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Hand Gesture Controlled Vehicle Using Accelerometer with The Help of Zigbee Pairs

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Abstract*: In this paper a model to control the vehicle via hand gesture using accelerometer is presented. Accelerometer is a three axis device which is mounted on the human hand in order to perform the movement of the vehicle as per the actions performed by the human hand .The signal transmission from transmitter to receiver is done by zigbee technology. The microcontroller used is a ATmega328 microcontroller, it is programmed to take analog reading as input from accelerometer and to transmit the signal at the receiving end of the robotic arm.The DCmotor are used to achieve the movement of the vehicle. The main aim is to control the robotic arm via human gesture in a wired fashion with ease in motion over a given range. It consists of mainly two parts, one is transmitter part and another is receiver part. The transmitter will transmit the signal according to the position of accelerometer and your hand gesture and the receiver will receive the signal and make the vehicle move in respective direction. Here, the program is designed by using Arduino UNO.

***Index Terms*: MCU, Gesture, Accelerometer, DC Motor, Aurduino UNO, Zigbee.**

I. INTRODUCTION

In recent years, robotics is a current emerging technology in the field of science. Robotics is the new booming field, which will be of great use to society in the coming years. Though robots could be a replacement to humans, they still want to be organized by humans. Robots can be wired or wireless, both having a controller device. Beyond controlling the robotic system through physical devices, recent method of gesture control has become very popular. The main reason for using gestures is that it offers a more natural way of controlling and offers a rich and intuitive form of communication with the robotic system. These days many types of wireless robots are being developed and are put to varied applications and uses. Human hand motions are natural and with the help of wireless communication, it is easier to interact with the robot a open way. The robot moves depending on the gesture made by your hand and from a distance. The objective of this paper is to build a wireless gesture control robot using Arduino, accelerometer,Zigbee technology. The Arduino Uno microcontroller reads the analog output values i.e., xaxis and y-axis values of the accelerometer and converts that analog value to respective digital value. The digital values are processed by the Arduino Uno microcontroller and according to the tilt of the accelerometer sensor mounted on hand, it sends the commands to the zigbee transmitter which is received by the transmitter and is processed at the receiver end which drives the motor to a particular direction. The robot moves forward, backward, right and left when we tilt our palm. The robot rests when it is parallel to the ground.

II. RELATED WORK

The paper concentrate on the improvement of the robot arm by using the usage of flex sensor and 3 servo motor related to the arduino uno that's organized by means of manner of processing software program program and a computer mouse. The ones robot arm are reasonably priced and without trouble available which makes it free from pointless wire connection, decreasing its complexity. However nevertheless there's a demand of including new ideas and capability. The significant goal of the paper is to put into effect a gadget via which the user can deliver commands to wireless robotic the use of gesture. Right here, the consumer manage or navigate the robotic with the aid of the use of motion of palm. The indicators are made from those gesture with the assist of photograph processing and indicators are exceeded to the robotic to navigate it inside the special route .The paper explains about the application and layout of gesture managed robot by means of the use of flex sensor, ultra sonic sensor, digital compass and accelerometer connected to atmega microcontroller. The research paper describes the robot, that's managed by a hand glove wirelessly with the help of bluetooth. The robot is evolved via using the input section together with sensor, lcd, display and a bluetooth tool and the output phase which is such as nxt microcontroller, motor and digicam. The programming is developed in matlab.

III. PROPOSED MODEL

The whole assignment is break up into sections one is transmitter segment and other is receiver section. The circuit diagram and the transmitter prototype is proven in determine 2, and discern 3 respectively, and the transmitter segment includes one arduino uno, one 3-axis accelerometer and one rf transmitter module. The circuit diagram of receiver module and the receiver prototype is proven in parent four and decide 5 respectively. The receiver segment consists of one rf receiver module, one motor driving force ic, two pmdc motor, wheels. Right here,two separate 5 volt electricity deliver is applied to each the sections.

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In the end, the arduino uno reads the analog output values i.e., x-axis and y-axis values from the 3 axis accelerometer and converts the analog charge to respective digital fee.

The virtual values are processed via the arduino uno and ship to the rf transmitter that is acquired through the receiver and is processed on the receiver stop which drives the motor to a selected direction. The robotic actions in advance, backward, right and left while there may be tilt within the palm of individual in ahead, backward, right and left respectively recommendations as established in discern 1.

