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Internet of Things Based Global Industrial Process Monitoring and Controlling Through Wireless Communication

J.Geetha Ramani, R.Sangeetha, V.Ajith Kannan, S.Vishali

Abstract— **Internet of Things based global industrial process monitoring through wireless communication is based on IoT which is rapidly increasing technology. IoT is the network of physical objects or things embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data system which will automatically monitor the industrial applications and generate Alerts/Alarms or take intelligent decisions using concept of IoT. A secured and energy efficient wireless industrial automation system via credit card sized single board computer called raspberry pi. The work is to control the industrial devices, managing the power utilities. These are all done through Wi-Fi network with help of server pc. It will reduce the power usage and to alert the people about the critical situations in the industry. This can be done by using the corresponding sensors. The system will activate the alarm interfaced with the raspberry pi during the critical situations and motors were automated in which when the tank is full, motor will automatically stops the flow of the chemical and when the tank is full SMS is send to the user in the industry.**

Index Terms—**Communication, software, Alerts, Alarms, IoT.**

I. INTRODUCTION

Industrial monitoring has vital role in industrial area to monitor and control the industrial applications or equipments. Industrial monitoring is used to know dynamic condition of industrial devices or machines. Industrial monitoring is used to accomplish fast processing, minimize power consumption, to improve quality, lessen expensive systems and global management of industry. The advancement in Wireless technology continues to grow thus, eliminating the need for cables that ultimately allows cost efficient network deployments. Even it is documented that wirelessly connected assets are up to IOX less expensive than wired alternatives. Thus, in order to remotely monitor pipelines, natural gas 1eaks, equipment condition, and real-time reservoir status , the chemical industry is apparently lookingtowards WSN technologies. The WSN technologies deployed in environments involve sensors that gather important industrial data enabling.

II. EXISTING SYSTEM

Some of the system that failed prior to this system are

A. WIRELESS SENSOR NETWORK

This work presents a water quality monitoring system using wireless sensor network(WSN) technology and powered by solar panel. To monitor chemical tank in different level site and in real time, novel system architecture constituted by distributed sensor nodes and a base station is suggested. The nodes and base station is connected using WSN technology. Designed and implemented a prototype system using one node powered by solar cell and WSN technology. Data collected by various sensors in the node side such as level, Temperature, Gas, Light intensity is sent via WSN to the base station. This novel system has advantages such as low carbon emission, low power consumption, more flexible to deploy and so on.

B. REMOTE MONITORING OF INDUSTRIAL DEVICES USING CLOUD

The industrial Device Communicate to the DMS through OPC UA protocol.OPC UA protocol read and write the data to the device. Client Layer sends and receives Message to the Cloud. Client Layer is responsible for altering the message from Cloud and converting it to OPC UA standards. Cloud uses the IoT and the Web hosting services. Client Layer interacts with the IoT service and the Web hosting component hosts a REST ful web service. The REST Service polls for the message to be received from Cloud . It exposes three endpoint for READ and WRITE .The Mobile device acts as a Smart REST Client which also contains a User interface specifically designed to display the device**.**

III. PROPOSED SYSTEM

The Smoke and the Temperature produced by Chemical Tank produce the Hazardous effect and Harmful affect inside the Industry and outside the surrounding Enviroment. Increase in Temperature may damage the Chemical Tank Quality and reduce the flexibility and working speed of the Chemical Tank. Due to continuous Heating the Tank get overheated and start damaging. To avoid overheating cooler Fan ONs automatically when detect high Temperature. Chemical industrial operations involve a lifecycle of processes which are categorized into three major sectors subdivisions; upstream (exploration and production), midstream (storage and transportation), and downstream (refining and marketing). In the upstream sector the raw materials are searched and extracted. In the midstream sector the produced chemical is stored and then transported to the downstream sector for refining processes. In the downstream sector the raw materials are processed to a finished product.

