Detection and identification of unauthorized entry by using HC-05 and ESP8266 sensors and IoT

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Abstract

An industry is too big to manually maintain security measures, thus using certain high-tech electronic equipment may solve the many issues that an industry faces. Together, these cutting-edge electrical circuits are used to build the security system. The Industrial Security System offers every facility required for an Industry's complete security requirements. Typically, intruders, fire accidents, and improper attendance maintenance are the causes of issues in the industrial sector. An Unauthorized Entry Alarm, Fire Sensors, and Power Fault Detection Sensors are all part of this project. In order to design a low cost sensor based industrial security system, we have attempted to raise the degree of security by fusing new approaches and adding new concepts. In our day to day life or in industrial purpose security and automation is a prime concern. Industrial automation and security system design is growing nowadays. The designing of this security system is simple hardware circuit. It allows every user to use this wireless security system by using or combining fire detection, unauthorized person identity sensor, power fail sensor interfaced to microcontroller unit. Whenever threshold value crossed i.e if fire detected immediately sprinkler will on, if unauthorized entry identified or power failed immediately buzzer will on and data transfer to android app using HC-05 and data uploaded to web page using ESP8266.

Keywords: ESP8266, HC-05, IOT, low cost sensor, unauthorized entry.

INTRODUCTION

The most important one for any homeowner, whether they live in a single-family home or an apartment, is industrial security. You must make sure that your home is equipped with the ideal home security monitoring system if you want to have complete peace of mind whether you are at home or away from it. The GSM-based industrial security system may be used to offer protection for household, commercial, and industrial settings utilizing GSM technology. Security systems are specific technological tools used to identify intruders in a house or business. Motion detectors, LPG detectors, and smoke detectors are the fundamental parts of a home automation security system. It is more affordable and straightforward to maintain than any other security measure. When the user is away from home or industry, all the sensors are activated by switching on the Security system.

Whenever systems experiences a abnormal condition in the industry like any fire/smoke occurs in the home/industry and any intrusion into the home/industry the Security system alerts the security personnel as well as the owner of the industry by sending SMS alerts to the users of the home/industry. In the system along with security, industrial lighting is also activates based on the lighting available in the industry. The system operates with the help of sensors installed in this system.

Existing systems

1. Wired System,
2. RF Based Security System,
3. Web enabled Security System.

Proposed System

The proposed system uses Bluetooth module and IOT which enables us to know the security status of home/industry when we areaway from the home/industry.
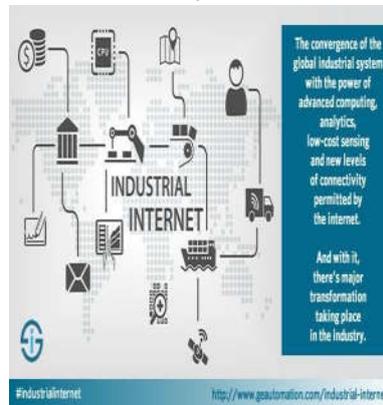

Fig .1. Industrial automation

LITERATURE REVIEW

In the existing system of industry the stores are being monitored with the help of Arduino boards and GSM technology where in Arduino boards acts as a microcontroller but not as a server. Here the set up cost is bit high whichmay pose problems for the installation. Hence inorder to overcome all these features Arduino boards or renes as microcontrollers are beingreplaced with the controller unit which is a latestversion and also which acts both as a microcontroller as well as server. Main featureof this methodology is its cheap cost forinstallation and multiple advantages. Here one can access as well as control the agriculture system in laptop, cell phone or a computer.

