

# People Counting and Alert System

**Maheswari O D**

Department of computer science and Engineering  
Velammal College of Engineering and Technology  
Madurai, Tamilnadu, India

**Usha A**

Department of computer science and Engineering  
Velammal College of Engineering and Technology  
Madurai, Tamilnadu, India

## Abstract

People counting and alert system is proposed to count the number of people, travelling inside the share auto vehicle. The recent survey around Tamil Nadu says that, many accidents was happened because of overcrowded and overloaded of people and luggages in share auto vehicle. “These vehicles are supposed to seat only four or seven people including the driver, depending on the size of auto” quoted on The NEWS Minute.

Since the share auto fare is less than or equal to that of a bus fare, people preferring share auto vehicle as it was easily available anywhere at any time. They can also stepped out anywhere based on their choice as it has no stop like that of a bus.

In this system, we use an two IR Sensors, One is to count the number of people who are getting into the share auto vehicle and Other is to de count the number of people who are getting down from the share auto vehicle. A LCD (Liquid Crystal Display) is used to monitor the people count inside the share auto vehicle. If the people count exceed 6, then automatically an alert message is sent to the nearby traffic police stated that the auto is overloaded. At the same time Relay Circuit cuts-off the fuel supply to the engine, suddenly the share auto will off.

Load Cell is used to calculate the average weight of the load that carried inside the auto, if this load exceed the threshold level, then automatically an alert message is sent to the nearby traffic police through the GSM module. At the same time Relay Circuit cuts-off the fuel supply to the engine, suddenly the share auto will off.

Gas Sensor (MQ-2) used to detect whether the driver consumed alcohol or not. If so, an alert message sent to the nearby traffic police. And at the same time Relay Circuit cuts-off the fuel supply to the engine, suddenly the share auto will off.

## Keywords

Load cell, InfraRed Sensor, Arduino Board, GSM Module, Gas sensor, DC motor, Single relay driver.

## Introduction

The key concept of the IR-UWB radar sensor is transmitting and receiving narrow impulse signal which occupies wide bandwidth in the frequency domain. Wide bandwidth makes various fine properties such as fine resolution, good penetration, multipath-immunity, and so on. Many researches for using IRUWB radar are being done in many areas. They are developing health care sensor using IR-UWB radar, and in the IR-UWB radars are used as the ranging device for implementing indoor

global positioning system. In addition, they use the IR-UWB radar sensor for counting the number of people in the interesting area and, in an IR-UWB radar is used to count the inbound and outbound people. In, they only consider single target which is incoming or outgoing from radar sensor by using the concept of state machine. It is proper to be used for narrow gate which only one human could move such as a door of room. To be used as a counting sensor for counting the number of inbound and outbound people in the wide area such as hallway in the subway station, a new strategy is needed. To resolve this problem, we used two IR-UWB radar sensors which are equipped with narrow beam antennas in the azimuth aspect.

Two IR-UWB radar sensors make adjacent two thin layers which are positioned vertically to the moving direction of people. Owing to the fine resolution of the IR-UWB, the radar sensor could detect most of the inbound and outbound people theoretically. Much narrow azimuth angle of the antenna makes it easier to detect the following human right behind the other human.

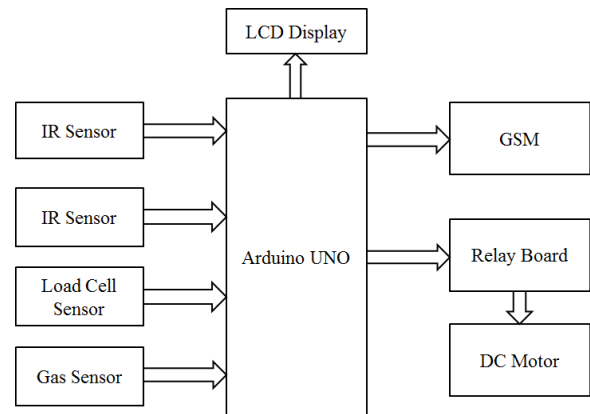
Based on the suggested structure, a new algorithm is proposed to count the number of inbound and outbound people in the wide area such as hallway in the subway. Information about how many people come to inside or go to outside could be useful in the many industrial areas.

