

ROBOT VEHICLE CONTROLLED BY GESTURES

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Abstract— Gesture recognition makes humans to communicate with the machine and interact naturally without any mechanical equipments. A lot of research has been already done in the field of gesture recognition using different mechanism and algorithms. The majority of study is done in this field using Image processing techniques and methodologies. This is aimed in designing a cost effective low power consuming device to control the locomotion of robot using gesture from hand which leads to the advance in the concept of unmanned vehicle. Recognition rate of postures has a lot of scope for improvement by compromising the system response time. The theme of the study is to design a robot vehicle which can be controlled by gesture

Index Terms—gesture recognition, image processing techniques, unmanned vehicle, robot vehicle

I. INTRODUCTION

Revolution of robot in various areas, and people are trying to control them more accurately and easily. The application of controlling robotic gadget it becomes quite complicated when there comes the part of controlling it with remote or many different switches. In military application, industrial robotics, construction vehicles in civil side, medical application for surgery. In these fields it is quite complicated to control the robot with remote or switches, sometime the operator may get puzzled with switches and button itself, so a new concept is introduced, to control the robot vehicle by the moving the of hand and then simultaneously control the movement of robot vehicle. Over the past few decades people are finding easiler way to communicate with robots in order to enhance their contribution in our daily life. Humans and robots are combined in order to overcome the new challenges. From the very early stages it was one of the main objectives to control the robot smoothly and make humans feel comfortable. So rather using the older method of controlling robot by means of remote or keyboard its better to control a robot with the help of our hand gesture. Because hand gesture is very natural way of communication for humans.

Hand gesture technology being used more mostly used in many fields nowadays. Its becoming very popular in the robotic industry. Gesture recognition enables humans to communicate with the machine (HMI) and interact naturally without any mechanical devices. The gestures of different

organs of the body are used to control the wheel chair and different intelligent mechanisms have been developed to



Fig 1 Accelerometer controlled robot vehicle

control the intermediate mechanisms[4] By including the concept of gesture recognition, it is possible to point a finger at computer screen so that the cursor will move accordingly.[1].

There are many varieties of hand gesture technologies available nowadays but one of the most popular form is accelerometer based hand gesture technology. Accelerometers have also involved themselves in to the digital and hand written character recognition based on gesture classification. The 3-axis accelerometers signal classification finds an application which involves quite a very precision and uses different methods The accelerometer can measure the static acceleration of gravity in tilt sensing application, as well as due to motion, shock or vibration dynamic acceleration can be measured. [2]. Accelerometer can be able to capture human hand gestures. By sensing the gesture the vehicle will works accordingly. There are many challenges associated with the accuracy and advanatage of gesture recognition software. For image-based gesture recognition there are some limiations on the equipment used and image noise. Images or video may not be consistent or occur in the same location. Items in the background have a distinct features of the users that may make recognition more complicated.

The variety of implementations for image-based gesture recognition may also cause issue for viability of the

technology to general usage. Human gestures are captured by visual sensors, robust computer vision methods are also required to capture the gesture, for example, hand tracking and hand posture recognition[3] is used for capturing movements of the head, facial expressions or gaze direction. Our main objective is to minimize the delay and make the response time faster. On the other hand to make a prototype that is inexpensive that is cheaper than the traditional gesture control robotic car.

This paper is organized as follows. Section II describes the detail concept of the Proposed System. Section III presents the hardware setup of the proposed system. Section IV discusses the results related to the proposed design.

II . Proposed system

This paper describes the concept of a robot vehicle which can be helpful in civil and military works. In the existing system is based on the wired means of communication which is a drawback and that is overcome by means of wireless technology. The concept is based on the movement of the user's hand movement the robot vehicle takes its direction. Here, the Gesture sensor which is then affixed with the internal flex sensor is placed on the transmitter side, which may capture the user movement and then it is given to the microcontroller by means of an interfacing unit. Then it transfers the information to the other side by means of a wireless communication protocol (Zigbee).