J.Geetha Ramani, Professor**,** Department of ECE, SNS College of Technology,Coimbatore,India
R.Sangeetha, V.Ajith Kannan, S.Vishali, UG Student, Department of ECE, SNS College of Technology,Coimbatore,India

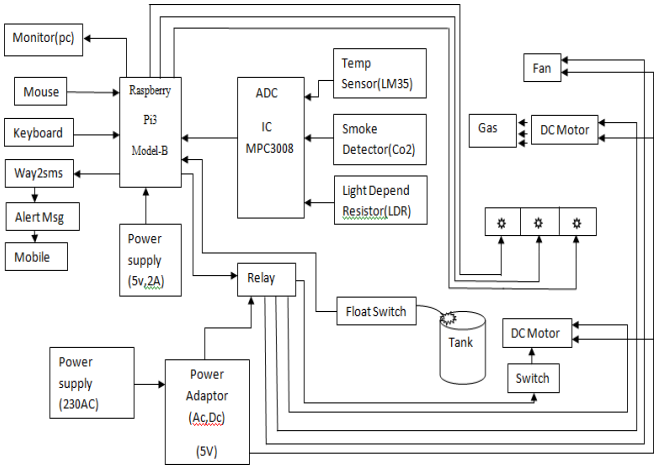


Fig:1 Block diagram

IV. HARDWARE DESCRIPTION

The hardware tools used are

A. *RASPBERRY PI*

The Raspberry Pi is a miniature marvel with a credit card sized, low cost but fully functional and programmable computer with modern high-definition multimedia capabilities. Raspberry-Pi computer can be expanded with modules, like adding a camera module or a touch screen module, to increase the scope of the device. Raspberry-Pi has Broadcom BCM2837, CPU 4*Arm Cortex-A53,1.2 GHz. GPU Broadcom Videocore IV.RAM 1GB LPDDR2(900 MHz). Networking 10/100 Ethernet, 2.4GHz 802.11n wireless. Bluetooth 4.1 Classic, Bluetooth Low Energy. Storage Micro SD. GPIO 40-pin header, populated. Ports HDMI, 3.5mm analogue audio-video jack, 4*USB 2.0, Ethernet, Camera Serial Interface(CSI), Display Serial Interface(DSI). The Raspberry Pi produce only an analog values.

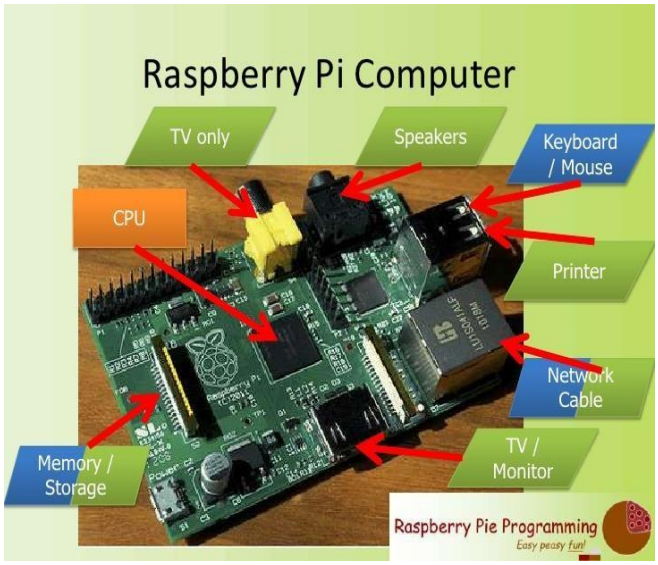


Fig:2 Raspberry pi

B. *SENSORS*

Sensor is an electronic component, module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics, frequency a computer processor. Sensors used are Temperature sensor, Gas sensor, LDR, Float switch.

