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Smart Controlling and Alerting System for Gas Leakage Detection

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ABSTRACT: In this technology have a core component of smart embedded system. The latest technology and IOT smart embedded system is trendiest field in research area. In this project we are proposing IOT based smart stove. When a accident cause at that time from a stove, so we are designing a way to safely enabled stove With a child lock system and gas leakage detection We use the smart technique stove it will help to ensure safety and detect age from real time video streaming. The main object of our project is when the children will try to turn on the gas then it will not be able to turn on the gas stove. We set the gas detection alarm it entitles safety. The implementation of the project is by using Raspberry pi and gas detection with mobile a buzzer for the hardware. This project we have machine learning object detection algorithm [HaarCascade] and a deep learning architecture [CNN] for the system execution. When the accident may cause at that time the stove is ensure the remote for safety as well as manual based on IOT

KEYWORDS: gas detection, email notification, age detection

I. INTRODUCTION

The internet and embedded systems are revolutionizing daily life by providing unique computing systems that communicate with other network devices. These devices improve domestic environments and enable remote operation and monitoring through the Internet of Things (IOT). This research presents an IOT-based smart stove in Bangladesh, offering real-time age detection for child lock and safety from accidental gas leakage. The stove is both manual and electric, using a Raspberry Pi microcomputer and other necessary sensors, modules, and apparatus. The stove can entitle safety and gas detection alarm.

The Raspberry Pi is a low-cost, versatile computer that can be connected to a PC or TV, allowing people of all ages to explore. It can perform various tasks, such as browsing the web, playing high-definition video, creating spreadsheets, word-processing, and playing games. The Raspberry Pi has been used in various digital projects, including age detection systems for children under 12. The system uses the Raspberry Pi Camera Module for age detection. Python, a key Python feature, supports both procedure-oriented and object-oriented programming, and offers interfaces to various frameworks and libraries.

II. RELATED WORK

In this work they are proposing a method that is by utilization of raspberry pi. The raspberry pi have a digital computer which may created and as completely many ways. Also in our project we are using MQ sensors which as the implementation for the LPG supply of a gas, the button edge is achieved then it will send the alarm message to the power versatile. And the message is sent to email. In our whole project the working is on the framework that has been executing a python code and also it as the sensors libraries. Using the neural networks, estimate our method for the age and gender estimation. By proposing the CNN approach, the age and gender will be classified to the real-world. There of two types of CNN architecture it includes one is to extraction of the feature and other is for classification. The In our paper we are proposing a method that is by utilization of raspberry pi. The raspberry pi have a digital computer which may created and as completely many ways. Also in our project we are using MQ sensors which as the implementation

for the LPG supply of a gas, the button edge is achieved then it will send the alarm message to the power versatile. And the message is sent to email. In our whole project the working is on the framework that has been executing extraction of the feature is for the age and to gender. By the robust image the algorithm and processes the faces. The microcontroller is performed for using gas leakage. The gas sensor can be easily combined to a unit which can sound a alarm. The sensor can be used to sense the gases like a cigarette the smoke. The sensor can be low when it senses the gas leakage. So it can be detected by turned on of the microcontroller and the buzzer. The industrial systems can also be design by using the IOT.

The sensors had which that is used to system development and which it detects the gas leakage. Raspberry pi plays an major role then the other components. The main necessary of the gas detection that monitor and when gas or smoke is detected then it will send the message to the user. By sending a message to user it is warning to the people by the detector. The detector senses the gases like LPG and the methane gas which as ability to catch the fire and it might cause the blast. Algorithm that is been used in research which is as the method of the library in Open CV which as mainly used for the python programming. The ability of recognition of the face can use the passwords, for high valued security system as the RFI-cards. By the raspberry pi the system as the cost and easy with the best performance. The microcomputer and the camera can communicate to systems by the help of network. The image of people that has been detected through the system is by image processing by the algorithms.