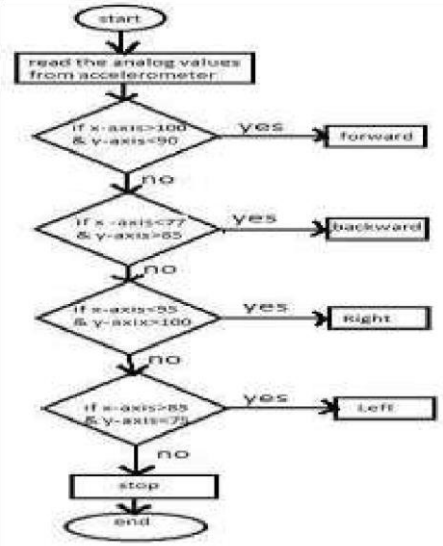


Figure-1 Flow Chart of the Proposed Method

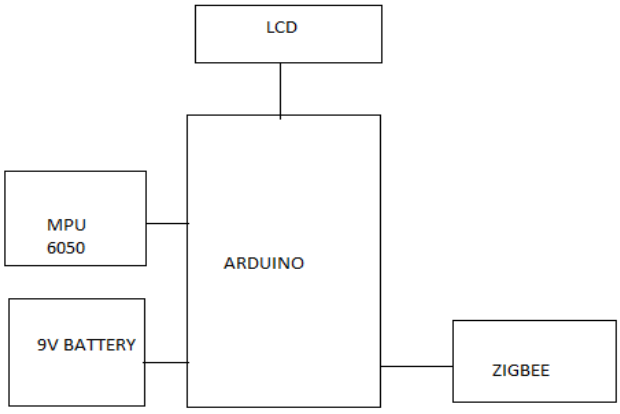


Figure-2 Block Diagram of Transmitter Part

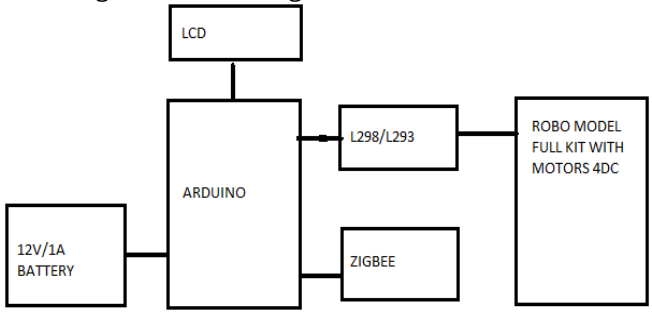


Figure-3 Block Diagram for Receiver Part

IV. IMPLEMENTATION

A. Software used

Here, the program is designed by way of the usage of arduino uno. The program is written in arduino integrated development surroundings (ide) as proven in discern 6. Here, the version used is 1.6.1.It connects to the arduino hardware to upload applications. But before importing this system there is a want to select suitable microcontroller so, “arduino uno” from the device menu has been chosen. And for correct communication with pc and arduino uno boards there is a want to pick com port fromthe device menu. Helpful Hints

B. Hardware used

ARDUINO

It's far a microcontroller board primarily based on atmega328 [2] [3] which has 14 digital i/o and 6 analog pins. It has everything that is needed to guide the microcontroller. In reality join it to the computer with a usb cable to get began with the arduino uno board. It's miles flexible, easy to apply hardware and software. Arduino uno can sense the environment through receiving input from a diffusion of sensors and may affect its surroundings by way of controlling lighting fixtures, vehicles, and different actuators.

ACCELEROMETER

The adxl335[9] is a small, skinny, low power, whole 3-axis accelerometer with sign conditioned voltage outputs. It has 6 pins. Three pins is for x,y,z axis. First pin for electricity supply (vcc), 2nd pin for ground (gnd) and the final one for self-test (st). It operates on three.3v from the arduino uno board. X and y axis pins are linked to a0 and a1 pin of arduino uno board respectively. It could degree the static acceleration of gravity from tiltsensing applications in addition to dynamic acceleration as a consequence of movement, surprise or vibration and gives corresponding analog values thru x,y,z axis pins.The adxl335 is to be had in a small, low profile, 4mm x 4mm x 1.45 mm, 16lead, plastic lead body chip scale bundle. The low fee and small sixe of three-axis accelerometer, are the two element that makes it effetctive to stumble on the hand gesture.

MOTOR DRIVER

We have used L293D[10] IC which is 16 pin DIP package motor driver having 4 input pins, 4 output pins, 4 VCC pins and 4 ground pins. All 4 input pins are connected to the output pins of decoder IC. And 4 output pins are connected to the DC motors of robot. We have connected all 4 VCC pins to 5V DC supply

PMDC MOTOR

The permanent magnet dc[7] motor consists of an armature winding as used in case of a ordinary motor, however does not necessarily incorporate the sphere windings. The constructions of these varieties of dc motor are radially magnetized permanent magnets and are hooked up on the internal periphery of the stator core to produce the sector flux. The rotor then again has a traditional dc armature with commutator segments and brushes. The diagrammatic representation of a everlasting magnet dc motor is proven in figure. The torque equation of dc motor indicates tg= kaφ ia. Right here φ is always constant, as everlasting magnets of required flux density are motor chosen at the time of creation and may’t be modified thereafter.