1) *TEMPERATURE SENSOR*

When the temperature inside the tank increases by continuous working the cooler fan is ON automatically to reduce the heat inside the industry. Here LM35 Temperature sensor is used. LM35,the temperature can be measured more accurately than with a thermistor. It also possess low self heating and does not cause more than 0.1 °C temperature rise in still air. The operating temperature range is from -55°C to 150°C.

Fig:3 Temperature Sensor

2) *GAS SENSOR*

Gases like methane, LPG, CO2 are detected by using mq4 which is realised inside the industry and is controlled by motor ON. High Sensitivity, Detection Range is 100-10,000ppm iso -butane propane

C. *LDR*

LDR inside the industry is used to measure the light intensity in rooms and the lights are ON automatically according to the light intensity change. It has a high resistance because there are very few electrons that are free and able to move - the vast majority of the electrons are locked into the crystal lattice and unable to move. As light falls on the semiconductor, the light photons are absorbed by the semiconductor lattice and some of their energy is transferred to the electrons.

D. *FLOAT SWITCH*

During mixing of two chemical in a single tank Float switch is used to measure the chemical level that had already fixed. When the chemical mixture increases above the fixed level the inlet of the pipes is closed automatically by motor OFF to stop the flow. Water level sensor is an easy-to-use, cost-effective high level/drop recognition sensor, which is obtained by having a series of parallel wires exposed traces measured droplets/water volume in order to determine the water level.

Fig:3 Temperature Sensor

E. DC MOTOR

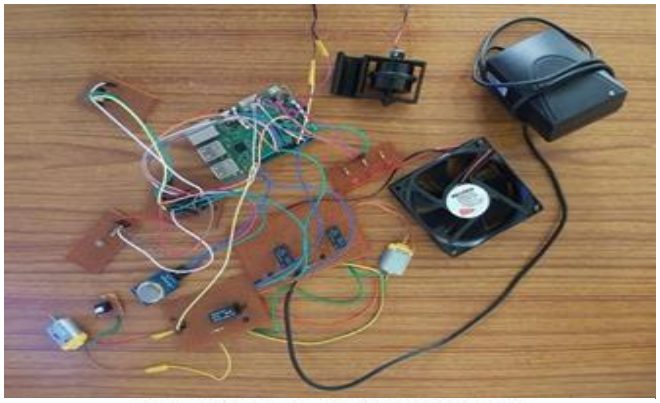
A DC motor is a class of rotary electrical machines that converts electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields

.Nearly all types of Dc motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in the motor.

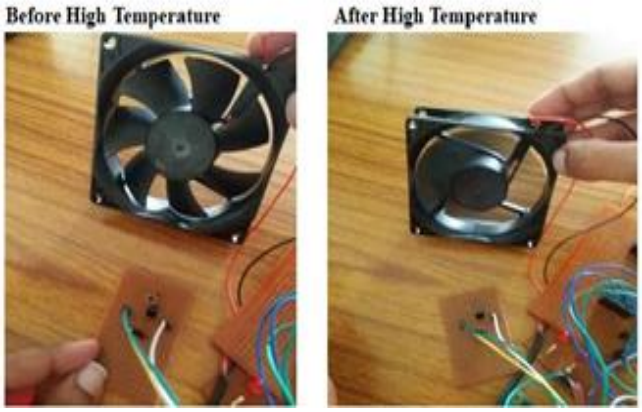
V. WORKING DESCRIPTION

Chemicals in Chemical Industries produce different types of Harmful effects which may affect the workers health, environment. To overcome such challenge in chemical industry a parameters are added to avoid High Temperature, Gas Leakage, Chemical Mixing Level in Chemical Tank and Light Intensity. Temperature and Float switch is inserted inside the Chemical Tank to check the Heat and liquid level inside the tank. Gas leakage and light inside the Industry is monitored. If there is any increase in the fixed value a message is send to the workers through Way2 SMS App using WiFi. Fan is ON automatically to reduce the Heat .To stop the liquid flow inside the chemical tank and to stop the Gas leakage the motor is ON or OFF accordingly. The LEDs will be automatically ON if there is any requirement of light. These setups are connected to Raspberry Pi 3 Model B though the sensors produce only an analog values an ADC converter is connected to the sensors and to Raspberry Pi to produce digital values.