III. METHODOLOGY

The proposed methodology involves the utilization of a Raspberry Pi as a digital computer with multiple configurations. The project employs MQ sensors for gas leakage detection, particularly for LPG supply. When a button edge is triggered, an alarm message is sent to a versatile power source, which then sends an email notification. The entire project is built upon a Python framework with sensor libraries. For age and gender estimation, neural networks, specifically a CNN approach, are utilized for real-world classification. The CNN architecture involves feature extraction and classification stages. Gas leakage detection is facilitated by a microcontroller, and when gas is sensed, an alarm is triggered by the combination of the gas sensor and a buzzer, enabling quick detection and warning. The Raspberry Pi plays a major role in the system and offers a cost-effective and high-performance solution. Additionally, the system incorporates image processing algorithms for robust face recognition. The camera and microcomputer communication is facilitated through a network, and the OpenCV library is used for Python programming. The system can be applied to industrial IOT applications, where gas detection is crucial for safety. The detector identifies gases like LPG and methane, which pose a risk of fire and explosion. Overall, the methodology involves a comprehensive integration of hardware (Raspberry Pi, sensors) and software (Python, CNN, OpenCV) components for gas detection, face recognition, and age and gender estimation.

1(a) Algorithm for face detection

- STEP 1: Start
- STEP 2: Import libraries.
- STEP 3: Pre-trained Haar Cascades for face detection.
- STEP 4: Reading input image.
- STEP 5: Image will convert to grayscale.
- STEP 6: Face detection perform.
- STEP 7: Bounding boxes draw to detected face.
- STEP 8: Output image with detected face.
- STEP 9: Image is save.
- STEP 10: Stop.

The libraries are installed and pre-trained models are loaded by harr cascade classifier for face detection and next the image will capture by reading input of image. the image will convert into grayscale. It will perform the face detection

by drawing bounding boxes around the detected faces then the output will display with detected faces. The mathematical model of face detection is presented by define the set-off face images in the database $\times 1, \times 2, \times 3, \dots \dots \dots \times l$. the sets that are divide into L classes, where the class that registered person [55, 56, 57, 58]. For image we define vector values. The conventional face detection algorithm is by basically scanning the face it scans the image.

$$\mu = \mu(\mu_1, \mu_2, \mu_3, \dots, \mu_k)$$

The distance function the class must be exceed the threshold value the face recognition algorithm of an image

The output of the sequence of the face frame coordinates zero face frames or one face frame the output face frame.

$$d(\mu_g, \mu_k) > d(\mu_h, \mu_k), g \neq h, g, h = 0, 1, \dots, G - 1$$

Haar Cascade is a algorithm that detect the images for the scale of an image and location.

$$I_i(x, y) = \sum_{i=1}^{x,y} I(x', y')$$

$$S_i = \sum_{i=0}^{y,x} r_{i,k} - \sum_{i=0}^{y,x} r_{i,f}$$

(b). Algorithm for age detection

- STEP 1: Start
- STEP 2: Collection of data.
- STEP 3: Data set splitting.
- STEP 4: Deep learning model.
- STEP 5: Trained model.
- STEP 6: Evaluation model.
- STEP 7: Age estimation of face
- STEP 8: Stop

The age detection that detects the face of a person which age estimation based on face that drawn more which includes feature extraction and age estimation by using deep learning method. The CNN method that is based on age detection [23-30]. CNN is used to extract age of a person. Data collection for preparation data set splitting which as a deep learning model. The mathematical model by using CNN in order to reduce the complex of network and training time the age estimation deep CNN.

$$E(W) = \frac{1}{2N} \sum_{i=1}^N || \tilde{y}_n - y_n ||^2$$

That is a type of architecture of deep learning that is use for image recognition and layer. CNN is a type of neutral network which higher representation for image it takes image pixel data and trains the model automatically of better classification.