### System overview

The proposed system consists of people counting and give an alert and weight module detection system and whether the

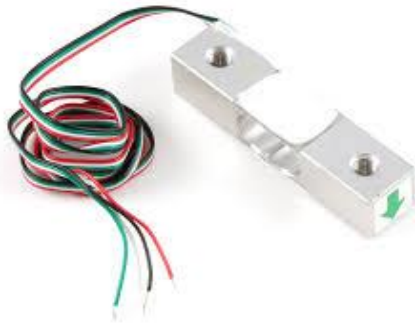
driver consumes alcohol or not using gas sensor. The system block diagram comprises of parts as shown in figure1. It consists of

- IR Sensor
- Gas Sensor
- Load Cell
- Arduino board
- DC Motor
- Single relay driver
- GSM Module
- LCD Display



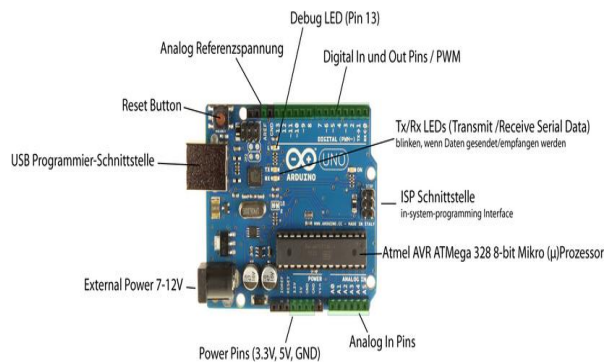
### Load cell:

A load cell is a transducer device which transforms a non-electrical physical quantity such as temperature, weight (mass) into an electrical signal. In our project, we have to measure the how much quantity of the gas in the cylinder using weight sensor. Load scale is the capable to detect the change in fluid level. Load cell measurements are quick and precise. They are more affordable and have longer life span. The output from the load cell is in mV.



**Arduino board:**

In this proposed system Arduino UNO R3 is used as a controller. Arduino is an Open-Source Prototype Platform based on easy-to-use hardware and software. It has 20 digital input/output pins. Most important feature of Arduino UNO is USB connectivity. It means the data communication between the PC and Arduino become easy. Another important thing is no requirement of a physical press of reset button because it can be reset by software running on a connected computer. It works on 5V.



Arduino IDE software is installed in PC for embedding the program to Arduino. It supports the languages C and C++ using special rules of code structuring.



**Gas Sensor:**

MQ6 is a semiconductor type gas sensor which detects the gas leakage. The features of MQ6 are

- High sensitivity to LPG.
- Small sensitivity to alcohol, smoke.
- Fast response.
- Stable and long life.
- Simple driver circuit.

It is suitable for detecting of LPG, iso-butane, propane, avoid the noise of alcohol, cooking fumes and cigarette smoke. This sensor is highly sensitivity and fast response time.



Figure 6  
 Gas Sensor MQ6

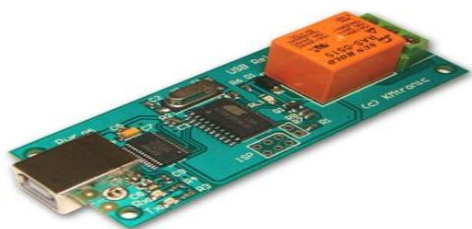
**DC motor:**

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The advantage of dc motor: Speed variation and torque. In our project, we have to rotate the motor when the gas leakage is detected.



### Single relay driver:

In this proposed system, DC motor is used for rotating the regulator in the cylinder when the detection of gas. If the electrical spark is evolved from the motor, the fire accidents occur. We have to avoid that accident by single relay driver. It is used to manage and control the spark.



### IR Sensor

IR Sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. By using an LED which produces light at the same wavelength as what the sensor is looking for, you can look at the intensity of the received light. When an object is close to the sensor, the light from the LED bounces off the object and into the light sensor. This

results in a large jump in the intensity, which we already know can be detected using a threshold. Infrared radiation is emitted or absorbed by molecules when they change their rotational-vibrational movements. It excites vibrational modes in a molecule through a change in the dipole moment, making it a useful frequency range for study of these energy states for molecules of the proper symmetry. Infrared spectroscopy examines absorption and transmission of photons in the infrared range.



