As per UGC guidelines an electronic bar code is provided to seure your paper

International Journal for Modern Trends in Science and Technology, 9(06): 61-65, 2023
Copyright © 2023International Journal for Modern Trends in Science and Technology
ISSN: 2455-3778 online
DOI: https://doi.org/10.46501/IJMTST0906009
Available online at: http://www.ijmtst.com/vol9issue06.html

IOT based Industry Protection and Controlling using ARM Controller

Lanka BhavyaKantham | D.Kishore

Department of Electronics and Communication Engineering, Aditya College of Engineering and Technology

To Cite this Article
Lanka BhavyaKantham and D.Kishore. IOT based Industry Protection and Controlling using ARM Controller. International Journal for Modern Trends in Science and Technology 2023, 9(06), pp. 61-65. https://doi.org/10.46501/IJMTST0906009

Article Info
Received: 06 May 2023; Accepted: 04 June 2023; Published: 06 June 2023.

ABSTRACT

IOT is crucial for protecting industries. The ARM STM32 microcontroller-based IOT industrial protection and controlling system was created to shield industries against losses brought on by unforeseen mishaps. Connecting various devices to the internet is what is meant by the phrase "internet of things." Along with losses, it lists fire incidents such furnace explosions, machine temperatures, weather conditions in industries like humidity levels, gas leaks, low lighting, and intelligent power management. The system implements this functionality using ARM STM32. In order to reduce industrial accidents and losses, the system makes use of temperature sensors, gas sensors, level sensors, and sensors to detect low lighting. The system is made up of alarm, LCD screen, light, and sensors. Data from the sensors is continuously scanned to record values and check for fire, gas leaks, and other problems before being transmitted online. The system's Wi-Fi module is what makes it possible to access the internet. By uploading the sensor data to a server and displaying it online through a business website, the industry may be controlled and watched remotely. The goal of this research is to intelligently lower the likelihood of accidents occurring in various sectors.

KEYWORDS:ARM, LCD display, Fire sensor, Gas sensor, Light sensor, Level Sensor, Thing Speak.

1. INTRODUCTION

The Internet of Things (IoT) is "a self-configuring and adaptive system consisting of networks of sensors and smart objects with the goal of connecting all things, including everyday and industrial objects, in such a way that makes them intelligent, programmable, and more capable of interacting with humans" [1],[2]. IoT will have the ability to connect nearly all components or portions of industrial infrastructures, smart medical telemonitoring systems, and smart transportation systems in the near future. It will also offer information exchange facilities to keep people and systems up to date [3],[4],[5]. Existing, virtually industrial systems were built with equipment that was highly weighted with instrumentation and connected by large wires, expensive deployed sensors, local system controllers, and wired systems that could not be upgraded or replaced because of their higher cost. But over the past 20 years, changes have been made to the way IP-based industrial systems are designed, and now IoT is a way to reduce future costs associated with industrial equipment, sensors, system controllers, and systems communication by sharing and transmitting data with other connected, similar objects that are a part of the IoT environment [6,7].

By integrating sensors, communication modules, and control systems into industrial equipment, IoT (Internet of Things) based industry protection employing ARM microcontroller enables real-time monitoring and management of the industrial processes.

The ARM microcontroller receives the data that the industrial equipment's installed sensors collect on numerous factors, including temperature, pressure, and vibration. The microprocessor evaluates the data and sets off the proper reactions, such as equipment shutdown if a crucial parameter rises above a safe level.

IoT-based industry protection systems can offer predictive maintenance in addition to real-time monitoring and control, allowing for the early identification of possible problems and minimizing downtime. The industry may benefit from higher productivity, efficiency, and cost reductions as a result.