RELATED WORK

This research detects if any worker is entering inside the department or not. If some workers enters the working chamber ormachinery room the lights will be on and if no one is present in the working room the lightswill be off. If there is no one in the working chamber or in the plant then in that case if the lights or halogen bulb near the convey or belt or the boiler is continuously on so this wastage of electricity will cost heavy bills for the company. By using this system the wastage part can be easily overcome and more important than that this circuit is wireless and automatic on off lights so need for manual working for switching off the lights every time.
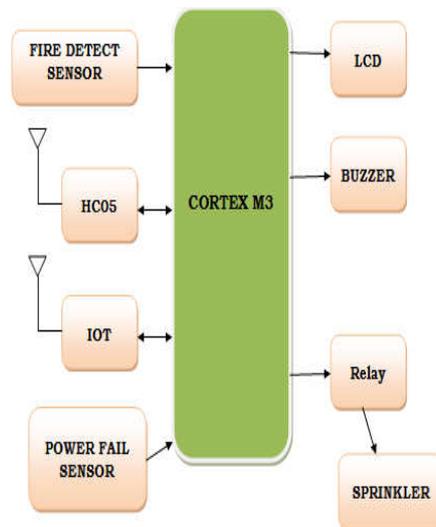
Fig .2. Proposed Block Diagram

CORTEX M3

The Cortex-M3 processor is specifically developed to enable partners to develop high performance low-cost platforms for a broad range of devices including microcontrollers, automotive body systems, industrial control systems and wireless networking and sensors. Arm Design Start provides the fastest, simplest, no-risk route to custom silicon success.

Design the most optimal System-On- Chip with a processor that has the perfect balance between area, performance and power with comprehensive system interfaces and integrated debug and trace components.

Develop solutions for a large variety of markets with a full-featured Armv7-M instruction set that has been proven across a broad set of embedded applications.

Capture a worldwide experienced developer base to accelerate adoption of new Cortex-M3 powered products and leverage the available extensive knowledge base to reduce support costs.

Achieve exceptional 32-bit performance with low dynamic power, delivering leading system energy efficiency due to integrated software controlled sleep modes, extensive clock gating and optional state retention. Powerful debug and non-intrusive real-timetrace

Comprehensive debug and trace featuresdramatically improve developer productivity. It is extremely efficient to develop embedded software with proper debug.

Memory Protection Unit (MPU)

Software reliability improves when eachmodule is allowed access only to specific areas of Memory required for it to operate. This protection prevents unexpected access that may overwrite critical data.

Integrated nested vectored interrupt controller (NVIC)

There is no need for a standaloneexternal interrupt controller. Interrupt handlingis taken care of by the NVIC removing the complexity of managing interrupts manually via the processor.

Thumb-2 code density

On average, the mix between 16bit and 32bit instructions yields a better code densitywhen compared to 8bit and 16bit architectures. This has significant advantages in terms of reduced memory requirements and maximizingthe usage of precious on-chip Flash memory.

BLUETOOTH

Bluetooth is a short-range radio link intended to replace the calble(s) connecting portable and/or fixed electronic devices. Key features are robustness, low complexity, low power and low cost [1]. There are already similar standards in this market, such as IrDA, HomeRF and IEEE 802.11 family. Bluetooth is designed to offer some unique advantages that none of the others can provide. For example, IrDA uses infrared as medium, so its range is limited to around 1 meter, and it requires a line-of-sight communication. In comparison, Bluetooth can operate at a range up to 10 meters, or even 100 meters with enhanced transmitters. RF signals goes through walls, so a Bluetooth network can span several rooms. Compared with HomeRF and IEEE 802.11 family, Bluetooth has much lower data rate and transmission range (10 meter). WhileHomeRF supports 1.6 ~ 10 Mbps data rate and IEEE 802.11a/b supports 54/11 Mbps, Bluetooth supports only 780 Kbps, whichcan be used for 721 kbps downstream and

57.6 kbps upstream asymmetric data transfer, or 432.6 kbps symmetric datatransfer. Both HomeRF and IEEE 802.11operates at 100 meter range, while Bluetoothoperates at up to 10 meter.

