Human Detection Using 3D Virtual Glove Robot

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Abstract - **One of the main problems which we are facing is, the rescue operation in the accidental conditions is getting more and more difficult. Sometimes it leads to condition in which even rescue team cannot reach such dangerous spot. To avoid such a situation we have designed this paper "Human Detection Using 3D Virtual Glove Robot". Human detection robot detects the presence of human in various hazardous conditions where rescue team can not enter. It consists of transmitter and receiver sections. The movement of on field robot is controlled by using Accelerometer by using which we can virtually control the robot. The sensed parameters/conditions are feedback to transmitter via zigbee. Current conditions are displayed at transmitter on the LCD.**

Keywords- **Human detection, Pick and place, Parameter sensing.**

Abbreviations-

        LCD: Liquid Crystal Diode

        3D: 3 Dimensional

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I. INTRODUCTION

Technology is upgrading day by day in various parameters. Therefore to make compatible with these new technologies we have to modify the traditional devices by maintaining the user friendliness. Mouse and keyboard do not adapt very well to immersive environments though they are traditional interaction device. User may be standing or in movement, cannot use these devices because they work on desk i.e these devices requires a support. So change of context is necessary every time to execute a non-immersive task. These constant context changes from immersive to 2D desktops introduce a rupture in the user interaction with the application. The objective of this work is to develop a device that maps a touch interface in a virtual reality immersive environment.3D virtual glove robot, can be used in immersive environments, having two main functionalities: tracking the position of the user's index finger and vibrate the fingertip when it reaches an area mapped in the interaction space to simulate a touch feeling. Human Detection using 3D Virtual Glove Robot express the working of the robot in 3 Dimensions which is virtually controlled by the movement of hand from distant location. Accelerometer is the main input element for virtual control in which the angle of movement of hand is converted into corresponding voltage levels. These voltage level are further converted in the form of movement of the robots.

PIR (Passive Infrared Sensor) is used for human detection. It uses the infrared rays for the detection of live human. Infrared rays are radiated from human bodies which are detected by the sensor. This information is transferred wirelessly using Zigbee. Zigbee is communication protocol which is used for personal area network. Zigbee device is used for longer distance communication between transmitter and receiver. The LCD is used to indicate the sensed parameters.

II. PROBLEM STATEMENT

Robot programming technologies are quite difficult to apply to multi fingered robot due to robot language and teaching playback because such type of robots require instruction for both motions and forces at many points simultaneously. In this technique Robot is controlled by human motion measurement. Task programming based on the observation of human operations is highly desirable for humanoid robots because humans would be able to teach the tasks to robots without having to provide detailed descriptions of motions and forces explicitly.

So making the Robot which will go to the place where human cannot withstand for example Earthquake where the rescue operation is required for buried people. In Gas leakage and fire conditions where important things cannot be picked up by human being because of undesirable and harmful condition, there this kind of robot is very useful for pick and place application.
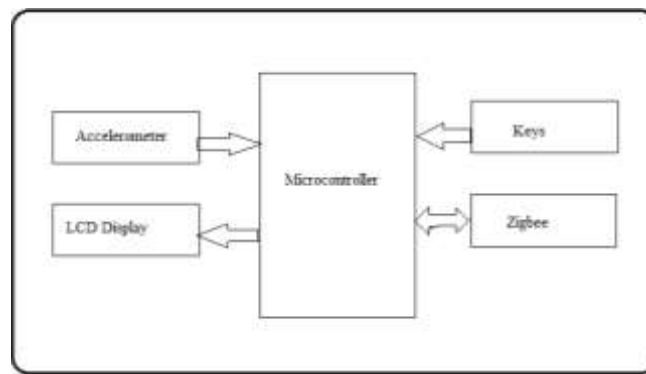
III. PROPOSED BLOCK DIAGRAM

