RASPBERRY PI BASED A CYBER - DEFENSIVE INDUSTRIAL CONTROL SYSTEM WITH REDUNDANCY AND INTRUSION DETECTION

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ABSTRACT

The latest technology that can help to reduce catastrophic accidents caused by fire. The whole system and evaluated its effectiveness as well as scalability. With the improvement of sensor technology, the system will become more efficient and useful. If this system can be successfully integrated in every factories, then it is hoped that the loss of life and property due to the fire accidents will reduce remarkably and the country's economy will not be stumbled by such tragic accidents.

KEYWORDS: Raspberry Pi, VideoCore IV GPU, Broadcom BCM2835, Wi-Fi.

1. INTRODUCTION

Raspberry Pi is a credit-card sized computer manufactured and designed in the United Kingdom by the Raspberry Pi foundation with the intention of teaching basic computer science to school students and every other person interested in computer hardware, programming and DIY-Do-it Yourself projects. The Raspberry Pi is manufactured in three board configurations through licensed manufacturing deals with Newark element14 (Premier Farnell), RS Components and Egoman. These companies sell the Raspberry Pi online. Egoman produces a version for distribution solely in China and Taiwan, which can be distinguished from other Pis by their red coloring and lack of FCC/CE marks. The hardware is the same across all manufacture. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, VideoCore IV GPU and was originally shipped with 256 megabytes of RAM, later upgraded (Model B & Model B+) to 512 MB. It does not include a built-in hard disk or solid-state drive, but it uses an SD card for booting and persistent storage, with the Model B+ using a Micro SD. The Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Python as the main programming language, with support for BBC BASIC (via the RISC OS image or the Brandy Basic clone for Linux), C, Java and Perl.

2. EXISTING SYSTEM

This incident shows that many garment factories do not have proper fire prevention and rescue system. Hundreds of factories are vulnerable to fire broke out because the factories are very old and lack fire detection technology. Moreover, most of the factories do not have an automatic system to stop fuel

and electricity supply when fire breaks out, and it takes a lot of time for the fire service to reach the disaster spot.

3. LIMITATIONS

From the above made inferences of various papers, there are quite a few drawbacks of the already existing systems here as follows:**[1].**This incident shows that many garment factories do not have proper fire prevention and rescue system.[2].Hundreds of factories are vulnerable to fire broke out because the factories are very old and lack fire detection technology.[3].Most of the factories do not have an automatic system to stop fuel and electricity supply when fire breaks out, and it takes a lot of time for the fire service to reach the disaster spot.[4].An IOT based fire alarming system to help detect fire as soon as possible and save precious human lives.[5].This system used localization technique for finding the position and distance of fire.

4. LITERATURE SURVEY

[1]. Ethirajan Anbarasan, "Dhaka Bangladesh clothes factory fire kills more than 100," in BBC, 25 November 2012.
Description: As the IT industry enters into a new phase of technology innovations, business expansions there are a lot of things to worry about in the software design methodologies. Currently IT industry is witnessing major changes in the processor architecture such as multicore processor technology, and the demand for high performance. Today we have more computing power with affordable price. But the question arises is: Are we ready to exploit this power? We have a number of processors starting from dual core to several number of cores, how do we effectively utilize those? We have more CPUs than number of I/O channels, how can we deal with an application that needs to utilize CPU and IO? In this paper we are going to demonstrate with limited number of IO channel how effectively we can split a large file with high speed.

[2]SSM: Secure-Split-Merge Data Distribution in Cloud Infrastructure.
Description: This incident shows that many garment factories do not have proper fire prevention and rescue system. Hundreds of factories are vulnerable to fire broke out because the factories are very old and lack fire detection technology. Moreover, most of the factories do not have an automatic system to stop fuel and electricity supply when fire breaks out, and it takes a lot of time for the fire service to reach the disaster spot .In this perspective, a system to detect fire and alarm the employees before it breaks out is a crying need. In this paper, we designed an IOT based fire alarming system to help detect fire as soon as possible and save precious human lives. The system will use several sensors to detect any symptoms of fire. The sensors will be placed on proper places after doing surveys on the factory for its vulnerable places of fire. After choosing the best places for placing the sensors, the sensor will be activated. The data collected by sensors will be sent to Arduino microcontrollers placed on various places. The microcontroller will then process the data. All the microcontrollers will be controlled centrally by Raspberry Pi microcomputer. Intelligent algorithm is used to decide when to start alarm for fire. Besides, the system will stop gas and electricity supplies on sensing fire break out and will start firing suppression

system, like opening fire extinguishing water valves. At the same time the system will send SMS using GSM module to the nearby fire service station informing them of the incident. The system will also inform the location of the fire to the administrator using GPS module. Several types of sensors will be used, for example, temperature sensor, gas sensor, smoke sensor, flame sensor, etc.

[3] COBBS: Sowah, Robert, et al. - A Multicloud Architecture for Better Business Solutions.
Description: This is designed and implemented a fire detection system for vehicle using fuzzy logic. They used temperature, flame and smoke sensors for sensing fire. The system also can extinguish fire in 20 seconds and they used the air-conditioning system for extinguishing fire.

5. PROPOSED SYSTEM

The system includes gas sensor for detecting gas leakage and to actuate exhaust fan PIR sensor detects intrusion and activates camera to capture surveillance video. From the video key frames is detected using background subtraction algorithm and hallucinated by Singular Value Decomposition to obtain high resolution images. Face region is segmented from the key frames using Viola Jones algorithm. Recognition is done using multi key point descriptor. Fire detection is done using color and shape evaluation and fake fire is recognized using growth evaluation. Future work may include additional features like electronic device control, power management could be added to the home automation system. Additional sensors and actuators could be added to the system.