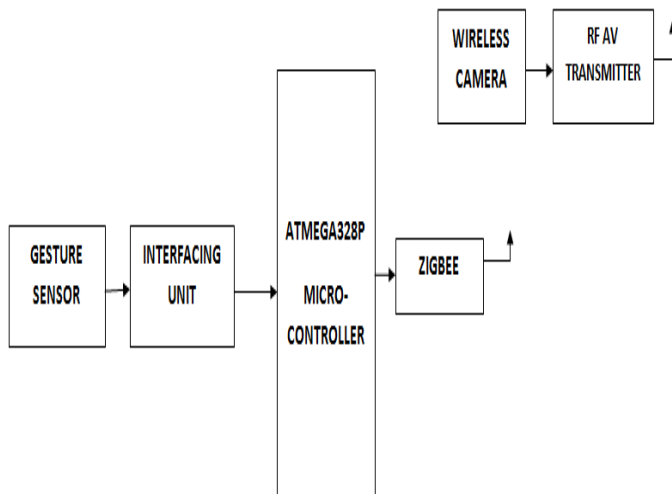


Fig 2 Block diagram at the transmitter side

Here, a wireless camera is affixed in the robot vehicle which may then shot the movement of the vehicle and then displayed on the computer at the transmitter side. And here communication between the vehicle and the computer may happen by means of radio frequency.

At the receiving side the robot will be placed which then

perform all the action that is then done by the user. And this can be then it finds the application in civil and military.

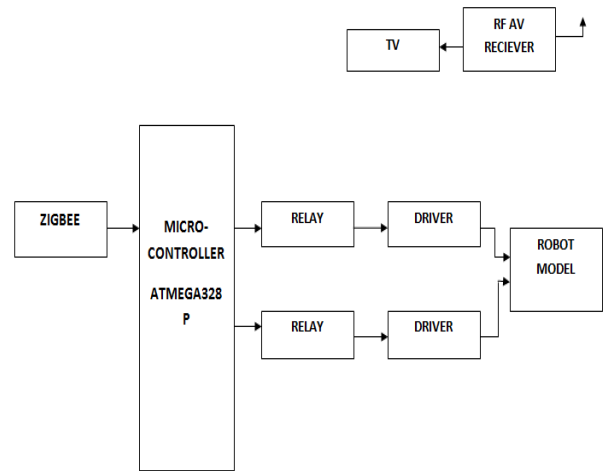


Fig 3 Block diagram at the receiver side

The data that is transmitted at the transmitter side is then received by the zigbee at the other end. And based on the action that is done by the user is then sensed by the microcontroller on the receiver side. And then before the action done by the robot vehicle it is given to the relay and the driver circuit and the robot perform the similar action as that of the human. And then action can be taken by the wireless camera and then it is viewed on the TV on the transmitter side.

A. GESTURE SENSOR:

Gesture sensors, also called **bend sensors**, measure the amount of deflection caused by bending the sensor. There are various ways of sensing deflection, from strain-gauges^[4] to hall-effect sensors. The three most common types of flexion sensors are conductive ink-based, fiber-optic, conductive fabric/thread/polymer-based. A property of gesture sensors is that folding the sensor at one point to a prescribed angle is not the most effective use of the sensor. As well, by bending the sensor at one point that is more than 90° may permanently cause damage the sensor. Instead, fold the sensor around a radius of curvature. The smaller the radius of curvature and the greater the whole length of the sensor may be involved in the deflection, the greater it causes the resistance.

B. EMBEDDED SYSTEM:

ATmega328 is a chip microcontroller from the fairly Atmel and correspondingly belongs to the mega AVR series. The Atmel 8-bit AVR RISC based microcontroller has combines 32kB ISP flash memory with read-while-write capabilities, 1kB EEPROM, 2kB SRAM, 23 general-purpose I/O lines, and also have 32 general-purpose working registers, three flexible timers/counters with compare modes, also have internal as well as external interrupts, serial programmable universal asynchronous receiver transmitter

(USART), a byte-oriented 2-wire serial interface, SPI serial port, 10-bit A/D converter, programmable watch-dog timer(PWT) with an internal oscillator and five software-selectable power-saving modes. Here, in this study we prefer this mainly because it is for cost effective . and communication in microcontroller can be done in bidirectional .

