Home Security & Protection System Using ESP32-Cam And PIC Microcontrollers

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Abstract- *In recent times, there are much security and protection system required for industrial and commercial applications. The technology also developing from day to day life. So these security and protection schemes can be done for home with these technologies. This system involves securing the house by door locking system using one time password and face recognition system with fire protection, Liquefied petroleum gas leakage protection.*

In order to unlock the door, the one time password should be entered correctly which sent to the owner of the house and also the face should be matched with the registered images.The fire protection system can be carried out using the temperature sensor, if the temperature value raised above the specific level, the water pump will be turned ON to extinguish the fire. The Liquefied petroleum gas leakage protection is used to identify the gas leakage in the house using the gas sensor and it will turn on the exhaust fan. Those values of gas and temperature will be recorded and can be viewed through any mobile or laptop through IoT. It shows the real time value of gas and temperature as graph using IoT and can be downloaded as csv file also with respective date and time of the LPG gas leakage and temperature value.

Keywords- Face Recognition system, One Time Password (OTP) based door locking System, Fire Protection Circuit, LPG Leakage Protection System

I. INTRODUCTION

Our daily life revolves around the concept of automation and the things that are automated are said to be of benefit because they reduce the intervention of human beings. Our idea revolves around designing and implementing a home security and protection system which can be deployed in house so that only authorized personnel can gain access to it. Our smart door lock system requires the face should be matched with the registered images.After successfully recognising the face, the one time password (OTP) will be sent to the owner's mobile. That OTP should be entered correctly to unlock the door.

Gas leakage is a serious problem and nowadays it is observed in many places like residences, industries, house etc. It is noticed that due to gas leakage, dangerous accidents occur. Liquid petroleum gas (LPG) is highly inflammable and can burn even at some distance from the source of leakage. The Liquefied petroleum gas leakage protection is used to identify the gas leakage in the house using the gas sensor and it will turn on the exhaust fan using the relay circuit thereby the gas will be get out from the house**.**

Fire is a serious danger to life and property in worldwide. It is usually caused by combustion of materials which releases heat in large amount. Fire accident is common feature in factories, house, markets etc. due to inadequate fire protection. So we try to design automate fire detection with water sprinkler system because the event is very dangerous in our life. The fire protection system can be carried out using the temperature sensor, if the temperature value raised above the specific level, the water pump will be turned ON to extinguish the fire through the relay circuit with the help of PIC controller. Also an alert message will be sent to inform the owner.

Those values of leaked LPG gas and temperature caused by fire will be continuously monitored through IoT.

II. SYSTEM ANALYSIS

Face recognition and OTP can provide increased security compared to traditional security systems. Face recognition can ensure that only authorized individuals are granted access to your home, while OTP can ensure that the person entering the OTP is the actual owner of the device and not someone else trying to gain access.A face recognition and OTP-based security system can help prevent burglary by making it more difficult for unauthorized individuals to gain access to your home. Burglars may be deterred by the added security measures and choose to target a less secure property instead.A fire sensor can detect smoke or heat and alert the occupants of the home of a potential fire, giving them time to evacuate and call for emergency services.A water pump can be connected to a fire sensor and activated automatically when

the sensor detects a fire, helping to quickly extinguish the fire and prevent it from spreading.An exhaust fan can be connected to an LPG gas sensor and activated automatically when the sensor detects a gas leak, helping to quickly ventilate the area and prevent the buildup of gas.An LPG gas sensor and exhaust fan can help minimize the risk of gas explosions by detecting and ventilating gas leaks before they have a chance to reach dangerous levels.