ADVANTAGES

[1]. This microcomputer is useful for small or home based businesses that run on a smaller budget than bigger companies for you are not required to purchase any special licenses from the Raspberry Pi Foundation to use their product or if you invent new technology that embeds the product.**[2].**Businesses can also save money on buying cooling systems that are required to cool servers.**[3].**The product does not require the user to have extensive programming experience since it is aimed for the younger generation to learn about programming. Python, the programming language that the Pi uses, is less complex than other languages available. **[4].**The product also gives you a lot of room to experiment and turn it into something else that is entirely different. **[5].**The SD cards on the board can be easily switched, which allows you to change the functions of the device without spending a lot of time re-installing the software. **[6].**This product makes it possible to build complex and effective products at a cheaper price.
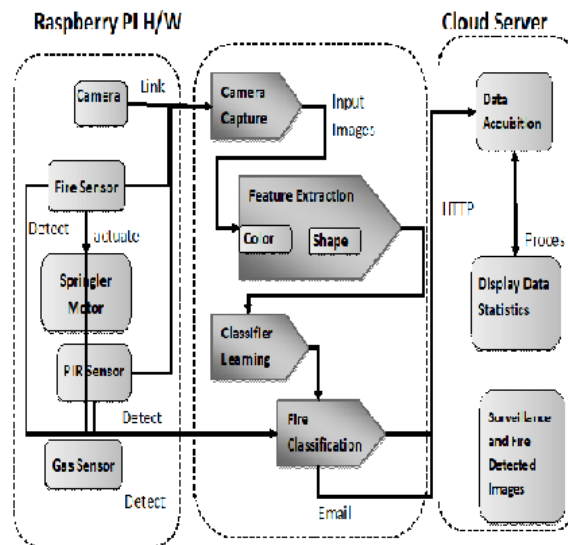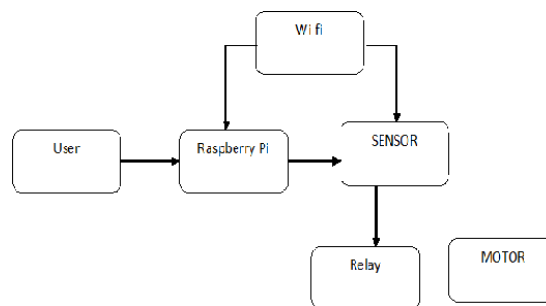
Fig. 1. Architecture Diagram

FEATURES

- The class model captures the static structure.
- The state model expresses the dynamic behaviour of objects.
- The use case model describes the requirements of the user.
- The implementation model shows the work units.
- The interaction model represents the message flows.

6. FLOWCHART

CONCLUSION&FUTURE ENHANCEMENT

The latest technology that can help to reduce catastrophic accidents caused by fire. The whole system and evaluated its effectiveness as well as scalability. With the improvement of sensor technology, the system will become more efficient and useful. If this system can be successfully integrated in every factories, then it is hoped that the loss of life and property due to the fire accidents will reduce remarkably and the country's economy will not be stumbled by such tragic accidents.

REFERENCES

[1]. Ethirajan Anbarasan, "Dhaka Bangladesh clothes factory fire kills more than 100," in BBC, 25 November 2012.

[2]. Oxfam, "31 die in Bangladesh factory fire as brands do too little, too late," in press.

[3]. Sowah, Robert, et al., "Design and implementation of a fire detection and control system for automobiles using fuzzy logic," in Proceedings of Industry Applications Society Annual Meeting, 2016.

[4]. Yu, Liyang, Neng Wang, and Xiaoqiao Meng "Real-time forest fire detection with wireless sensor networks," in Proceedings of International Conference on Wireless Communications, Networking and Mobile Computing, Vol. 2, 2005.

[5]. Chen, Thou-Ho, et al. "The smoke detection for early fire-alarming system base on video processing," in Proceedings of International Conference on Intelligent Information Hiding and Multimedia, 2006.

[6]. Gaikwad, K. M., et al., "Fire Monitoring and Control System," in Proceedings of International Research Journal of Engineering and Technology (IRJET), 2016.

[7]. Fuzi, Mohd Faris Mohd, et al., "HOME FADS: A dedicated fire alert detection system using ZigBee wireless network," in Proceedings of Control and System Graduate Research Colloquium (ICSGRC), 2014.

[8]. Kwon, Oh-Hyun, Sung-Min Cho, and Sun-Myung Hwang, "Design and implementation of fire detection system," in Proceedings of Advanced Software Engineering and Its Applications, 2008.

[9]. Islam, Taoufikul, Hafiz Abdur Rahman, and Minhaz Ahmed Syrus, "Fire detection system with indoor localization using ZigBee based wireless sensor network," in Proceedings of International Conference on Informatics, Electronics & Vision (ICIEV), 2015.

[10]. Trivedi, Kartik, and Ashish Kumar Srivastava, "An energy efficient framework for detection and monitoring of forest fire using mobile agent in wireless sensor networks," in Proceedings of International Conference on Computational Intelligence and Computing Research (ICCIC), 2014.

[11]. Dong, Wen-hui, Li Wang, Guang-zhi Yu, and Zhi-bin Mei, "Design of Wireless Automatic Fire Alarm System," in Proceedings of Procedia Engineering 135, 412-416, 2016.

[12]. Sun, Xiao-qian, and Ming-chun Luo, "Fire risk assessment for super high-rise buildings," in Proceedings of Procedia engineering 71, 492501, 2014.

[13]. Jing, Chen, and Fu Jingqi, "Fire Alarm System Based on Multi-Sensor Bayes Network," in Proceedings of Procedia Engineering 29, pp. 2551255