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## Design and Implementation of Canny Bot

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**ABSTRACT:** Industry search and rescue operation is a dangerous and difficult task. The amount of information required to mount a rescue operation is staggering and time consuming. Gas leaks or fire accidents put everyone in danger and is difficult to be detected. But, robots can detect these unseen hazards as it can penetrate the disaster zones much more easily than humans. Our system, which is a robot with high sensitivity sensors for heat and Gas detection, does this work efficiently and accurately -thereby providing security and prevention from these disasters. Along with this, our system is also able to move and pick objects and detect unauthorized humans in the protected zone.

### I. INTRODUCTION

Robot has a greater scope in today's world. They have numerous applications. In this chapter the descriptions of robot and their applications are discussed. A robot is a mechanical or virtual artificial agent, usually an electro-mechanical machine that is guided by a computer program or electronic circuitry. Robots can be autonomous or semi-autonomous. The branch of technology that deals with robots is called robotics. The first digital and programmable robot was invented by George Devol in 1954 and was named the Unimate. The word robot can refer to both physical robots and virtual software agents, but the latter are usually referred to as bots. There is no consensus on which machines qualify as robots but there is general agreement among experts, and the public, that robots tend to do some or all of the following: move around, operate a mechanical limb, sense and manipulate their environment, and exhibit intelligent behavior especially behavior which mimics humans or other animals.

Robots have replaced humans in the assistance of performing those repetitive and dangerous tasks which humans prefer not to do, or are unable to do due to size limitations, or even those such as in outer space or at the bottom of the sea where humans could not survive the extreme environments. Industrial robots usually consist of a jointed arm (multi-linked manipulator) and end effectors that are attached to a fixed surface. One of the most common types of end effectors is a gripper assembly.

Roughly half of all the robots in the world are in Asia, 32% in Europe, and 16% in North America, 1% in Australasia and 1% in Africa. 40% of all the robots in the world are in Japan, making Japan the country with the highest number of robots. In the past few years high technology has become more progressed and less expensive. With the availability of high speed processors more people have become interested in real applications. In order to detect gas, fire, human we propose the project by using respective sensors. This project can be used mainly in industries and also for military purposes. To create an intelligent robotic system controlled by a computer -which is capable of moving and picking objects; which is also equipped with fire, gas, and human detection sensors.

### II. RELATED WORKS

Object tracking system by adaptive pan-tilt zoom cameras and arm robot -Hiroyuki Ukida, Yasuhiro Terama and Hiroki Ohnishi (1). This paper explains particle filter method for object detection. It estimates 3-D position of object using two cameras. An object tracking system uses an arm robot and pan-tilt-zoom cameras. The object detection method consists of the sparse template matching using color information and the particle filter methods for a fast detection. And estimate 3D position of it by the binocular stereo method using two cameras. In order to detect object stably, we control the

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zoom (the focal length) of cameras adaptively considering 3D object positions. By controlling the zoom parameter of cameras, they have shown a stable tracking result in experiments.

Multi sensor-based human detection and tracking for mobile service robots - Nicola Bellotto, Huosheng Hu (2). This paper explains the laser-based leg detection using the onboard laser range finder (LRF). The approach is based on the recognition of typical leg patterns extracted from laser scans, which are shown to also be very discriminative in cluttered environments. These patterns can be used to localize both static and walking persons, even when the robot moves. Furthermore, faces are detected using the robot's camera, and the information is fused to the legs position using a sequential implementation of unscented Kalman filter.

An Environmental adaptive control system of a wheel type mobile robot for the rough terrain movement - Sato, M. Kanda, A., Ishii (3). This paper explains about the wheel type mobile system which is high energy efficiency, simple mechanism and well investigated control system. However, the wheel type mobile robots have the difficulty in the rough terrain movement. In this research, we propose an environmental adaptive control system for a wheel type mobile robot for the rough terrain movement. This proposal system recognized the traveling environment and switched the adaptable controllers, and showed the better performance than only one controller[1].

Remote control of robot arm with five DOF - Vajnberger V (4) This paper explains the whole process of making a system for remote control of a robot arm with five degrees of freedom (DOF). For this purpose a hardware structure was fully designed and implemented. The hardware structure is based on microcontroller PIC16F877A and surrounding architecture that controls movement of different axis of the arm. The arm has no sensors, so the visual information from the camera was used as feedback. Two communications were used to operate robot arm. The first one is realized by serial RS-232 protocol between PC and Microcontroller, and this communication is used to operate the arm. The second communication uses TCP/IP protocol for remote control. The TCP/IP protocol provides communication between server and client computers and sends information of position of robot arm. The main objective of this paper was to obtain fully and precise control of every degree of freedom.