C. Wireless Transmission Protocol (Zigbee):

ZigBee is one of the standard based wireless technology designed to address the unique needs with low cost, feasible and power wireless sensor control networks. Since ZigBee can be used almost anywhere, is easy to implement and requires only a feasible power to operate. In this paper, communication happens by means of wireless protocol in existing system only wired means of communication can be used by it have lots of limitations which is overcome by means of wireless communication. ZigBee uses 128-bit keys to implement its security mechanisms. A key can be associated either to a network, and also being used by both ZigBee layers and the MAC sublayer, or to a link, which can be acquired through pre-installation, agreement or by transport. Link keys are established based on a master key which controls link key correspondence. Ultimately, at least the initial master key must be acquired through the secured medium (transport or pre-installation), as the security of the whole network depends on it. Link and master keys are then only visible on the application layer. Different services uses different variations of the link key in order to avoid leaks and security risks.

D. DRIVER UNIT (L293D):

This driver circuit is a 16-pin DIP package motor driver IC (IC6) having four input pins and four output pins. All four input pins are joined to output pins of the decoder IC (IC5) and the four output pins are connected to DC motors of the robot. Enable pins are then used to enable input/output pins on both sides of IC6. Motor drivers circuit may act as current amplifiers and they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors. Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an input is high, the associated driver circuit gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the input enable is low, that driver is disabled, and their outputs are off and in the high-impedance state.

E. WIRELESS CAMERA:

Wireless technology is the new concept that is applied then just about everything these days, and video surveillance is an added advantage of it. A wireless camera may then includes a transmitter to send video over the air (radio frequency) to a receiver instead of through a wire .Most wireless cameras are technically cordless devices, meaning is that though they transmit a radio signal, they still need to be connected it to a power source (battery). Still, "wifi" is the commonly used industry term. Some cameras do have internal batteries of course, making them purely wireless. But battery lifetime is still an problem for professional or even

semi-professional applications. These devices work on a simple principle. The camera contains a wifi-radio (RF) transmitter. This radio frequency transmitter may transmit the camera's video, which can be receiver up by a receiver, which will be connected to a monitor or recording device. Some receivers have internal storage, while others must be connected to a external storage devices.

III HARDWARE SETUP

Controlling robotic widgets has becomes quite hard and complicated and when there comes the part of controlling it with remote or many distinct switches. Mostly in military application, industrial robotics, construction vehicles in civil side, medical application for surgery/operation. In this field it is quite complicated to control the robot with remote or switches, sometime the operator may get puzzled with the switches and button itself, so a new concept is introduced to control the robot vehicle with the movement of hand which will simultaneously control the movement of robot [5]. Here, is a prototype model which illustrates the model of robot vehicle.



Fig 4: Robot vehicle model

Based on the movement of hand the robot may move in the desired direction.

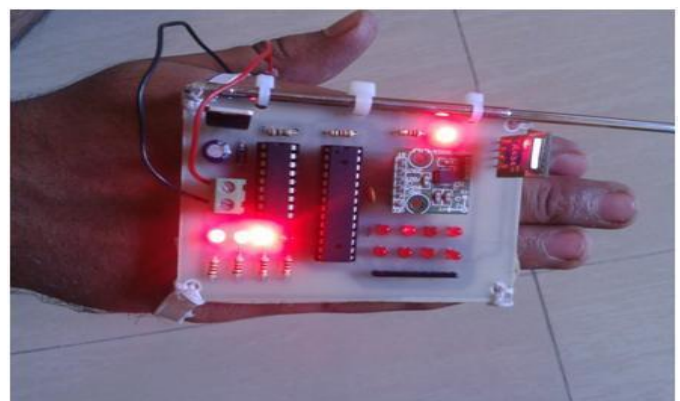


Fig 5: Transmitter side

Here, in the transmitter side the movement is then sensed and then it is passed to the receiver side by means of wireless protocol (Zigbee). Where the discrete packets of information

are transferred when it matches with address of the receiver side it may then transfer the data.



Fig 6: Robot model

Robot Moves in the Direction of the hand gesture of the user

IV. RESULT

Control Hand Gestures	Robot Direction
Forward Tilt	Forward
Left Tilt	Left
Right Tilt	Right
Backward Tilt	Backward
no Tilt	Stop

V. CONCLUSION

Controlling issue is always the main factor. In this study to tried to make easier and simpler controlling system. Here, it is mainly focused to make a system which is cheap and reliable. There are lots of opportunities to make many important projects based on our project. We can add a video which will transmit the footage wirelessly in our monitor. A robotic arm can be added in the system and which also can be operated with the help of hand gesture. Hand gesture control wheel chair can be made by following the same mechanism as our project with a bigger and high torque motor. This wireless gesture control system can also be helpful for controlling our home appliances.

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