2. RELATED WORK

In the 1940s, when computers were still in their development, they occasionally performed a single task but were often too massive to be referred to as "embedded." But over time, a combination of computer technology, solid-state devices, and conventional electromechanical sequences gave rise to the idea of programmable controllers [8]. The Apollo Guidance Computer, created by Charles Stark Draper at the MIT Instrumentation Laboratory, was the first clearly modern embedded system. The Apollo guidance computer was regarded as the most dangerous component when the project first started. This risk was raised by the use of the then-new monolithic integrated circuits, which were used to minimize the size and weight. The Automatics D-17 guidance computer for the Minuteman (missile), introduced in 1961, was the first mass-produced embedded system. To figure out the work produced by different researchers over the past twenty years, the literature related to the research issue has been evaluated over that time. There are numerous systems for remote monitoring and control that are intended to serve as platforms for commercial products or experimental investigations. It has been determined that practically all of the dispersed analysis is the following categories, which include several methods of internet-based observation using servers, GPRS modems, etc. GSM module SMS protocol use, either alone or in conjunction with internet technologies networks of wireless detectors Bluetooth, Wi-Fi, Zigbee, and RF are all used for wireless monitoring (radio frequency) [9]. Applications include those for home automation, security systems, bio-medical uses, agriculture, the environment, reservoirs, bridge health monitoring, and many more.Since these pioneering uses in the 1960s, the cost of embedded systems has decreased. Processing speed and functionality have both significantly increased.

The Intel 4004, for instance, was the first microprocessor and was used in calculators and other small systems, but it needed external memory and support chips.

Features up/down buttons or knobs on a tiny microcontroller that controls digital devices [10],[11]. Embedded systems were nearly universally used in electronic devices by the end of the 1980s, and this trend has persisted ever since.

3. PROPOSED METHOD

The block diagram of proposed system is shown in the figure.1 in which ARM is heart of the system. The ARM is used in the project to control all transfer signals among different devices. The proposed system sends the signal from different sensors, i.e. Temperature, Gas, Fire, LDR and Level sensor to the ARM. ARM then sends this data to the Wifi module, LCD and buzzer.

A temperature sensor is used to detect the temperature greater than threshold and then buzzer is activated automatically as notification. A gas sensor is used to detect the gas leakage in industry and a light is provided for giving alert notification. Fire sensor is used to detect any fire occurred in industry and fan is provided for cooling action and can also act as an exhaust if there is gas leakage. The LDR is a light detection sensor used to monitor and detect the light in the industry it is of day time and activated in night time. If the light is detected in daytime also then buzzer is activated and then displayed the data in LCD and think speak website. Similarly, level sensor is used to detect the water or any liquid level greater than the threshold value and the same controlling action can be take place for this condition also as light detection. The respective data is available LIVE on a Think speak website there by immediate action can be taken in each case.

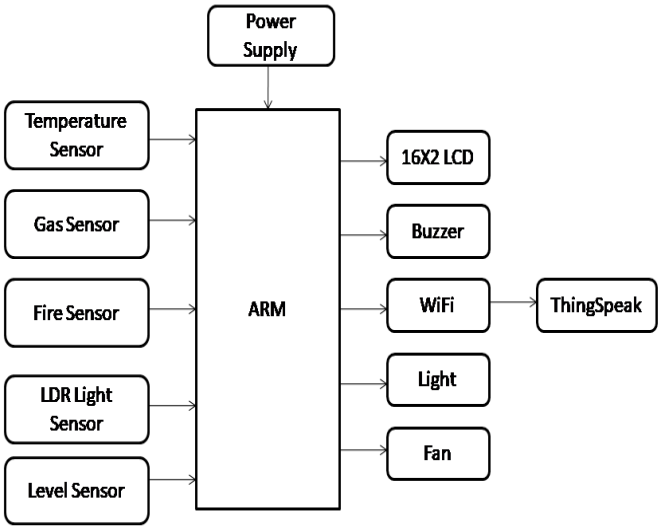


Figure 1: Block Diagram

ARM is programmed to turn ON the buzzer when the sensors detect parameters greater than a threshold value. At the same time, the LCD would display informative messages for each scenario. The WiFi technology is used to control the loads like Fan and Light in the building through Think Speak. The entire information of monitoring system continuously displayed in the 16X2 LCD. This system is userfriendly and easy handling technology such that it can be installed in houses and in small places.

