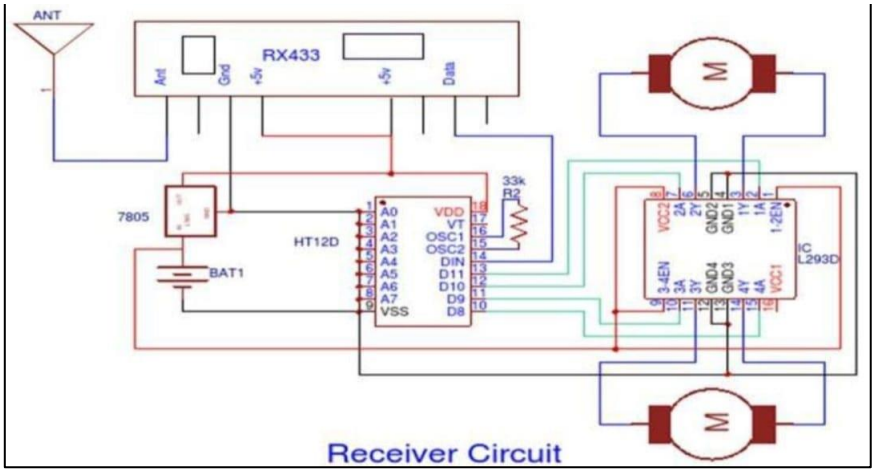

Fig 8: - Receiver Circuit.

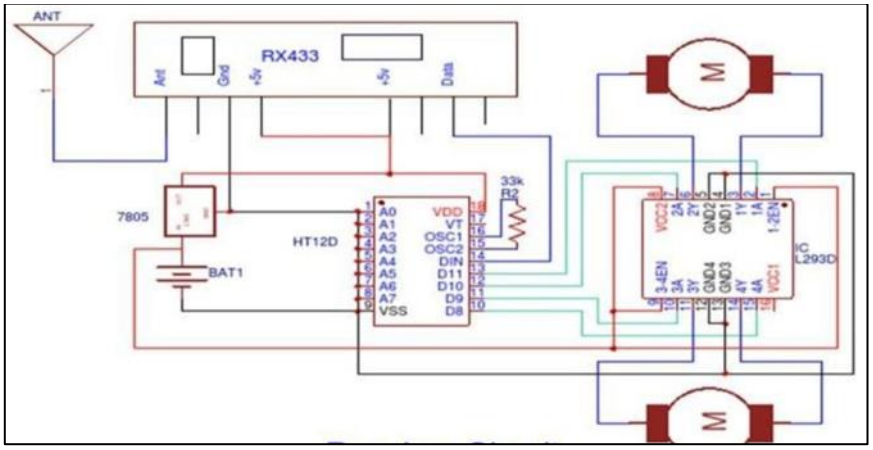

Fig 9: - Transmitter Circuit.

This transmitted signal is received by the RF receiver, demodulated and then passed onto the decoder IC. The decoder IC decodes the coded waveform and the original data bits are recovered. The input is a serial coded modulated waveform while the output is parallel. The pin 17 of the decoder IC is the Valid Transmission (VT) pin. A led can be connected to this pin which will indicate the status of the transmission. In the case of a successful transmission, the led will blink. The parallel data from the encoder is fed to the port 1of the microcontroller. This data is in the form of bits. The microcontroller reads these bits and takes decisions on the basis of these bits. What the microcontroller does is, it compares the input bits with the coded bits which are burnt into the program memory of the microcontroller and outputs on the basis of these bits. Port 2 of the microcontroller is used as the output port. Output bits from this port are forwarded to the motor driver IC which drives the motors in a special configuration .Gesture controlled robot works on the principle of accelerometer which records hand movements and sends that data to the comparator which assigns proper voltage levels to the recorded movements. That information is then transferred to an encoder which makes it ready for RF transmission. On the receiving end, the information is received wirelessly via RF, decoded and then passed onto the microcontroller which takes various decisions based on the received information.These decisions are passed to the motor driver IC which triggers the motors in different configurations to make the robot move in a specific direction. Task was divided into two parts to make the task easy and simple and to avoid complexity and make it error free. The first is the transmitting section which includes the following components: Accelerometer, encoder IC, RF Transmitter Module.The second is the receiving end whichcomprises of following main components: RF Receiver Module, Decoder IC, Mic

rocontroller, Motor Driver IC, DC Motors.The accelerometer records the hand movements in the X and Y directions only and outputs constant analog voltage levels. These voltages are fed to the microcontroller which processes the input and encodes the data into digital form which is suitable to be transmitted through the xbee serial transmitter. Circuit for this hand gesture controlled robot is quite simple. As shown in above schematic diagrams, a RF pair is used for communication and connected with arduino. Motor driver is connected to arduino to run the robot. Motor driver's input pin 2, 7, 10 and 15 is connected to arduino digital pin number 6, 5, 4 and 3 respectively. Here we have used two DC motors to drive robot in which one motor is connected at output pin of motor driver 3 and 6 and another motor is connected at 11 and 14. A 9 volt Battery is also used to power the motor driver for driving motors.