$$w(j, k) = \exp\left(-\frac{||x_j - x_k||}{2t^2}\right)$$

$$FcW = \lambda F_s W$$

$$fk(x) = \langle wk, \phi k, (x) \rangle + bk$$

2. Pin diagram for gas leakage detection

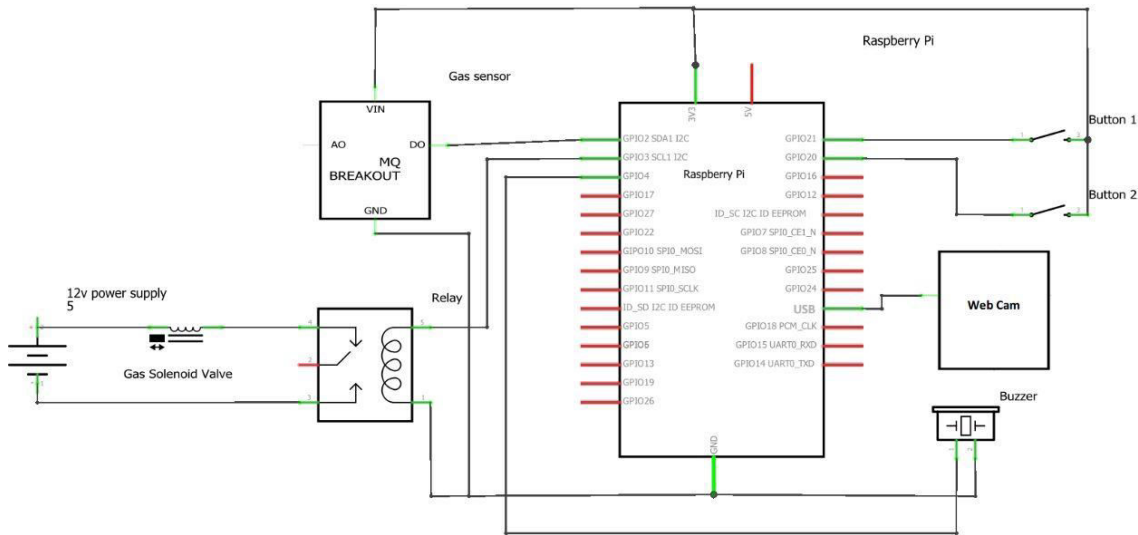
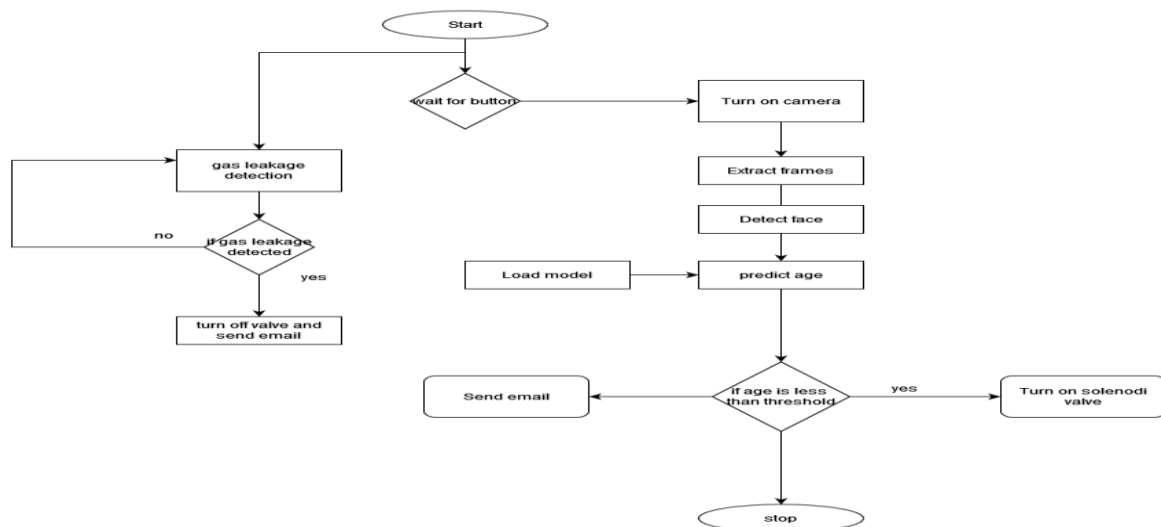