STM32F103C8T6 ARM Microcontroller

The Blue Pill is a development board based on ST Microelectronics' STM32F103C9T6 microcontroller that has an ARM Cortex-M3 core that runs at 72MHz max. Software libraries are available that allow users to program the chip using the Arduino IDE. The Blue Pill is a 32-bit Arduino compatible development board that features the STM32F103C8T6, a member of the STM32 family of ARM Cortex-M3 core microcontrollers. This board aims to bring the 32-bit ARM core microcontrollers to the hobbyist market with the arduino style form factor.

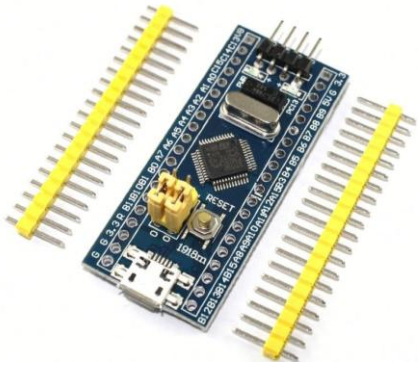


Figure 2: ARM Microcontroller

WiFi Module

A low-cost, Wi-Fi-enabled microcontroller module called the ESP8266 is suitable for a number of projects, including Internet of Things (IoT) gadgets, home automation, and wireless sensor networks. Since its 2014 release by Espressif Systems, it has gained popularity as a result of its simplicity of use and wide-ranging community support. The module has an integrated Wi-Fi radio and a potent 32-bit microprocessor, and it can be programmed in a variety of contexts and programming languages.

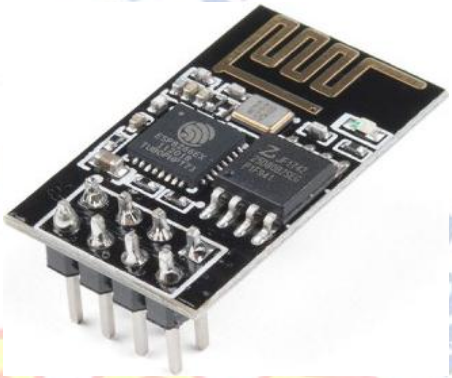


Figure 3: Wi-Fi Module

4. Results & Discussion

An IoT-based system for monitoring industrial settings in real-time, including temperature, humidity, chemical levels, gas leak detection, and smoke detection, is presented in this work. Remote monitoring is possible from any location in the world because to the ARM controller's server-like functionality. This system's inexpensive price and tiny size might help industrial settings avoid fire mishaps and other damages.