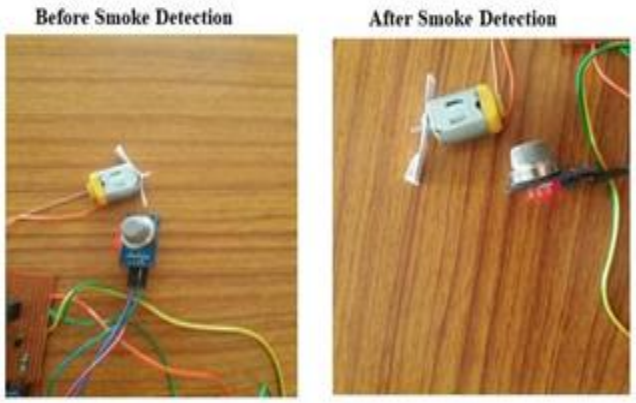
OUTPUT

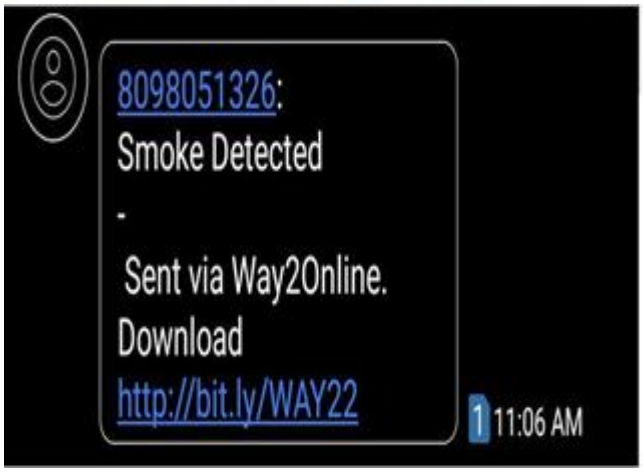


TEMPERATURE SENSOR RESULT

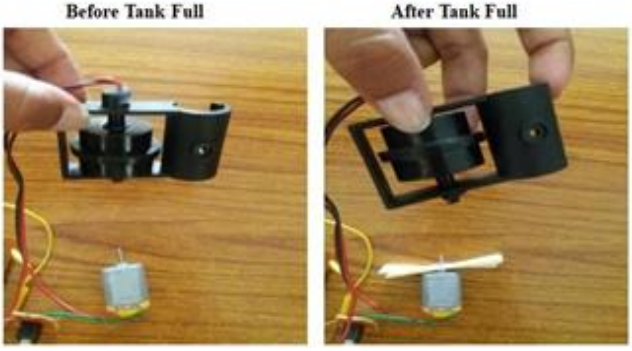


SMOKE DETECTOR RESULT





FLOAT SWITCH RESULT



VI. CONCLUSION AND FUTURE WORKS

The system introduces an IoT based industrial monitoring system by implementing industry standard protocols on IoT module, and data conversion mechanisms for different industrial applications. The processing part of system deals with large amount of data and communication protocols like wi-fi module. The same system can be used for monitoring different real time applications in industries as per there requirement. The proposed solution was tested on a limited number of physical devices. It was found that for physical industrial devices connected to network at real- time could be monitored and operated without any glitches. The case could be extended for a multiple number of industrial devices connected to the IoT hub. Consideration of performance, reliability, scalability should be high. The above approach for more number of devices communicating concurrently at real-time. Implementation of sensors in wide area over the machines and instruments. Control and Monitor circumstances by using concept of Artificial Intelligence. Implementing the sensors to household appliances and monitor and control with the help of Artificial Intelligence.

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