

A Review on MY-SR Next Generation Automated Gas Safety System Using IoT

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ABSTRACT

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Smart embedded systems have become a core component in the latest technologies, and IoT based smart embedded system is the trendiest field in the research area. In our research, we are proposing an IoT based smart stove. Any accident might occur at any time from a stove. So, we are designing a two-way safety enabled stove with a child lock system and gas leakage detection feature open the door or window. The intelligent stove will try to ensure safety and will detect age from real-time video streaming. Our main focus is a child would not be able to turn the stove on. As well as, the stove can entitle safety via gas detection alarm. Automatic gas booking system once read the load cell has less value. We are using a Arduino Uno and Gas Detection Module with a buzzer for the hardware implementation. Also, we are applying a Machine Learning object detection algorithm (Haar Cascade) and a deep learning architecture (CNN) for the system execution. Since our stove is IoT-based, the stove is ensuring safety remotely as well as manually which will try to prevent accidental occurrences.

Keywords : Arduino Uno, CNN, Child lock system

I. INTRODUCTION

Internet and embedded systems are one of the major growing fields that can change the way people live their daily lives. The objective of embedded devices is that they build a unique computing system. An embedded system generally runs as a single operation. However, these embedded devices that are connected to the internet can communicate through other network devices. Moreover, these devices provide flexibility and facilities to improve the domestic environment. People have the control to operate and monitor the devices remotely through the IoT (Internet of Things) features. In this research, we are presenting a smart embedded device that is an IoT

based smart stove. The stove will provide us two-way protection: Real-time age detection for child lock and safety from accidental gas leakage. We are doing this research in the perception of Bangladesh. The stove will be both manual and electric. In our work, we are introducing an IoT based smart system that will be representing the concept of our smart stove. For the system, we are using Arduino Uno which is a microcomputer. Other necessary sensors, modules, and apparatus are interfaced with the Arduino Uno.

The Arduino Uno is a credit-card sized, low-cost computer that connects to a PC screen or TV, and utilization a common console and mouse. It is a capable little device that permits people of all ages to explore.

It is capable of doing everything an individual would expect a personal computer to try to, from browsing the web and playing high-definition video, to creating spreadsheets, word-processing, and playing games. Moreover, the Arduino Uno has been utilized in a good array of digital maker projects, from parent detectors to weather stations and music machines. On account of the safety measures, we have proposed the child lock in our system. Hence, we have appended the age detection method so that a child below 12 years old cannot turn on the stove. For the age detection, we are using the Laptop and Camera. And, for the software implementation, we have interfaced with Open CV (a library) python codes with algorithms and trained datasets. Python supports both procedure-oriented and object-oriented programming which is one of all the key python features. Python joins astounding force with clear syntax. Python has exceptionally abnormal state dynamic information types and dynamic composing including modules, classes, exemptions. There are interfaces to numerous framework calls and libraries, even as to different windowing frameworks.

II. LITERATURE REVIEW

The system proposed by Arun Raj uses PIC16F877A as a microcontroller and uses a load cell to measure the weight level of the cylinder and uses MQ - 6 gas sensors to detect any leakage. For intimating the user, it uses a 16x2 LCD display and uses a GSM module to send SMS to the user. Padma Priya K₁ proposed a system that uses ARM 7 as a microcontroller unit. The system uses a Load cell, MQ-6 to measure the weight of the LPG cylinder and to detect any LPG leakage. For the users to monitor the measured parameters, an LCD display is used, and to receive SMS updates a GSM module is used. In addition to that, if the leakage is detected, a solenoid valve is activated to cut off the LPG connection. The system proposed by Alan_Macker uses Arduino UNO. Load cell sensor is used to measure the level of LPG inside the cylinder and MQ - 6 Sensor is used to detect any leakage of LPG. It uses an LCD Display and a

piezoelectric buzzer to intimate the user. Also, for SMS service, it uses GSM modules. Arpit Kumar Srivastava proposed a system that measures the level of the LPG in the cylinder using a Load cell sensor and uses an MQ-4 sensor to detect any leakage from the LPG cylinder. The system uses Arduino UNO for carrying out all the processing and to enable web applications ESP8266 is used.