Figure 4: Project Kit

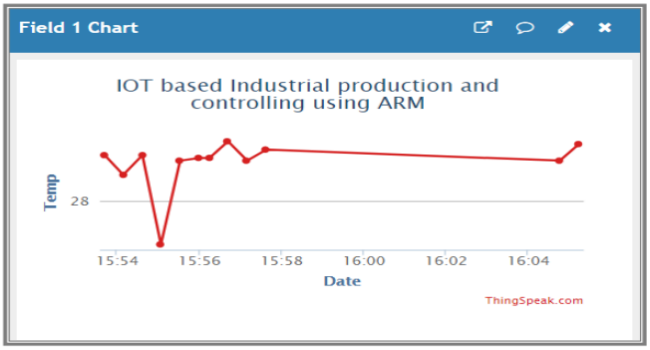


Figure 5: Temperature sensor values of LM35

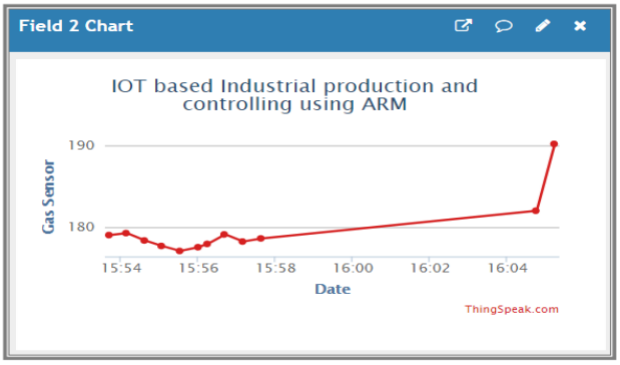
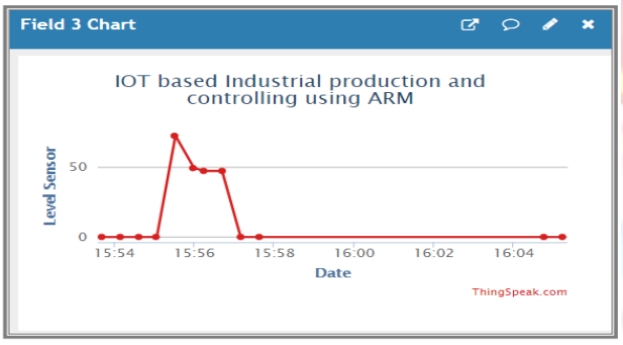


Figure 6: Gas sensor values stored in things speak web browser.



A

Figure 7: Level sensor values stored in things speak web browser.

5. FUTURE SCOPE AND CONCLUSION

An ARM microcontroller-based IoT-based industry protection system can offer an effective and efficient solution for guaranteeing the safety and security of industrial facilities, according to the system's findings. Real-time detection and response by the system to a variety of dangerous situations, including as fires, gas leaks, and unauthorized access, can help to avoid or reduce damage. Many interesting directions are remaining for further research around WSN in IoT environment. Using additional sensors all possible safety issues could be monitored such as dust, vibrations, fire etc. The other important data can be communicated through this system making it feasible where wired communication is a hindrance.

In future, a generic model for IoT system will be designed where numerous of devices will network in order to exchange information within secure channels. To overcome the security issues, a cryptography based security mechanism which implementation was significant in the protection of information while exchanging between several connected devices within the premises of IoT system.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

REFERENCES

[1] Internet of Things for monitoring the environmental parameters(2017), 2016 International Conference on Information Technology (InCITe) - The Next Generation IT Summit on the Theme - Internet of Things: Connect your Worlds, DOI: 10.1109/INCITE.2016.7857588

[2] P.RamBabu, C.Madhusudan, "Industrial Automation and Control System Using Can Protocol". International Journal & Magazine of Engineering, Technology, Management and Research, Volume No: 2 (2015), Issue No: 12 (December).

[3] IoT and SCADA: Complimentary technologies for Industry 4.0

[4] Lopez Research LLC, "Building Smarter Manufacturing With The IoT," 2014

[5] R., P., J. L, "Securing the Internet of Things, in Computer,: vol. 44, no. 9, pp. 51-58, Sept. 2011.

[6] ICON Labs, "Secure the Internet of Things," https://www.iconlabs.com/prod/internet-secure-things

[7] R.M et al., "Security in the Industrial Internet of Things," 2016

[8] Vishwajeet H. Bhide (2014) , "A Survey on the Smart Homes using Internet of Things (IoT) ", International Journal of Advanced Research in Computer Science and Management Studies (IJARCSMS), ISSN: 232 7782 (Online), Vol.2, Issue.12.

[9] MinalNikose, Pratibha Mishra, Avinash Agrawal, " A Review on Industrial Automation by Zigbee Based Wireless Remote Controller", International Journal of Scientific & Technology Research volume 3, issue 4, April 2014.

[10] Vinay sagarK ,Kusuma S (2015) , "Home Automation Using Internet of Things", International Research Journal of Engineering and Technology (IRJET),p-ISSN: 2395-0072 , Vol. 2 Issue. 3.

[11] Elizabeth Kadiyala, ShravyaMeda, RevathiBasani (2017), "Global industrial process monitoring through IoT using Raspberry pi", IEEE International Conference on Nextgen Electronic Technologies: Silicon to software (ICNETS2), DOI:10.1109/ICNETS2.2017.806794

International Journal for Modern Trends in Science and Technology
IJMTST