III. PROPOSED METHODOLOGY

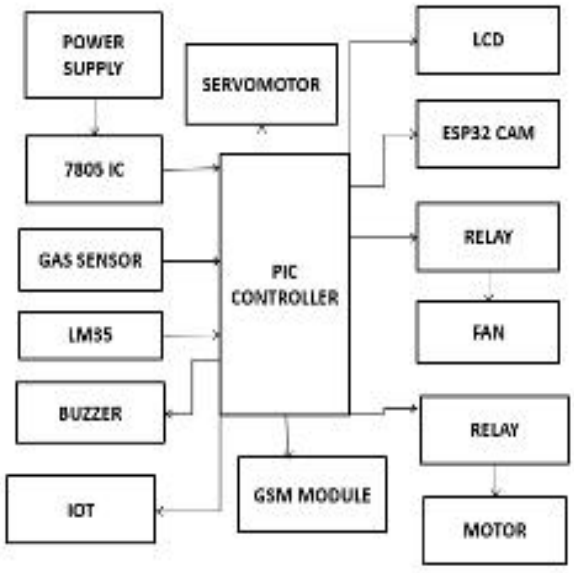

Figure1.Block Diagram

The PIC controller is powered by the power supply.It is connected with other components like ESP32-CAM,LM35,relay, gas sensor motor and LCD Display. After successfully recognizing the face using ESP32-CAM, an OTP is sent to the mobile number & that OTP should be entered in the door. If OTP& face are matched, the door will open, otherwise it will not open. Also whenever the LM35 sensor detects the fire problem inside the house, it will supply the water into the house to remove the fire using the relay and the value will be monitored through IoT.

The Liquefied petroleum gas leakage protection is used to identify the gas leakage in the house using the gas sensor and it will turn on the exhaust fan using the relay circuit thereby the gas will be get out from the house.It is used in the door of house and also for lockers.It can also be implemented for industries, office for fire protection.It can be used for detecting the liquefied petroleum gas in the house kitchen.It can also be used in the areas where these fire and LPG protection needed.

IV. SYSTEMDESIGN

In this proposed concept, we are using two Microcontrollers namely ESP32-CAM & PIC Microcontrollers. The ESP32-CAM is capable for capturing the image of the person who tries to open the door and validating it with the already registered images. The PIC controller is responsible for remaining entire process. It co ordinate the process of fire protection system and LPG leakage protection system and manipulate with the IoT modal for monitoring it from anywhere.IoT- Internet of Things. The Internet of things is used to view the recorded LPG gas and temperature value through any mobile or laptop.

V. EXPERIMENTALSETUP

The PIC16F877A controller is powered form the power supply board. It is connected with other components like ESP32-CAM, LM35,relay, MQ6, motor pump, GSMmodule and LCD Display.When the face is recognized successfully using ESP32-CAM which is low-cost and has small-size camera, an OTP is sent to the mobile number using GSM module & that OTP should be entered in the door.Then only door will be opened using servomotor, otherwise door will not open.

LPG protection circuit detects the gas leakage with MQ6 gas sensor.After it identifies above a certain value, it sends signal to the PIC microcontroller and exhaust fan will be turned ON using the relay 12V 7Ah which is an electromechanical device. Also whenever the LM35 sensor which has three terminals detects the fire inside the house,it send signal to the PIC microcontroller and that microcontroller will turn ON the motor which acts as a water pump supply the water into the house to remove the fire. The motor will be turned ON using the relay12V 7Ah which is an electromechanical device.Those gas and temperature value will be recorded and can be viewed through any mobile or laptop using IoT. A buzzer is an electronic device that produces a sound by generating an oscillating signal of a certain frequency. It sounds when the fire or LPG leakage protection circuit turns ON. It is an added advantage.

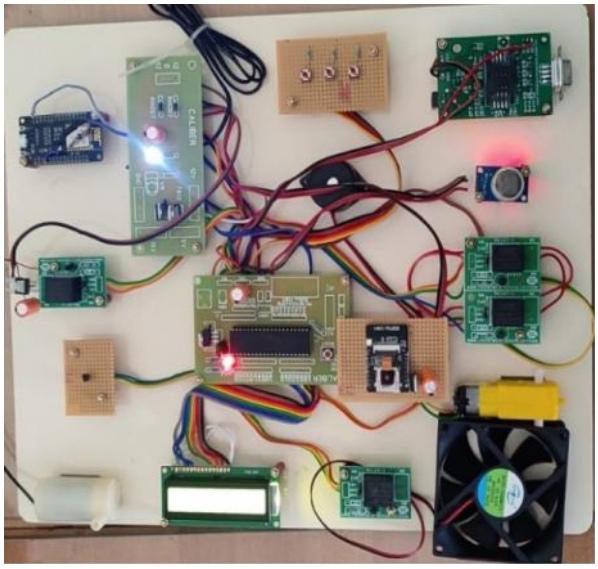

Figure 2. Snapshot of Proposed Hardware Kit system.