An IOT Based LPG Leakage Sensing and Alerting System

AUTHORS: P. Kanaka Maha Lakshmi, P.S.G. Aruna Sri, P. GopiKrishna

Gas is detecting innovation has among the topical research, ponder for rather now and then. With the reason for local gas chamber cooking turned out to be simple and settling them is moreover abbreviated. Be that as it may, at that point are likewise sick impacts of utilizing these barrels. Spillage of residential gas isn't just lethal to human and creature life, yet in addition aims colossal property misfortune. In this way, location and essential advances are to be considered to forestall unfortunate mishaps. Many accidents tendencies due to short circuits, gas leakages, Etc. won't permit a normal person to enter the accident space, therefore on the scale back any harm. Such accidents are a unit, increasing every day, owing to lack of awareness, precaution measures and mental object. Multiple sensors were used for detection method. This paper presents an intelligent security system helpful for many of the house and business application.

Age and Gender Classification using Convolutional Neural Networks

AUTHORS: Gil Levi and Tal Hassner

Automatic age and gender classification has become relevant to an increasing amount of applications, particularly since the rise of social platforms and social media. Nevertheless, performance of existing methods on real-world images is still significantly lacking, especially when compared to the tremendous leaps in performance recently reported for the related task of face recognition. In this paper we show that by

learning representations through the use of deep-convolutional neural networks (CNN), a significant increase in performance can be obtained on these tasks. To this end, we propose a simple convolutional net architecture that can be used even when the amount of learning data is limited. We evaluate our method on the recent Audience benchmark for age and gender estimation and show it to dramatically outperform current state-of-the-art methods.

Deep Convolutional Neural Network for Age Estimation based on VGG Face Model

AUTHORS:

Zakariya Qawaqneh Arafat Abumallouh Buket D. Barkana

Automatic age estimation from real-world and unconstrained face images is rapidly gaining importance. In our proposed work, a deep CNN model that was trained on a database for face recognition task is used to estimate the age information on the Audience database. This paper has three significant contributions in this field. This work proves that a CNN model, which was trained for face recognition task, can be utilized for age estimation to improve performance; Over fitting problem can be overcome by employing a pretrained CNN on a large database for face recognition task; Not only the number of training images and the number subjects in a training database effect the performance of the age estimation model, but also the pre-training task of the employed CNN determines the performance of the model.

Machine learning for improved image-based wavefront sensing

AUTHORS: Scott W Paine, James R Fienup

For large amounts of wavefront error, gradient-based optimization methods for image-based wavefront sensing are unlikely to converge when the starting guess for the wavefront differs greatly from the true wavefront. We use machine learning operating on a point-spread function to determine a good initial estimate of the wavefront. We show that our trained convolutional neural network provides good initial estimates in the presence of simulated detector noise

and is more effective than using many random starting guesses for large amounts of wavefront error.

The Internet of Things (IoT): Applications, investments, and challenges for enterprises

AUTHOR: In Lee and Kyoochun Lee

The Internet of Things (IoT), also called the Internet of Everything or the Industrial Internet, is a new technology paradigm envisioned as a global network of machines and devices capable of interacting with each other. The IoT is recognized as one of the most important areas of future technology and is gaining vast attention from a wide range of industries. This article presents five IoT technologies that are essential in the deployment of successful IoT-based products and services and discusses three IoT categories for enterprise applications used to enhance customer value. In addition, it examines the net present value method and the real option approach widely used in the justification of technology projects and illustrates how the real option approach can be applied for IoT investment. Finally, this article discusses five technical and managerial challenges.

III. SYSTEM ARCHITECTURE

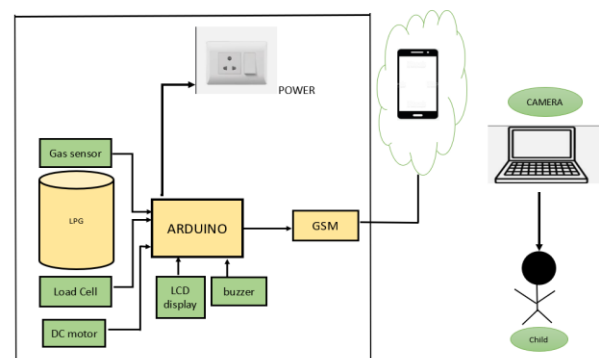


Fig 1. System Architecture of AGS System

The Problem Statement: Smart embedded systems have become a core component in the latest technologies, and IoT based smart embedded system is the trendiest field in the research area. In our research, we are proposing an IoT based smart stove. Any accident might occur at any time from a stove. So we are designing a two-way safety enabled stove with a

child lock system and gas leakage detection feature. The intelligent stove will try to ensure safety and will detect age from real-time video streaming. Our main focus is a child would not be able to turn the stove on.