However, as a result of the lower data rate and transmission range, Bluetooth offers much lower cost per node (approximately 5 ~ 10% of HomeRF and IEEE 802.11). So it is more suitable for applications involving low data rate (dataand voice), small number of devices (8 at maximum), low power consumption and short range

(up to 10 meter), such as PC-to- peripheral networking, home networking, hidden computing, data synchronization (such as between PC and PDA), mobile phone devices, and future smart devices or entertainment equipment

SPDT

A relay is an electrically operated switchused to isolate one electrical circuit from another. In its simplest form, a relay consists ofa coil used as an electromagnet to open and close switches contacts. Since the two circuits are isolated from one another, a lower voltage circuit can be used to trip a relay, which will control a separate circuit that requires a higher voltage or amperage. Relays can be found inearly telephone exchange equipment, in industrial control circuits, in car audio systems, in automobiles, on water pumps, in high-power audio amplifiers and as protection devices.

The switch contacts on a relay can be "normally open" (NO) or "normally closed" (NC)-- that is, when the coil is at rest and not energized (no current flowing through it), the switch contacts are given the designation of being NO or NC. In an open circuit, no current flows, such as a wall light switch in your homein a position that the light is off. In a closed circuit, metal switch contacts touch each other tocomplete a circuit, and current flows, similar to turning a light switch to the "on" position. In the accompanying schematic diagram, points A and B connect to the coil. Points C and D connect to the switch.
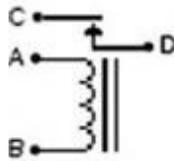
Fig.3. Relay connection

INTERNET OF THINGS

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT commandset firmware, meaning, you can simply hook thisup to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge,and ever growing, community.

Fig.4. Internet of things Interfacing

This module has a powerful enough on- board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front

and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces; it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

There is an almost limitless fountain of information available for the ESP8266, all of which has been provided by amazing community support. In the *Documents* section below you will find many resources to aid you in using the ESP8266, even instructions on how to transforming this module into an IoT (Internet of Things) solution.
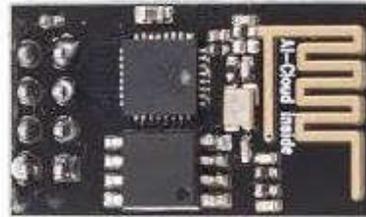

Fig6. ESP8266 IOT module

There seems to be three ways of using this module, in order of increasing complexity:

1. Sending it AT commands from a computer viaan USB to serial adapter. This is mostly useful for testing and setup.
2. Interfacing with cortex M3 or any other microcontroller and using this board as a peripheral.
3. Programming the module directly and use its GPIO pins to talk to your sensors, eliminatingthe need for a second controller.

RESULT ANALYSIS

The Internet of Things provides access to a broad range of embedded devices and web services. Thing Speak is an open data platform and API for the internet of Things that enables you to collect, store, analyze, visualize, and act on data from sensors or actuators, such as Cortex M3, Beagle Bone Black, and other hardware. For example, with Thing Speak you can create sensor-logging applications, location tracking applications, and a social network of things with status updates, so that you could have your homethermostat control itself based on your current location. The primary element of Thing Speak activity is the channel, which contains data fields, location fields, and a status field. After you create a

Thing Speak channel, you can write data to the channel, process and view the data with MATLAB® code, and react to the data withtweets and other alerts. The tycortex m3al ThingSpeak workflow lets you:

1. Create a Channel and collect data
2. Analyze and visualize the data
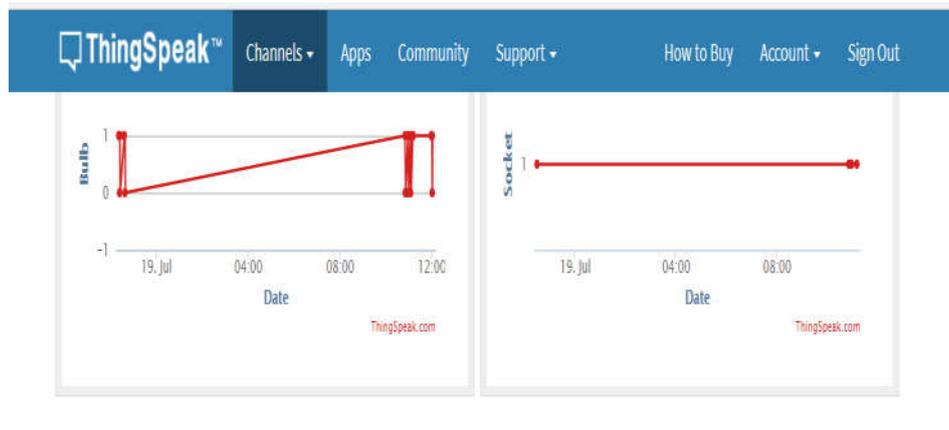3. Act on the data using any of several Apps.