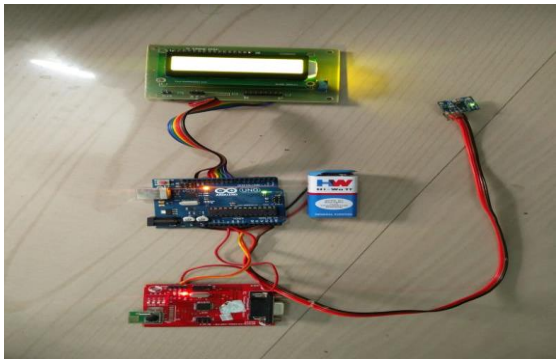
For a permanent magnet dc motor tg = ka1ia whereka1 = ka.φ which is another constant. In this case the torque of dc motor can most effective be modified by controlling armature supply. Two dc motor of one hundred rpm are used on this paper. One motor is hooked up to pin 3 and 6 of motor driver and every other motor is attached to pin 11 and 14.

Zigbee Technology

Zigbee technology builds on IEEE standard 802.15.14 which defines the physical and MAC layers. Above this, zigbee defines the application and security layer specifications enabling, interoperability between products from different manufacturers. In this way Zigbee is as uperset of the 802.15.4 specification. with the applications for remote wireless sensing and control growing rapidly it is estimated that the market size could reach the hundreds of millions of dollars as early as 2007.

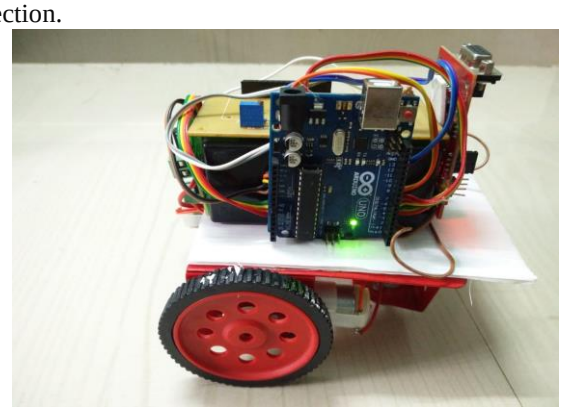
V.TRANSMITTER PART

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.



VI. RECEIVER PART

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.



VII. DESIGN AND WORKING

The transmitter prototype is stored on the palm and the receiver prototype (i.E robotic) moves in line with the palm motion. This paper explains about the 5 specific gesture role of the hand i.E prevent circumstance, ahead motion, backward motion, moves toward right and moves in the direction of left.

A. Stop Condition

While the accelerometer is parallel to the horizontal plane, all the output pins of decoder (13, 12, eleven, 10) are set to excessive which makes the robot in prevent mode. Led are related to the decoder output pins. Seeing that all the output pins are high, so all of the led are sparkling.

B. Forward Movement

Whilst the accelerometer is tilted to ahead, two output pin of decoder (thirteen, 11) are set to low and other two output pin of decoder (12, 10) are set to excessive. This circumstance commands the robot to transport in ahead path. Led linked to pin 13 and 11 aren't glowing as it's miles low and led linked to pin 10 and 12 are glowing since, it is high .

C. Backward Movement

While the accelerometer is tilted in the direction of backward route, output pin of decoder (12, 10) are set to low and other output pin of decoder (thirteen, 11) are set to excessive. This condition instructions the robotic to transport in backward path. Led connected to pin 13 and eleven are sparkling as it's far high and led connected to pin 10 and 12 aren't sparkling due to the fact, it's far low.

D. Moves Towards Right

While the accelerometer is tilted toward proper, output pin of decoder (12, 11) are set to low and different output pin of decoder (thirteen, 10) are set to excessive. This situation commands the robot to move toward right. The output can be visible inside the above photograph. Led linked to pin thirteen and 10 are glowing as it is high and led connected to pin eleven and 12 aren't glowing due to the fact that, it is low .

E. Moves Towards Left

While the accelerometer is tilted towards left, output pin of decoder (12, eleven) are set to high and other output pin of decoder (thirteen, 10) are set to low. This condition commands the robot to move closer to left. Led connected to pin 13 and 10 are not sparkling as it's far low and led linked to pin eleven and 12 are sparkling considering the fact that, it's far high.

VIII. COMPARISION WITH EXISTING SYSTEM

The most important benefit of this device over different structures is that it provides real time palm gesture popularity, main to an effective and natural manner of controlling robots. Extra benefit-- many present machine have used Bluetooth wi-fi manage which is changed through rf modules on this paper, and because of which the variety has been more suitable.

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IX. CONCLUSION

In this paper, an automated robotic has been evolved which goes in line with your hand gesture. The robot movements wirelessly consistent with palm gesture. The rf module is working on the frequency of 433 mhz and has a number of 50-80 meters. This robotic may be upgraded to detect human lifestyles in earthquake and landslide via enforcing the sensor accordingly. It could also be upgraded to bomb detecting robot because it has robot arm it may also lift the bomb. Gps gadget can be introduced to the robotic by using the help of which its place may be tracked.

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