SMART FIRE EMERGENCY RESPONSE SYSTEM USING IOT

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Abstract

Modern buildings around the world have become complex and augmented. Given the structural characteristics of modern buildings, quick evacuation using emergency exits or evacuee guidance markers during blackouts due to fire, building collapse, earthquakes, or aging of buildings need to be possible.

This paper suggests an Internet of Things(IOT)-based intelligent fire emergency response system that can control directional guidance intelligently according to the time and location of a disaster and the design of an integrated control system using wireless sensor networks to address the problems with existing fire emergency response systems in times of fire or building collapse.

Keywords:***Detour Evacuation System, Internet of Things, FireDetection, Raspberry pi, Twilio***

I.INTRODUCTION

The “Internet of Things” (IoT) may sound complex, but in actuality, is a fairly simple concept to understand. On a very high level, IoT is the ability for things that contain embedded technologies to sense, communicate, interact, and collaborate with other things, thus creating a network of physical objects. In recent years this concept has gained enormous momentum, and is now one of the most talked about things in the world of technology today. At this rapid rate of growth, it is projected that there will be approximately 26 billion connected devices by 2020.
Internet of Things applications can be found in every industry with a diversity of application for smart homes, smart buildings, travel and transportation, health and personal care, retail, agriculture, construction etc. The industrial Internet of Things revolves around automation and logistics. Increasingly we will see Internet of Things creating smarter solutions, programmatically adjusting to the human behaviour. The driving forces are efficiency and convenience.

There are still some barriers to adoption however, for example battery life of devices and cost of devices. GSM and 4G networks are used more and more for IoT applications and new advancements recently made in the network software and device stack will greatly improve on these aspects. Finding the right ideas and business model, how to go to market and secure ROI for Internet of Things applications are the most critical issues to solve for most companies in the coming years.

The original goal of the Raspberry Pi (Rpi) was to get inexpensive computers into the hands of kids, so they could tinker and learn to code. Since its inception it has been picked up by engineers, designers, and everybody inbetween. But did they succeed at their original goal?

I’ve been unable to find solid figures on the number of RPis finding their way into schools and the hands of children, however they have now sold over five million, so presumably at least some of these are reaching the intended market.I do think it’s very important that children get their hands on RPis, and here’s the reason why.

When my family got our first computer it was something we all used, and was in the lounge, and later the dining room. It wasn’t something you messed around with—if the computer was put out of comission through a hack gone wrong, it would’ve meant my sister couldn’t have done her homework for example. The computer was an appliance. You used it, but certainly didn’t experiment with it.

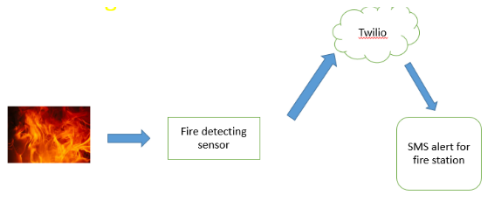
A flame sensor is an important safety feature on your gas heating equipment. During the ignition sequence, your gas furnace enters a process where either a spark or a hot surface igniter will ignite the gas. Once the gas is ignited, the flame sensor produces a current of electricity. This is measured in micro amps. If the furnace’s control board does not read the right level of micro amps, the furnace will no longer give the system fuel to avoid an explosion.

Over time, if the flame sensor is not cleaned properly, oxidation or carbon buildup can interfere with the flame sensor’s ability to work properly, which can end up causing the heating system to malfunction.

The way to establish if a soiled flame sensor is causing a furnace malfunction is to take a micro amp draw reading, which an expert furnace technician can give you. If a dirty flame sensor is the guilty party, the furnace expert will clean the sensor with steel wool. If dirt was the only factor, we will see a notably higher amp reading. If the reading shows no change, the technician will carry on with the heating equipment repair diagnostic process.

II PROPOSED PROJECT

The main purpose behind this project is to reduce the loss in terms of life, cost… when the fire accidents occursthis system specifies the time and location using to address the problems in times of fire.



In this project the flame sensor detects the fire and it activates the GPS which finds the current location of fire accident area. The location is stored in the cloud and activating message is send to the destination point by the GSM module. So that we can reduce the cost and we can save the human life before getting more damage. In generic cases we all finds that fire accident known when half or more lost is happened, So we can all reduce this lost by this project.

III.IMPLEMENTATION

3.1*Flame Sensor*:

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system. When used in applications such as industrial furnaces, their role is to provide confirmation that the furnace is properly lit; in these cases they take no direct action beyond notifying the operator or control system. A flame detector can often respond faster and more accurately than a smoke or heat detector due to the mechanisms it uses to detect the flame. The range of a flame detector is highly determined by the mounting location. In fact, when making a projection, one should imagine in what the flame detector "sees". A rule of thumb is, that the mounting height of the flame detector is twice as high as the highest object in the field of view. Also the accessibility of the flame detector must be taken into account, because of maintenance and/or repairs. A rigid light-mast with a pivot point is for this reason recommendable. A "roof" on top of the flame detector (30 x 30 cm, 1 x 1-foot) prevents quick pollution in outdoor applications.