Today's industrial stoves have many features including temperature sensor, temperature controller, blower fan, other switches, etc. In comparison, over the last century or so, the household stove has only slightly increased in complexity incorporating an automatic ignition, but few other features. The burners available in the market don't prevent gas leakage, which is a major concern. The question arises whether the household burner can incorporate some of the complex features reserved for industrial burners. The complexity of household stoves can be greatly increased so as to keep up with the generally increasing complexity and incorporation of microcontrollers in most household and electronic devices. Considering the increasing shortage of gas and fossil fuel, it is only appropriate that we incorporate features to stop the flow of gas in the absence of a flame. This is also a safety feature preventing the accumulation of potentially explosive gas-air mixture in a confined room. The gas may also render unconscious or cause the death of an unwitting resident.

The Existing System: Many times we observe that in our houses whenever LPG gas cylinder is empty, then we request for new cylinder at the office of LPG gas provider. Many times it happens that because of shortage of LPG gas cylinder, there is delay in providing gas cylinder. Main reason behind this is delay in booking /informing to the gas provider. The use of the LPG gas is in the home or restaurant for the cooking purpose and it is also useful in industries for the cutting or welding purpose. In these places, if the LPG gas in the gas cutters are empty at that time request for new gas cylinder are sent to the storage departments and if there is shortage of gas cylinders in the storage department then there is delay in providing LPG gas cylinder.

Currently, no measures are taken to detect the leakage of gas which may lead to severe incidents and people may also lose their lives. A proper or efficient system should be established in each and every house/industry/restaurant etc., to avoid these kinds of incidents. An MQ-135 gas sensor is used to detect any leakage of the LPG from the cylinder. The same metric is also displayed to the user via the LCD display and also via SMS. To avail a new LPG Cylinder, the LPG vendors have a booking application which can be accessed by mobile call and pressing relevant digit for booking a new cylinder. After booking the LPG Cylinder through a call, it takes 2 to 3 days for delivery. This process is done by the user when the LPG level is lower than a 97% of the total LPG in the cylinder.

The Proposed System: The system focuses on complete monitoring of the weight level of the LPG cylinder and checks for any leakage from the cylinder. The proposed system, carry out the monitoring purpose, two sensors are used namely the Load cell sensor and MQ-135 Gas sensor. The load cell sensor is an electronic device that is used to measure the weight of an object when placed on top of it. The MQ135 gas sensor is an electronic device that is used to detect any alcoholic substance suspended in the surrounding atmosphere. The Load cell sensor and the MQ-135 gas sensor are connected to the Microcontroller that is used to carry out all the processing needed for the system to operate. Block diagram of the Proposed System To utilize the measured metrics from the Load cell and the MQ-135 gas sensor, various integrations have been provisioned. Namely, a 16X2 LCD, two LEDs', a mobile application, and a web application. The 16X2 LCD is to display the weight of the cylinder and the percentage of LPG remaining inside the cylinder before it empties, mobile application and a web application developed with HTML is used for the user to lively view the metrics that are measured by the sensors. In addition to everything, a DC geared motor with 15 rpm is coupled with the LPG cylinder regulator knob which will turn

the position to OFF State when any LPG leakage is detected by the MQ-135 gas sensor.

IV. CONCLUSION

Though many works have been done previously relating age detection and gas leakage detection separately, we have proposed a combined method of both regarding the safety measurements. We have enabled two-way safety features in our smart stove i.e. a child lock system in the stove. And the other feature is, our smart stove will give an alarm if there is any accidental gas leakage. Since our smart stove, we have proposed in this paper is IoT based so the users will be able to monitor the stove remotely and prevent any accidental occurrences. Moreover, our system has been established in the perception of Bangladesh. The system of the smart stove is IoT based so the users can monitor it remotely to ensure safety. A GSM module can be installed in our system so that the users can not only monitor the stove but also be notified via an email or SMS.

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