

Internet of things based industrial environment monitoring and control: a design approach

Alaa Abdulhady Jaber¹, Firas Khalil Ibrahim Al-Mousawi², Hayder Sabeeh Jasem³

¹Mechanical Engineering Department, University of Technology, Iraq

²Al-Mustansiriyah University, Iraq

³University of Technology, Iraq

Article Info

Article history:

Received Jan 15, 2019

Revised Jun 25, 2019

Accepted Jul 5, 2019

Keywords:

Blynk platform

Environment monitoring

Internet of things

NodeMCU

ABSTRACT

In this research an internet of things (IoT) system is designed for the purpose of industrial environment monitoring and control. The system is mainly composed of control and sensor units. Control unit has the responsibility of managing the received data from the sensor unit and then executing the developed control algorithm based on the measured parameters. NodeMCU development kit is used as the core of the control unit. The sensor unit contains gas and temperature sensors utilized for measuring the temperature and concentration of toxic gases in the monitored space. A buzzer has also been embedded in the sensor unit for alerting the occupants acoustically in the danger situations. If the monitored temperature gets higher or lower than the set levels, the air conditioning system will be automatically operated. Similarly, the fan (ventilation) system will be operated if the level of toxic gases becomes high. A mobile application, based on Blynk platform, is then developed to enable the wireless monitoring and control of the environment by the in charge people. In addition to the automatic and wireless control the manual control capability is considered in the developed IoT system.

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Corresponding Author:

Alaa Abdulhady Jaber,
Mechanical Engineering Department,
University of Technology,
Baghdad, Iraq.
Email: 20039@uotechnology.edu.iq

1. INTRODUCTION

Monitoring environmental parameters, such as temperature, humidity and the concentration of toxic gases, in residential or industrial medium is of great importance for keeping the occupants safe and comfortable. Many previously conducted researches have been focusing on developing different hardware and software configurations for environment monitoring and control. For instance, researchers have developed a wireless sensor network (WSN) system for environment monitoring in an instant coffee factory [1]. In this research a wireless sensor node composed of four layers and based on 8051-microcontroller from Analog Devices and a Spartan 3 FPGA from Xilinx have been constructed. Of these four layers there are two sensor layers; the first one is adopted to manage the water quality measurements and the second is to measure the emitted gas level. The measured parameters are pH, temperature of the waste water and the concentration level of number of emitted gases, such as carbon monoxide (CO), Sulphur dioxide (SO₂), and nitric oxide (NO). Another paper proposed an agricultural environment monitoring server system that integrates environmental and soil sensors, GPS module and CCTV into a device to collect information for monitoring the environment at crop plantations [2]. The system provides real-time environmental monitoring and various application services based on the collected information. In term of electrical power, the proposed server system was provided with a solar cell module as its power source,