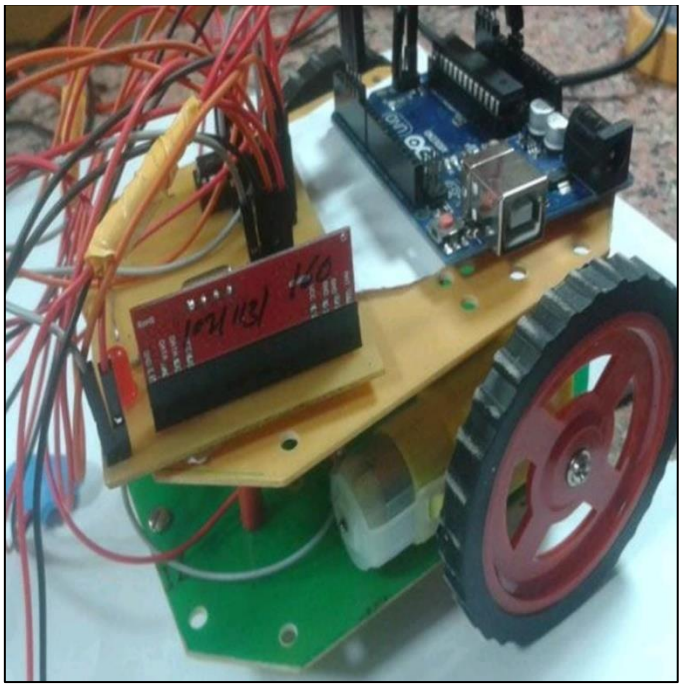

Fig 10: - Ready Model.

17. Robot

A robot is usually an electro-mechanical machine that can perform tasks automatically. Some robots require some degree of guidance, which may be done using a remote Control or with a computer interface. Robots can be autonomous, semi-autonomous or remotely controlled. Robots have evolved so much and are capable of mimicking humans that they seem to have a mind of their own

18.Light- emitting diode

A light-emitting diode (LED) is a semiconductor device that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

Appearing as practical electronic components in 1962, the earliest LEDs emitted low-intensity infrared (IR) light. Infrared LEDs are used in remote-control circuits, such as those used with a wide variety of consumer electronics. The first visible-light LEDs were of low intensity and limited to red. Early LEDs were often used as indicator lamps, replacing small incandescent bulbs, and in seven-segment displays. Later developments produced LEDs available in visible, ultraviolet (UV), and infrared wavelengths, with high, low, or intermediate light output, for instance white LEDs suitable for room and outdoor area lighting. LEDs have also given rise to new types of displays and sensors, while their high switching rates are useful in advanced communications technology with applications as diverse as aviation lighting, fairy lights, automotive headlamps, advertising, general lighting, traffic signals, camera flashes, lighted wallpaper, horticultural grow lights, and medical devices.

LEDs have many advantages over incandescent light sources, including lower power consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. In exchange for these generally favorable attributes, disadvantages of LEDs include electrical limitations to low voltage and generally to DC (not AC) power, inability to provide steady illumination from a pulsing DC or an AC electrical supply source, and lesser maximum operating temperature and storage temperature. In contrast to LEDs, incandescent lamps can be made to intrinsically run at virtually any supply voltage, can utilize either AC or DC current interchangeably, and will provide steady illumination when powered by AC or pulsing DC even at a frequency as low as 50 Hz. LEDs usually need electronic support components to function, while an incandescent bulb can and usually does operate directly from an unregulated DC or AC power source

19.CONCLUSION.

The purpose of project is to control a toy car using accelerometer sensors attached to a hand glove. The sensors are intended to replace the remote control that is generally used to run the car. It will allow us to control the forward and backward, and left and right movements, while using the same accelerometer sensor to control the throttle of the car. based on the hand movements. By using the above mentioned components the hardware was setup, thus resulting in the formation of a robot. In order to implement the experiment a Dell laptop was used, whose web camera acted as the input device for capturing the video. The software part was developed in Java for image processing wherein the hand gestures were analyzed to extract the actual direction. Eclipse Ide was used for developing the java code. The direction thus identified was send as characters to the robot with the help of Zigbee. XBee S2 version of Zigbee was used for enabling the communication. The final movement of the robot can be concluded as follows: At the beginning the robot was in a stop mode. As the hand moved from bottom to top, the robot moved in the forward direction. As the hand moved from top to bottom, the robot moved in the backward direction. As the hand was shown as an acute angle towards the left, the robot moved towards the left direction. As the hand was shown as an acute angle towards the right, the robot moved towards the right direction. As the hand is kept stationary with respect to the environment, the robot was in the stop mode. From the experiment, about 80% of the implementation worked according; the remaining was less due to background interference which is a negative marking to the implementation. Hand Gesture Controlled Robot System gives a more natural way of controlling devices. The command for the robot to navigate in specific direction in the environment is based on technique of hand gestures provided by the user. Without using any external hardware support for gesture input unlike specified existing system, user can control a robot from his software station. 4.

20. FUTURE SCOPE.

1) The on board batteries occupy a lot of space and are also quite heavy. We can either use some alternate power source for the batteries or replace the current DC Motors with ones which require less power.

2) The proposed system is applicable in hazardous environment where a camera can be attached to the robot and can be viewed by the user who is in his station. This system can also be employed in medical field where miniature robot are created that can help doctors for efficient surgery operations For more efficient response, threshold values can be used to detect gesture and advanced features such as finger counts that provide different functional commands can be used.

3) Entertainment applications – Most videogames today are played either on game consoles, arcade units or PCs, and all require a combination of input devices. Gesture recognition can be used to truly immerse a players in the game world like never before.

4) Automation systems – In homes, offices, transport vehicles and more, gesture recognition can be incorporated to greatly increase usability and reduce the resources necessary to create primary or secondary input systems like remote controls, car entertainment systems with buttons or similar.

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