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Fig 1: Block diagram of Transmitter of Human detection using 3D virtual glove robot.
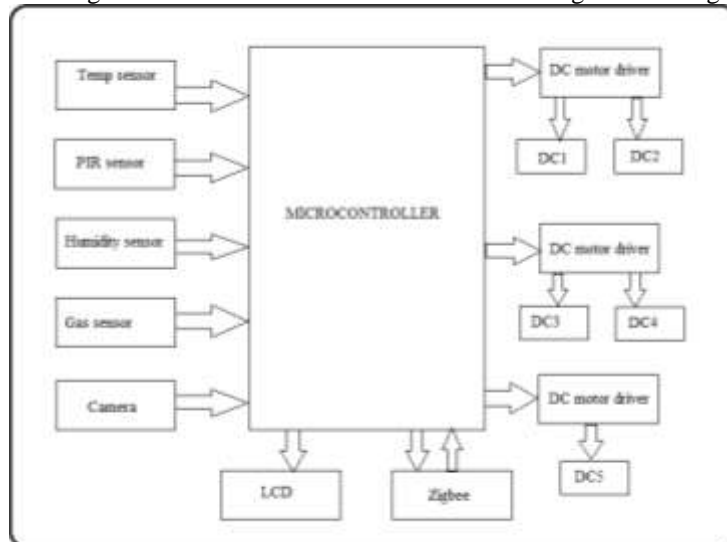

Fig 2: Block diagram of Receiver of Human detection using 3D virtual glove robot.

IV. OPERATION OF WORKING

This ARM based robot consists of three applications:

  1) Human detection 2) Parameter sensing (Gas leakage, humidity, temperature) 3) Pick and place.

It consists of two sections transmitter and receiver. On transmitting section, controlling of the robot mainly depends upon the accelerometer which is attached to a glove. The output of these accelerometer is in the form of change in voltage. These signals are then given to microcontroller. The microcontroller then transmits these signals wirelessly via ZIGBEE RF module. In our project we are using ZIGBEE RF module to transmit these signals. On the receiver side we have ZIGBEE RF receiver which receives these signals and give them to the other microcontroller. This microcontroller then drive the robot using the dc motors interfaced with the microcontroller. An additional feature of camera is also added in order to get updates of live conditions of the accidental field to improve the accuracy of the robot movements.

On receiver section robot, 4 sensors are interfaced. They are PIR sensor, temperature sensor, gas sensor and the humidity sensor. Among these, PIR sensor is playing the main role of detection of live humans. The PIR sensor continuously radiates the infrared for detection of humans. These sensors are analog in nature. So the outputs of these sensors are fed to the input of inbuilt ADC of microcontroller ARM-7. Once converted into digital form these measured parameters are displayed on LCD. These measured parameters are also transmitted to the control unit via ZIGBEE wireless communication and are displayed on LCD display unit.

The 16x2 LCD display unit is interfaced with microcontroller. This display unit is used to check the status of the system and to display the various sensor measured parameters. 16x2 LCD display unit is also very vital unit to debug the system in case of system failure.

V. ADVANTAGES

1) Robot can move in all direction to increase the space of detection.
2) Pick and place feature.
3) Reduces the human efforts required in hazardous areas.
4) Reliability is more.
5) Multi-fuctionality.

VI. APPLICATIONS

  1) Used for industry

Also in industries such as plastic manufacturing, the plastic is heated to great extent that tray or tank cannot be picked up by human being because of high temperature, there this kind of robot is very useful for pick and place application. It also gives the information about gas leakage. That reduces the human efforts required in hazardous areas such as chemical plants, mines etc.
2)   In coal mine
Making the Robot which will go to the place where human cannot withstand for example the mine which is below the earth surface where there is less air for breathing. For this pick and place feature is available.
3)   In Earthquake
Sometimes the conditions get so worst that it is impossible to rescue the victims. In such conditions the robot will be playing vital role. It will detect the live humans which get buried.
4)   Used for monitoring weather condition
It gives the information about the parameters like temperature, humidity by continuously displaying the values.

VII. CONCLUSION
The main idea behind this concept is to detect the live humans in vigorous and harmful conditions. Along with this it also sensed parameters like gas leakage, humidity and temperature. The controlling of the robot is done by human motion measurement rather than controlling by wired devices. The pick and place facility is also available. Along with the sensed parameter, the output of the PIR sensor is also displayed on the lcd. The accuracy and efficiency of the project is increased due the additional feature of camera for getting update of accidental condition. The efficiency and accuracy can be increased further by choosing the components of wide range as per the application and requirement.

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