Fig 7. Graphical representation of output

CONCLUSION

A detailed analysis of the systems now in use by businesses to monitor the security of their facilities was conducted. Industries were found to utilize separate systems for keeping an eye on things like staff attendance, intruder detection, fire detection, and bomb detection, among other security-related concerns. Managing and maintaining these systems may be time-consuming and occasionally expensive. Therefore, a suggested integrated system was made in which all the security systems previously described could be combined into a single system so that industries wouldn't have to handle individually. What technology may be employed to connect all systems together then becomes a question: The solution lay in embedded systems. Because CORTEX M3 MCU is the simplest and most flexible embedded system currently available, CORTEX M316F877A was chosen in which both digital and analogue inputs and outputs can be obtained. This MCU also has inbuilt Analog to Digital converters and Digital to Analog Convertors which is very useful for various sensors that have both analog and digital outputs which can be converted based on our requirements. The sensors which are being in the proposed systems give out analog outputs and using Schmitt Trigger they are converted to digitalsignals which are then fed into the digital ports of the CORTEX M3 MCU. To monitorall the sensor outputs and make them easily accessible by human these outputs are then required to be sent to a computer through RS232 port. This concludes that the present work was a success and it will provide a complete method for industrial security. It will ensure that all the hazards which are treated for the industrial security are proper taken care off. If we see the market penetration of this project, it will be quiteapt to say that a lot of industries will be able to integrate the product in their premises.This will in turn benefit not only theindustry but also create a flawless and transparent system.

References

[1]   Bates, M. P. (2018). Interfacing PIC Microcontrollers. Elsevier Science.

[2]   Instruments, T. (2017). "Datasheet max232." Online Document, 15.

[3]   Jayawardena, C. P. C. H. L. S. (08 January 2015). "A survey on the internet of things from an industrial marketperspective." IEEE, 2, 1660 – 1679.

[4]   Semiconductors, N. (2012). "74hc14; 74hct14 product data sheet.

[5]   Sengupta, A. G. A. M. S. (2014). "Micro-controlled automated smart tag- based attendance register (m. a. s. t. a. r)." International   Conference   onMicroelectronics, Circuits, and Systems.

[6]   Seyer, M. D. (2000). RS-232 made easy: connecting computers, printers, terminals, and modems. American Bell, Inc.

[7]   Xiong, C. Z. S. H. N. (08 April 2015). "Design and analysis of multimode-based anomaly intrusion

detection systems in industrial process automation." IEEE Transactions on Systems, Man, and Cybernetics: Systems (Volume: 45, Issue:10, Oct. 2015), 45, 1345 – 1360.

[8] Moummadi, K., Abidar, R., Medromi, H., "Generic model based on constraint programming and multi-agent system for M2M services and agricultural decision support," Multimedia Computing and Systems (ICMCS), 2011 International Conference on, vol., no., pp.1,6, 7-9 April 2011.

[9] Nerlove, Marc. "The Dynamics of Supply: Estimation of Farmers' Response to Price," Baltimore: Johns Hopkins Press, 1958.

[10] Li Jianting, Zhang Yingpeng, "Design and Accomplishment of the Real-Time Tracking System of Agricultural Products Logistics Process," EProduct EService and E-Entertainment (ICEEE), 2010 International Conference on, vol., no.,pp.1,4, 7-9 Nov. 2010.