

A Review on Multiple Applications Robot

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Abstract: Embedded System is a part of a complete device often including hardware, software and mechanical parts. This project presents multipurpose manual robot that has PIR sensor for Human Detection, which get activated based on external stimuli. The system imparts simultaneous monitoring through the wired camera attached to the Bot and sends simultaneous data to the CPU. The object in front of camera is located and directed. A gun hooked up to the Bot is used for pointing the target and hit the target object for target locating and shooting applications. Opposed to most common approaches, in which detection and tracking are done by an un segregated procedure, the approach preferred here relies on a modular structure, in which detection and locating are carried out individually, and the latter might acquire input data from different detection algorithms. The solution to the overall issues is based on the use of a Image processing for detection of object and target tracking done with assistance of gun movement. The robot also senses gas detection, depth detection ,night vision and accordingly takes steps. Gas Detection is done through MQ6 Gas sensor. Depth detection and night vision application is done through IR Sensor.

Keywords: Human detection, Target Tracking, Shooting Applications, Gas Detection, Depth detection.

I. INTRODUCTION

In this paper, we present a multiple applications robot which includes human detection, target tracking, shooting applications, Gas Detection, Depth detection.

This system is proposed for detecting intrusions, tracking intruding object and wrecking it. The system will be locked at some suitable place, from which complete and clear view of the area under vigilance can be captured with camera. The system is provided with a high resolution camera, image processing hardware, μC , motors and other supplementary hardware and mechanisms. Image Processing Hardware will acquire video captured by camera. Then it will process the captured data. System will track that object to calculate its speed of motion. This speed information is needed to decide the angle and time instant at which projectile is to be begun at intruding object to destroy it. Position of the object in the form of x-y coordinate is found and sent to μC . μC will control the angle of rotation of motors to position the cannon aiming at the object. At last object will get fired. Camera can also be used for vigilance when object is not to be tracked. The robot also senses ground surface and alerts.

The proposed multiple applications robot is simple to design and implement both in hardware and software aspects. It uses ARM 7 microcontroller, high sensitivity gas sensor (MQ6) and PIR sensors, wired camera and Zigbee modem to support reliable network.

II. REVIEW ABOUT PREVIOUS WORKS

Various studies have been done based on people counting using computer vision, [1] in this paper they present a solution to all people counting based on information provided by an overhead stereo system, fundamental conditions are identified:

1. The detection and tracking of human motion using an extended particle filter.

2. Modified K-means algorithm is used to provide a deterministic output
3. People trajectories are generated in order to perform people counting

[2] in this paper we are providing a solution for monitoring ground-level ozone, particulates, SO₂, CO and nitrogen dioxide(NO₂) and calculate air quality indices for these pollutants.

Also [3] in this we are providing a solution for C language code instead of that we are using a matlab programming for image tracking.

III. SYSTEM DESIGN

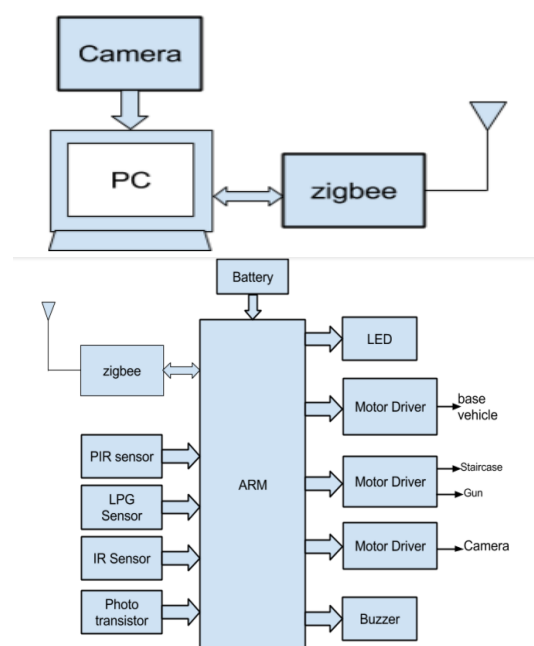


Fig.1: Block Diagrams of Multiple Applications Robot

The vital part of this project is the hardware model composed of adequate sensor with embedded system. Embedded systems are computer in the vast sense.