Fig-1 pin diagram of gas leakage detection

The Raspberry pi 4 model B it is the speed in processor and multi performance raspberry pi. IOT based application in our project raspberry pi connected to the entire component and it acts as main component for gas sensor LED buzzer, camera, solenoid valve and relay. The USB camera connect to the raspberry pi the camera is used to design for age detection and face of person it capture the real time video age estimation of the face and it predict the person. It works on temperature which adsorbs the oxygen in the air where it reduces density the buzzer which provide the sound alarm which as a 2 pin compact of structure it is lesser weight and solenoid valve it as a fluid power to control cylinders the fluid power motor and large industrial valves. A relay is an electric operated switch it as a set input terminal of a single or multiple control signal and it as a open close the circuit electric signal from outside source

3. FLOW CHART



In our project the flowchart we are proposing to start for using to turn on the stove. suppose if the stove button is do not press turn on then it shows No. the stove is turn on to press a button then its move Yes then it start to turn on camera it

will extract frames then it detects the face, after the detection of the face it will show the age of person and it will take sign from the Load model. If the age is greater than threshold value whether if it is no then it will send the email to the mobile of the user otherwise if it is yes then it turn on the solenoid valve after it moves to stop.

IV .DESIGN AND IMPLEMENTATION

In this work they are proposing a method that is by utilization of raspberry pi. The raspberry pi have a digital computer which may created and as completely many ways. Also in our project we are using MQ sensors which as the implementation for the LPG supply of a gas, the button edge is achieved then it will send the alarm message to the power versatile. And the message is sent to email. In our whole project the working is on the framework that has been executing a python code and also it as the sensors libraries. Using the neural networks, estimate our method for the age and gender estimation. By proposing the CNN approach, the age and gender will be classified to the real-world. There of two types of CNN architecture it includes one is to extraction of the feature and other is for classification. The In our paper we are proposing a method that is by utilization of raspberry pi. The raspberry pi have a digital computer which may created and as completely many ways. Also in our project we are using MQ sensors which as the implementation for the LPG supply of a gas, the button edge is achieved then it will send the alarm message to the power versatile. And the message is sent to email. In our whole project the working is on the framework that has been executing extraction of the feature is for the age and to gender. By the robust image the algorithm and processes the faces. The microcontroller is performed for using gas leakage. The gas sensor can be easily combined to a unit which can sound a alarm. The sensor can be used to sense the gases like a cigarette the smoke. The sensor can be low when it senses the gas leakage. So it can be detected by turned on of the microcontroller and the buzzer. The industrial systems can also be design by using the IOT.

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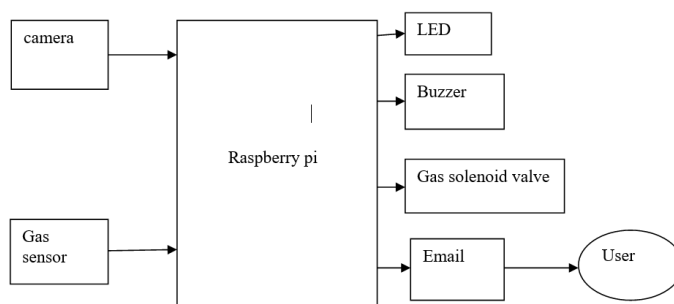


Fig.2 System design for gas leakage detection

Component description

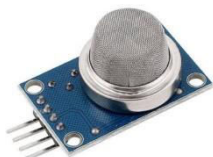
(a) Raspberry pie



The raspberry pi 4 model B it is the latest product in the popular raspberry pi range of the components. It is the dual band wireless LAN and Bluetooth have modular compliance, allowing the board to be designed into end products with significantly reduced the compliance

testing, and improving cost and time to market .the feature is as the high performance it is dual display support resolutions. It is connectivity to Bluetooth 5.0 and gigabit Ethernet also as the standard GPIO 40-pin GPIO header. Can perform machine learning operations. The Raspberry Pi 4 model B is a relatively affordable Linux-powered computer that also features a set of GPIO (general purpose input/output) pins that let you explore the Internet of Things (IOT) and control electrical components for physical computing.

(b) Gas sensor



Gas sensors are tools that enable us to comprehend the quantity of gas present in the surroundings as well as the way that gas naturally moves. Electrical signals from gas sensors may be used to determine the kind of gas composition, the amount of gas present, and its change [91–93].it detects the presence and concentration of various gases and vapors like a toxic explosive gases, humidity and odors. By gas sensors the gas leakage will detect the gases. And the sensor enabled solution which prevents the high risk of gas explosions and

outside premises.

