Abstract - The objective of this work is to minimize human casualties in hazardous conditions like in chemical related factories, fire accident places, mining areas where human cannot be enter. It is to design a robot having a wireless camera mounted on it, so that it can monitor target remotely when it required. It can silently enter into the target location and send us all the information through its tiny camera eyes. This robot can also be used of surveillance purpose. Accelerometer based control of an industrial robotic arm proposed an accelerometer based system to control an industrial robot sing two low cost and small 3-axis wireless accelerometers. These accelerometers are attached to human harms, capturing its behavior with the help of accelerometer gestures.

Keywords: Wireless; Camera; Robot; Accelerometer

1. INTRODUCTION

Robots are being used in variety of industrial applications for various activities like pick and place, painting, assembling of subsystems and in hazardous places for material handling etc. Robots are becoming more and more intelligent as technology advances in the areas of CPU speed, sensors, memories etc. and there is ever demanding applications even in defense [1]. Programming and control an industrial robot through the use of the robot teach pendant is still a tedious and time consuming task that requires technical expertise. Therefore new and more intuitive ways for robot programming and control are required. To overcome these problems accelerometer gestures and sensors are used to control the motion of robot. Accelerometer based gesture recognition has become increasingly popular over the last decade. The low moderate cost and relative small size of the accelerometer make it an effective tool to detect and recognize human body gestures [2, 3].

Nowadays tracking enemies at different areas are very much difficult for soldiers. There may be a chance of lost of lives of the soldier during war and emergency situations [4]. In mining areas the man cannot be entering into the dangerous locations in order to identify the person if any danger will occur. To overcome these problems, the idea is to design a robot which has a wireless camera placed on it, so it can monitor the target remotely, it enters silently and send all the information through camera [5, 6]. A robot based on “Human Machine Interfacing Device” utilizing hand gestures to communicate with embedded systems for tracking of enemies. The 3-axis accelerometer is selected to be the input device of this system, capturing the human arms behaviors. When compared with other common input devices, especially the teach pendant, this approach using, accelerometer is more intuitive and easy to work, besides offering the possibility to control a robot by wireless [7]. Using this system, a non-expert robot programmer can also control a robot quickly and in a natural way.

2. METHODOLOGY DESIGN AND ASSEMBLY

An accelerometer robot motion control with obstacle detection system consist of two parts, a transmitter and receiver and it works in two modes-manual and auto (predefined) mode. A wireless camera mounted on the robot will send is real time video signals, which could be seen on a remote monitor app, and action can be taken accordingly. When the accelerometer sensor is attached to the human arm it can detect even a small tilt in the arm and the corresponding readings are communicated to the robot through Zigbee for its navigation like left or right, back or forward [8]. A predefined path is taken when robot is in auto mode and the obstacles in the path can be identified with the help of ultrasonic sensors. The block diagram of system is shown in Fig. 1 and 2.

![Fig. 1 Block diagram: Transmission Section](image)

![Fig. 2 Block diagram: Receiver Section](image)
possesses an inertia which tends to resist change in velocity. It is the resistance to change in velocity. That is the source of the force exerted by the moving body. Accelerometers are available that can measure acceleration in one, two or three orthogonal axes [9].

2.1 Adriano Uno

The Adriano Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. The Fig. 3 represents Adriano Uno component [10]. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Adriano Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery [11]. The adapter can be connected by plugging a 2.1 mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and VIN pin headers of the power connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board [12]. The recommended range is 7 to 12 volts.

2.2 Ultrasonic Sensor

The transmitter emits 8 bursts of a directional 40 KHz ultrasonic wave when triggered and starts a timer. Ultrasonic sensor shown in Fig. 4 ultrasonic pulses travel outward until they encounter an object, the object causes the wave to be reflected back towards the unit. The ultrasonic receiver would detect the reflected wave and stop the stop timer. The velocity of the ultrasonic burst is 340m/sec. in air. Based on the number of counts by the timer, the distance can be calculated between the object and transmitter. The TRD Measurement formula is expressed as: \( D = \frac{C \times T}{2} \) which is known as the time/rate/distance measurement formula where \( D \) is the measured distance, and \( R \) is the propagation velocity (Rate) in air (speed of sound) and \( T \) represents time. In this application \( T \) is divided by 2 as \( T \) is double the time value from transmitter to object back to receiver [13].

2.3 LCD screen

LCD screen consists of two lines with 16 characters each. Each character consists of 5x7 dot matrix. Contrast on display depends on the power supply voltage and whether messages are displayed in one or two lines. For that reason, variable voltage 0-Vdd is applied on pin marked as VEE. Trimmer potentiometer is usually used for that purpose. Fig. 5 represents the LCD screen.

Some versions of displays have built in backlight (blue or green diodes). When used during operating, a resistor for current limitation should be used.

2.4 Power Supply

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can be broken down into a series of blocks, each of which performs a particular function. A DC power supply which maintains the output voltage constant irrespective of AC mains fluctuations or load variations is known as “Regulated DC Power Supply”.

2.5 Arduino Uno

A DC motor uses electrical energy to produce mechanical energy, very typically through the interaction of magnetic fields and current-carrying conductors. DC motor is shown in Fig. 6. The speed of a DC motor is directly proportional to the supply voltage, so if we reduce the supply voltage, the motor will run at half the speed.
2.6 H Bridge

An H-bridge is an electronic circuit which enables DC electric motors to be run forwards or backwards. These circuits are often used in robotics. H-bridges are available as integrated circuits as shown in Fig. 7, or can be built from discrete components.

![Fig. 7 H-Bridge](image)

2.7 Wireless Camera

Wireless camera is used to capture the real time video signals to the user transmission section so that we can easily monitor the target location.

2.8 ON/OFF Switch

A push button is a momentary or non-latching switch which causes a temporary change in the state of an electrical circuit only while the switch is physically actuated. An automatic mechanism (i.e. a spring) returns the switch to its default position immediately afterwards, restoring the initial circuit condition. There are two types,

A push to make switch allows electricity to flow between its two contacts when held in. When the button is released, the circuit is broken. This type if switch is also known as a normally open switch. Fig. 8 represents the normally open switch.

![Fig. 8 Normally Open Switch](image)

A push to break switch does the opposite, i.e. when the button is not pressed, electricity can flow, but when it is pressed the circuit is broken. This type of switch is also known as a normally closed switch. Fig. 9 represents the normally closed switch.

![Fig. 9 Normally Closed Switch](image)

3. RESULTS AND DISCUSSION

The accelerometer based robot has a wireless camera mounted on it and it captures the real time video signals to the operator, based on the received data operator can easily monitor the target location. By using zigbee technology data can be transmitted to the Transmission section without any interruption. The robot motion can be controlled by using accelerometer gestures.

4. CONCLUSION

It is concluded that smart surveillance system using Arduino of video and transmitting to a smart phone. All this techniques can be used in any conditions and areas where it is difficult for the security forces to reach. It can monitor the areas and secures a place from the adversaries who can be done by Wireless robot all the times with great accuracy and high precision. HD surveillance camera is set up in the Robot which is to monitor the video containing which will be stored and live video can be accessed from anywhere just by entering static IP assigned to the system in the web browser.

REFERENCES