PIR Sensor:

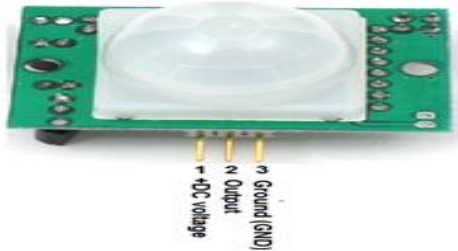


Fig.2 : PIR Sensor

PIR sensor is used to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. The Sensing range of PIR sensor is up to 20 feet (6 meters) 110 degrees x 70 degrees detection range. They are small, inexpensive, low-power, easy to use and don't wear out. They are often referred to as PIR, Passive Infrared sensor or IR motion sensors.

LPG Sensor:

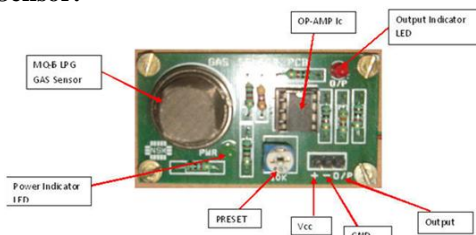


Fig. 3 : LPG Sensor

MQ-6 LPG semiconductor sensor is Combustible Gas Sensitive. The MQ-6 sensor can detect gas concentrations anywhere from 200 to 10000ppm. MQ-6 semiconductor sensor is Combustible Gas Sensitive. The MQ-6 gas sensor is made up of SnO₂ which has lower conductivity in clean air. This MQ6 sensor is used to sense the leakage of LPG. In normal conditions the output of this sensor is 'high' and it goes 'low', when the LP gas is sensed. Both Methane (CH₄) and Propane (C₃H₈) can be detected easily by MQ-6 sensor because it has high sensitivity towards the gases like Methane (CH₄), Propane (C₃H₈) and Butane (C₄H₁₀). It is a low cost sensor suitable for different application.

IR Sensor:



Fig. 4 : IR Sensor

The infrared sensor (IR Sensor) is an electronic device that transmits and/or detects infrared radiation in order to sense some conditions of its surroundings. IR Sensors measure the heat of an object, as well as detect motion. This sensor works by using a specific light sensor to detect a selected light wavelength in the IR spectrum. By using an Light Emitting Diode (LED) which produces light at the identical wavelength as what the sensor is looking for, you can look at the strength of the received light. When an object is near to the sensor, the light from the LED rebounds off the object and into the light sensor. This concludes in a large jump in the intensity, which we already know can be detected using a threshold.

Photo Transistor:



Fig.5 : Photo transistor

A phototransistor is different from a simple transistor in the way that in the recent, voltage applied to the base is changed by light striking it. L14G2 is an NPN phototransistor used here. It acts as a photo detector in the sense that it can modify the incident light into electric response. They are commonly used as sensors commonly paired with a light source like LED. These are the bipolar transistors having a transparent case. This transparent case exposes the base collector region of transistor to external light. When light incidents on this junction, electrons are produced by the photons. These electrons are injected in the base of phototransistor. The current gain of the transistor increases the resulting photocurrent at the base collector junction. The maximum dark current is 100nA; while in light its current is 500µA. The required light source is a gallium arsenide LED with peak wavelength is 940 nm.

IV. FUTURE SCOPE

Varieties of wireless technologies like Wi-Fi (Wireless Fidelity) or Bluetooth (802.15) can assist as communication protocol instead of Zigbee Module. Touch screen/Voice based robot control can also be used in future to make the system more Revolutionary.

V. APPLICATIONS

1. For Human Detection
In Rescue Operations where human reach is not possible.
2. Gas Detection
In Industrial Production (e.g., methane detection in mines).
3. Depth Detection
In Automotive Safety and 3D vision Applications.

4. Target Tracking Shooting Application Robot In Military Applications and Child Monitoring.

VI. CONCLUSION

This paper gives a review on the Multiple applications robot which has wide range of industrial, defense and domestic applications. In fieldwork, this robot can be used to find the depth of a particular location. Various advantages of this system are its scope of operation up to 100m, secure data transmission and easy to establish. The pointer gun has several convenience over conventional weapons. Therefore, this robot has great militaristic and industrial use that will revolutionize the future.

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