### III. PROPOSED SYSTEM

In our proposed system robot can detect the presence of human, fire and gas uniquely. It can move in multiple directions. It has arm that enables to pick the objects. By using a wireless camera, video streaming is done continuously[2].

#### A. Gas Detection Sensor

A gas sensor (MQ-2) is a device which detects the presence of various gases within an area, usually as part of a safety system. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down. A gas detector can also sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave the area. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals. They can be used to detect combustible, flammable and toxic gases. Gas detectors are usually battery operated. They transmit warnings via a series of audible and visible signals such as alarms and flashing lights, when dangerous levels of gas vapors are detected. As detectors measure a gas concentration, the sensor responds to a calibration gas, which serves as the reference point or scale. As a sensor's detection exceeds a preset alarm level, the alarm or signal will be activated. As units, gas detectors are produced as portable or stationary devices. Originally, detectors were produced to detect a single gas, but modern units may detect several toxic or combustible gases, or even a combination of both types[3].

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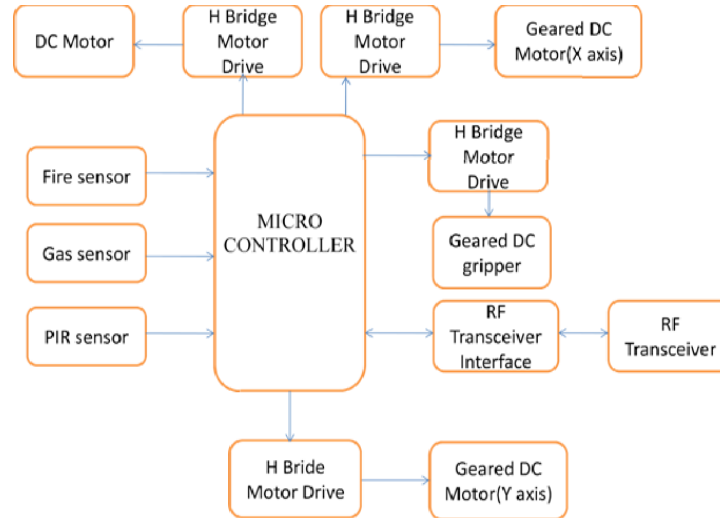


Figure 3. 1 Block diagram for Robot

In our project, the gas sensor is connected to port A in microcontroller. The gas sensor (MQ-2) has 3 pins in which the second pin is connected to the . When it senses the poisonous gases, the voltage begins to vary according to it. The indication of such poisonous gases can be seen in our Personal Computer[4].

### B. Features

- High sensitivity to Methane, Butane, Propane, LPG, Natural gas.
- Small sensitivity to alcohol, smoke.
- Fast response.
- Stable and long life.
- Simple Drive Circuit.

### C.Sensitivity adjustment

Resistance value of MQ-2 is different to various kinds and various concentrations of gases. So, when using these components, sensitivity adjustment is very necessary. We recommend that you calibrate the detector for 1000ppm H<sub>2</sub> or LPG concentration in air and use value of Load resistance (RL) about 20 K $\Omega$ (10K $\Omega$  to 47K $\Omega$ ).When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence[5].

### D.Fire Detection Sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in  $^{\circ}$  Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of  $\pm 1/4^{\circ}$ C at room temperature and  $\pm 3/4^{\circ}$ C over a full  $-55$  to  $+150^{\circ}$ C temperature range[6]. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it

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draws only 60  $\mu\text{A}$  from its supply, it has very low self-heating, less than  $0.1^\circ\text{C}$  in still air. The LM35 is rated to operate over a  $-55^\circ$  to  $+150^\circ\text{C}$  temperature range, while the LM35C is rated for a  $-40^\circ$  to  $+110^\circ\text{C}$  range ( $-10^\circ$  with improved accuracy). The LM35 series is available packaged in hermetic TO-46 transistor packages[7].