Fig -1: **Flame Detecting Sensor**

3.2 Raspberry Pi:

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated selling outside its target market for uses such as robotics. It does not include peripherals (such as keyboards, mice and cases). However, some accessories have been included in several official and unofficial bundles.

According to the Raspberry Pi Foundation, over 5 million Raspberry Pi's were sold by February 2015, making it the best-selling British computer. By November 2016 they had sold 11 million units and 12.5m by March 2017, making it the third best-selling "general purpose computer" In July 2017, sales reached nearly 15 million.

Processor speed ranges from 700 MHz to 1.2 GHz for the Pi 3; on-board memory ranges from 256 MB to 1 GB RAM. Secure Digital (SD) cards are used to store the operating system and program memory in either SDHC or Micro SDHC sizes. The boards have one to four USB ports. For video output, HDMI and composite video are supported, with a standard 3.5 mm phono jack for audio output. Lower-level output is provided by a number of GPIO pins which support common protocols like I²C. The B-models have an 8P8C Ethernet port and the Pi 3 and Pi Zero W have on-board Wi-Fi 802.11n and Bluetooth.

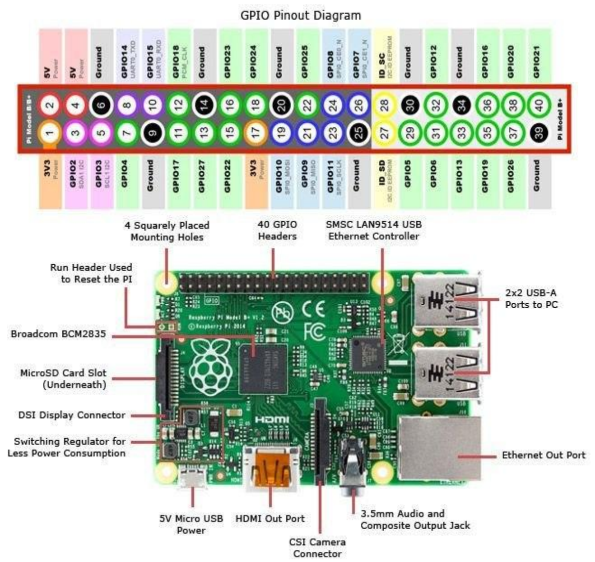


Fig -2: **Raspberry pi**

The Broadcom BCM2835 SoC used in the first generation Raspberry Pi is somewhat equivalent to the chip used in first modern generation smartphones (its CPU is an older ARMv6 architecture), which includes a 700 MHz ARM1176JZF-S processor, VideoCore IV graphics processing unit (GPU), and RAM. It has a level 1 (L1) cache of 16 KB and a level 2 (L2) cache of 128 KB. The level 2 cache is used primarily by the GPU. The SoC is stackedunderneath the RAM chip, so only its edge is visible.

3.3*GPS(Global Positioning System)*:

The Global Positioning System (GPS), originally Navstar GPS,is space-based radio navigation system owned by the United States government and operated by the United States Air Force. It is a global navigation satellite system that provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.

The GPS does not require the user to transmit any data, and it operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information. The GPS provides critical positioning capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver.