### GSM module

General packet radio service (GPRS) is a packet oriented mobile data service on the 2G and 3G cellular communication system's global system for mobile communications (GSM). GPRS was originally standardized by European Telecommunications Standards Institute (ETSI) in response to the earlier CDPD and i-mode packet-switched cellular technologies. It is now maintained by the 3rd Generation Partnership Project (3GPP). GPRS usage is typically charged based on volume of data transferred, contrasting with circuit switched data, which is usually billed per minute of connection time. Usage above the bundle cap is charged per megabyte, speed limited, or disallowed. GPRS is a best-effort service, implying variable throughput and latency that depend on the

number of other users sharing the service concurrently, as opposed to circuit switching, where a certain quality of service (QoS) is guaranteed during the connection. In 2G systems, GPRS provides data rates of 56–114 kbit/second. 2G cellular technology combined with GPRS is sometimes described as 2.5G, that is, a technology between the second (2G) and third (3G) generations of mobile telephony. It provides moderate-speed data transfer, by using unused time division multiple access (TDMA) channels in, for example, the GSM system. GPRS is integrated into GSM Release 97 and newer releases.

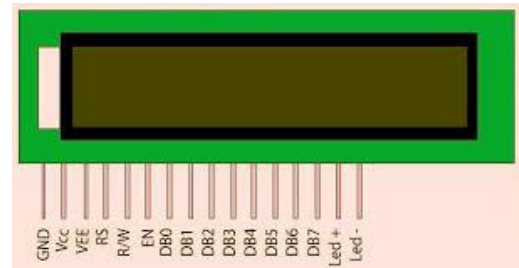


**LCD Display**

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines.

In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.



## Conclusion

The proposed algorithm use a magnitude information of each radar and mutual information of the trend of the found representative values. Using the values, the total number of people regardless of the direction is counted and the direction of each human is decided individually. Thus we have implemented a cost effective and efficient people counting system in share auto. The system is very helpful for avoiding the people death in accidents.

## Reference

- [1] Faheem Khan; Jeong Woo Choi; Sung Ho Cho, "Vital sign monitoring of a non-stationary human through IR-UWB radar," in Network Infrastructure and Digital Content (IC-NIDC), 2014 4th IEEE International Conference on, pp.511-514, 19-21 Sept. 2014
- [2] Lazaro, A.; Girbau, D.; Villarino, R.; Ramos, A., "Vital signs monitoring using impulse based UWB signal," in Microwave Conference (EuMC), 2011 41st European, pp.135-138, 10-13 Oct. 2011
- [3] Jae Sung Park; In Seok Baek; Sung Ho Cho, "Localizations of multiple targets using multistate UWB radar systems," in Network Infrastructure and Digital Content (IC-NIDC), 2012 3rd IEEE International Conference on, pp.586-590, 21-23 Sept. 2012
- [4] Sobhani, B.; Mazzotti, M.; Paolini, E.; Giorgetti, A.; Chiani, M., "Multiple target detection and localization in UWB multistate radars, "in Ultra-Wideband (ICUWB), 2014 IEEE International Conference on, pp.135-140, 1-3 Sept. 2014
- [5] Jeong Woo Choi; Jin Ho Kim; Sung Ho Cho, "A counting algorithm for multiple objects using an IR-UWB radar system," in Network Infrastructure and Digital Content (IC-NIDC), 2012 3rd IEEE International Conference on, pp.591-595, 21-23 Sept. 2012
- [6] Xuanjun Quan; Jeong Woo Choi; Sung Ho Cho, "In-bound/Out-bound detection of people's movements using an IR-UWB radar system, "in Electronics, Information and Communications (ICEIC), 2014 International Conference on, pp.1-2, 15-18 Jan. 2014
- [7] Joon-Yong Lee; Scholtz, R.A., "Ranging in a dense multipath environment using an UWB radio link," Selected Areas in Communications, IEEE Journal on , vol.20, no.9, pp.1677,1683, Dec2002
- [8] Piccardi, M., "Background subtraction techniques: a review," in Systems, Man and Cybernetics, 2004 IEEE International Conference on , vol.4, no., pp.3099-3104 vol.4, 10-13 Oct. 2004
- [9] Jeong Woo Choi; Sung Ho Cho, "A new multi-human detection algorithm using an IR-UWB radar system," in Innovative Computing Technology (INTECH), 2013 Third International Conference on , vol., no., pp.467-472, 29-31 Aug. 2013