PARAMETERS	EXISTING SYSTEM	PROPOSED SYSTEM
Component used for face recognition.	ESP8266 :Single Core	ESP32-CAM : Dual core
LPG leakage protection	Not Available	Available
Fire Protection	Not Available	Available
Monitoring Data through IoT	Not Available	Available

Table. 1. Comparison of proposed system with existing system.

VI. RESULT AND DISCUSSION

After recognizing the face and validating the OTP the door will be opened. Whenever gas sensor sense high gas value, the exhaust fan will be turned ON. The temperature sensor sense high temperature value and the water pump will be automatically turned ON. Those value will be displaying in the LCD of the hardware as well as monitored with respective date and time using IoT through any mobile or laptop.

Figure 3.After recognising face, it sends OTP

Figure 4. OTP Entered

Figure 5. It validates the OTP

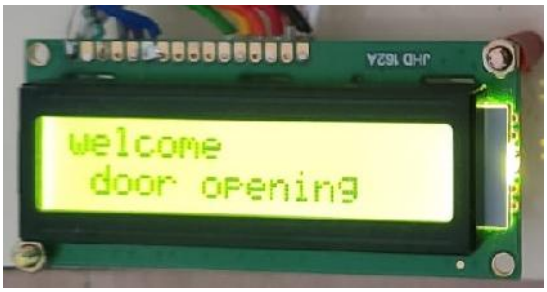

Figure 6. After validation, the door will open and also it is displaying in LCD

Figure 7. (G-Gas, T-Temperature) After attaining these values the fan & water pump will be turned ON.

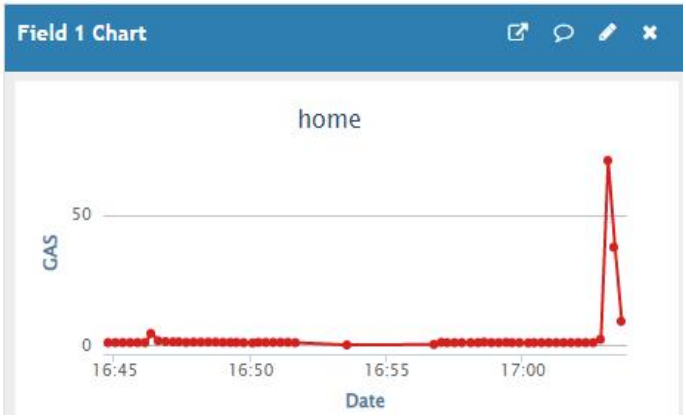

Figure 8. LPG gas variation viewing through IoT

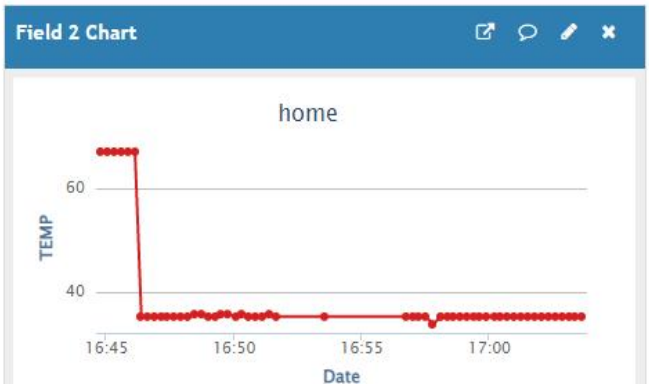

Figure 9.Temperature variation viewing through IoT

VII. FUTURE SCOPE

In future there will be much demand for IoT products and nowadays also there are increasing IoT technology. Thereby the door protection system with face recognition technology become the essential one and the fire protection system will play a vital role also in future because of the safety purpose. The liquefied petroleum gas (LPG) leakage protection will also be have a huge demand in the protection of house.

VIII.CONCLUSION

Thus the system of home Security and Protection using ESP32-CAM and PIC Microcontrollers involved the door protection with face recognition and otp is made.Also the LPG protection for safeguard of house. Detecting the fire & pump water to remove fire and thereby protecting the things and documents in the house also protecting human lives.

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