Fig -3: **GPS(Global Positioning System)**

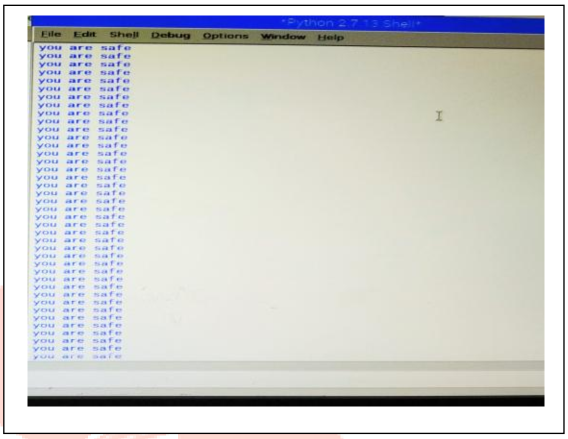
3.3 TWILIO

Twilio is a cloud communications platform as a service (PaaS) company based in San Francisco, California. Twilio allows software developers to programmatically make and receive phone calls and send and receive text messages using its web service APIs. Twilio's services are accessed over HTTP and are billed based on usage. Twilio uses Amazon Web Services to host telephony infrastructure and provide connectivity between HTTP and the public switched telephone network (PSTN) through its APIs. Twilio follows a set of architectural design principles to protect against unexpected outages, and received praise for staying online during the widespread Amazon Web Services outage in April 2011. Twilio supports the development of open-source software and regularly makes contributions to the open-source community. In June 2010 Twilio launched OpenVBX, an open-source product that lets business users configure phone numbers to receive and route phone calls. One month later, Twilio engineer Kyle Conroy released Stash board, an open-source status dashboard written in the Python programming language that any API or software service can use to display whether their service is functioning properly.Twilio also sponsors Localtunnel, created by now ex-Twilio engineer Jeff Lindsay, which enables software developers to expose their local development environment to the public internet from behind a NAT.

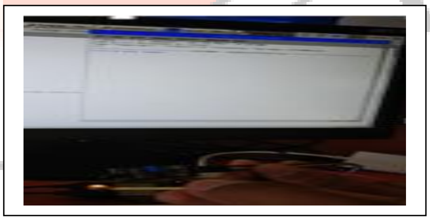
twilio

IV.RESULT

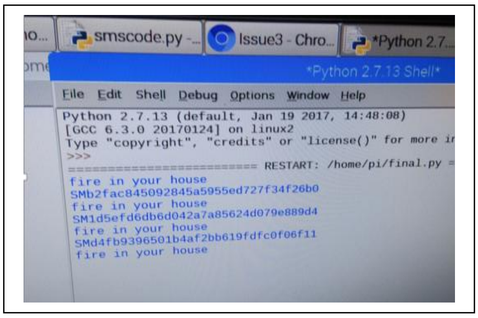
The below figure depicts the output of the project at stage 1 when the fire is not detected. It shows that "You are Safe".



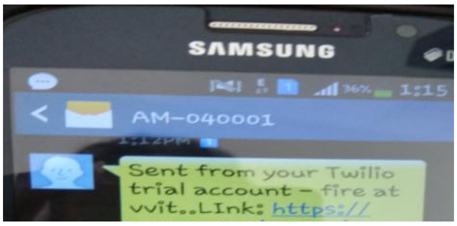
The below figure depicts the output of the project at stage-2 when the fire is detected. It shows that "Fire at Home".

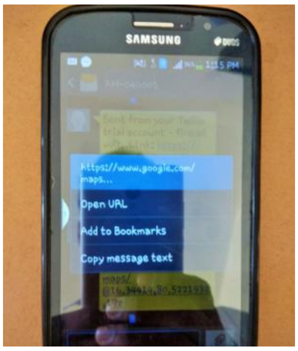


The below figure depicts the output of the project at stage-3 when the fire is detected immediately an alert message send to destination by the means of location.



The below figure depicts the output of the project at stage-4 when the fire is detected an alert location messagelink at destination mobile.





V.CONCLUSION

The proposed IoT-based smart fire emergency response system can reduce casualties by determining the point of occurrence of a disaster in a building to prevent directional confusion of the emergency lights and inappropriate evacuation guidance. The intelligent emergency evacuation system can also aid firefighting because it allows for a quick assessment of the exact location of the fire by integrating the intelligent and automated evacuation system with the central national emergency management agency. It reduces casualties and the time required for evacuation by guiding evacuees into dispersed detours that bypass the location of the fire.

Future studies will focus on expanding the applicability of this system to not only building disasters, but also various fields such as ocean vessels and evacuation within buildings, disaster safety through Web or mobile application services, and preventive actions for optimal disaster recovery.

VI. REFERENCES

[1] High-rise building fire safety standards development research, Korea fire safety Association **(2012)**.

[2] D. O. Kim, H. W. Mun, K. Y. Lee, D. W. Kim, H. J. Gil, H. K. Kim and Y. S. Chung, “The development of the escape light control system”, Proceedings of the Korean institute of illuminating and electrical installation engineers, vol. 23, no. 6 **(2009)**.

[3] J. S. Jang, I. C. Kong and D. H. Rie, “A Study for Optimal Evacuation Simulation by Artificial Intelligence Evacuation Guidance Application”, Journal of the Korean Society of Safety, vol. 28, no.3,**(2013),** pp. 118-122.

[4] S. W. Kim, “Sensor network research and development and commercialization practices”, Natural IT Industry Promotion Agency, no. 1325, **(2007),** pp. 1-14.

[5]https://www.raspberrypistarterkits.com/models/best-raspberry-pi-model/

[6]https://cdn-learn.adafruit.com/downloads/pdf/pir-passive-infrared-proximity-motion-sensor.pdf

[7]https://www.raspberrypispy.co.uk/2016/02/introducing-the-raspberry-pi-3-model-b/

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