## Features

- Linear + 10.0 mV/ $^\circ\text{C}$  scale factor
- Calibrated directly in  $^\circ$  Celsius (Centigrade)
- 0.5 $^\circ\text{C}$  accuracy guarantee able (at  $+25^\circ\text{C}$ )
- Rated for full  $-55^\circ$  to  $+150^\circ\text{C}$  range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60  $\mu\text{A}$  current drain
- Low self-heating, 0.08 $^\circ\text{C}$  in still air
- Non-linearity only  $\pm 1/4^\circ\text{C}$  typical
- Low impedance output, 0.1  $\Omega$  for 1 mA load

## Applications

The LM35 can be applied easily in the same way as other integrated-circuit temperature sensors. It can be glued or cemented to a surface and its temperature will be within about  $0.01^\circ\text{C}$  of the surface temperature. This presumes that the ambient air temperature is almost the same as the surface temperature; if the air temperature were much higher or lower than the surface temperature, the actual temperature of the LM35 die would be at an intermediate temperature between the surface temperature and the air temperature. This is especially true for the TO-92 plastic package, where the copper leads are the principal thermal path to carry heat into the device, so its temperature might be closer to the air temperature than to the surface temperature. To minimize this problem, be sure that the wiring to the LM35, as it leaves the device, is held at the same temperature as the surface of interest. The easiest way to do this is to cover up these wires with a bead of epoxy which will insure that the leads and wires are all at the same temperature as the surface, and that the LM35 die's temperature will not be affected by the air temperature.

In our project, the temperature sensor is connected to port A of microcontroller (pin 2). It has three pins in which the second pin is connected to microcontroller. The voltage gets varied according to the variation in temperature. For example, if the temperature is  $0^\circ\text{C}$ , the voltage gets varied to 0V and correspondingly. The indication of the temperature rise can be seen in our PC.

## E.Human Detection Sensor

The PIR (Passive Infra-Red) Sensor is a pyroelectric device that detects motion by measuring changes in the infrared (heat) levels emitted by surrounding objects. This motion can be detected by checking for a sudden change in the surrounding IR patterns. When motion is detected the PIR sensor outputs a high signal on its output pin. This logic signal can be read by a microcontroller or used to drive a transistor to switch a higher current load.

## Features

- Detection range up to 20 feet away
- Single bit output
- Jumper selects single or continuous trigger output mode
- 3-pin SIP header ready for breadboard or through hole project
- Small size makes it easy to conceal
- Compatible with BASIC Stamp, Propeller, and many other microcontrollers

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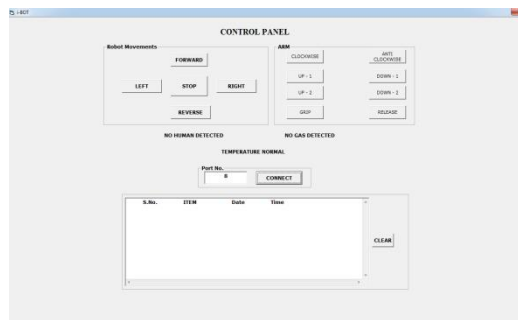
Applications

- Motion-activated nightlight
- Alarm systems

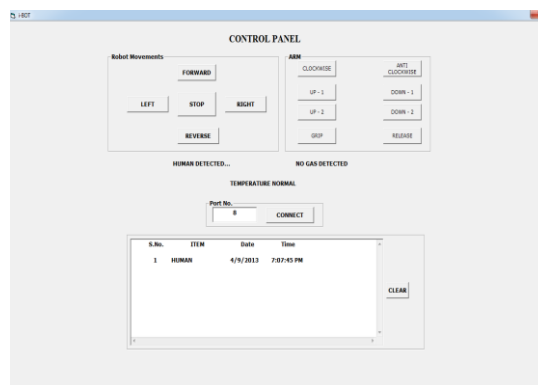
Sensitivity

The PIR Sensor has a range of approximately 20 feet. This can vary with environmental conditions. The sensor is designed to adjust to slowly changing conditions that would happen normally as the day progresses and the environmental conditions change, but responds by making its output high when sudden changes occur, such as when there is motion. Note: This device is designed for indoor use. Operation outside or in extreme temperatures may affect stability negatively[8]-[10].

## IV.IMPLEMENTATION



This snapshot shows the port connectivity establishment. It shows that the robot vehicle is ready to perform the actions.



This snapshot shows the detection of human with its respective date and time.

## V.CONCLUSION

Our system is capable of detecting the presence of fire, gas and human. It can also move in all directions and is able to pick the objects. Overall results were promising as expected. Thus the project has been successfully implemented. The main advantage of this project is that it can be operated by all as it is constructed with simple mechanism .Even though our

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system can be used to lift objects, in future we can enhance the design to increase the amount of weight it can lift. Images can also be captured when a human is detected and can be transferred safely by using steganography and GPS.

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