(c) Buzzer



A buzzer is a simple audio device that produces sound from an incoming electrical signal. It is also known as a sounder, audio alarm, or audio indication buzzers and magnetic buzzers are the two main types of buzzers. A buzzer or beeper it is an audio signaling device, which may mechanical, electromechanical or piezoelectric. The buzzer it an electronic device commonly produce sound it is light weight, simple construction and low price make it usable in various applications. It can used in homes and as a automobile alarms as well as for computer devices

due to their size variability.

(d) USB Camera



This camera connects to a computer via a USB connection in order to operate. The camera feeds are sent to the computer, where a software program enables you to see the images and upload them to the internet. And the USB connection allows for faster transfer of images and video, as well as remote control of the camera. The optical image generated by lens is projected onto surface of the sensor, and then converted into electrical signal, which can convert into digital image signal.

(e) Relay



A relay is an electrical operated switch it as set-off input terminal of single or multiple control signal the switch have many number of contact. A relay is simple electromechanical.

(f)Solenoid valve



An electrically operated valve is a solenoid valve. A solenoid, an electric coil with a moveable ferromagnetic core (plunger), is a component of the valve. Solenoid valve is control units which when electrically energized or de-energized, either shut off or allow fluid flow. It is used to control a valve electrically. Are designed to

be used with clean liquids and gases. The accurate fluid or gas regulation ideal of the sensitive processes. It is rapid opening closing actions for safety applications and swift reaction to hazards. It is durable, realizable performance reduces the maintainer also as a facts for wide range of applications.

V. RESULTS

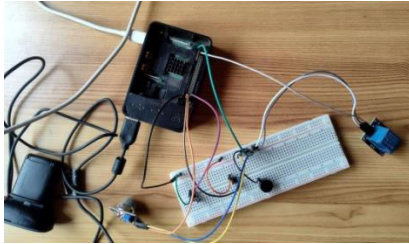


Fig.2: Output

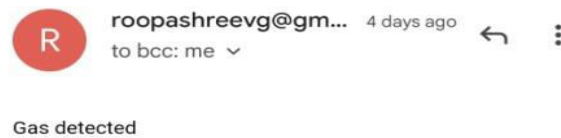


fig 3: Output displayed in email



Fig. 4: Output age detection

The result of this project is to built the smart stove which as safety enable for accidental gas leakage alarming system and to children lock system. The IOT that the stove is based for user that can ensure the safety measures by using remotely.

VI.CONCLUSION

The purpose of this research is to design a two-way safety smart stove for the gas leakage for the children. This intelligent stove will give the safety. And to detect the age of the person, our main concept is to focus on the children whether they are not be able to turn and off the stove. Hardware components such as raspberry pi and the gas detection the module with the buzzer can entitle the safety. By using the machine learning object detection and its deep learning for the execution of system. The smart stove is based on IOT to ensure the safety from the gas leakage accidents. By setting the alarm system it can enable the safety remotely. For the safety measures we are proposing this system which reduces the accidents rate through gas leakage and for children lock system.

REFERENCES

- [1] P kanaka the IOT based gas leakage sensing and for alerting system. [IJITEE] ISSN 2278-3075, volume-8, April 2019.
- [2]. Gil Levi and Tal for age detection and gender classification by using neural networks. IEEE workshops on the basses of the analysis of the modeling of the faces and gestures at IEEE conf. on computer vision and the pattern recognition 2015.
- [3]. Deep neural networks of age estimation based on VGG Face model and department of computer science and engineering university Bridgeport building.
- [4]. Paine S.W and Fiennes J.R 2018, machine learning to improve the image based sensing.



- [5]. Lee I, and Lee .K 2015 the IOT that applications, and investments that challenges of the enterprises. Business horizons.
- [6]. Syambas .N 2012 the image processing and face detection analysis of face verification that based on the age stage.[7]. Marques and Grana 2010 for the face recognition algorithms



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