LOW COST INTERNET-CONNECTED AIR-QUALITY AND WEATHER SURVEILLANCE SYSTEM

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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LOW COST INTERNET-CONNECTED AIR-QUALITY AND WEATHER SURVEILLANCE SYSTEM

ARAVINDRAN CHANDRA

This report is submitted in partial fulfillment of the requirements for the award of Bachelor of Electronic Engineering (Telecommunication Electronics) with Honours

Faculty of Electronic and Computer Engineering
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UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : Low Cost Internet-Connected Air-Quality and Weather Surveillance System

Sesi Pengajian : 1 3 / 1 4

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Special thanks to my family, project supervisor and friends

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ABSTRAK

Sistem Pemantauan Kualiti Udara dan Cuaca berkos rendah yang bersambung dengan Internet membolehkan keadaan udara dan cuaca semasa dipantau secara terperinci menggunakan peranti yang mempunyai sambungan Internet. Sistem ini menggunakan dua pengesan pengawasan cuaca seperti pengesan suhu dan pengesan kelembapan dan juga satu pengesan pengawasan kualiti udara. Data yang diperolehi akan dihantar kepada mikropengawal untuk tujuan paparan di LCD. Data tersebut juga akan dihantar secara tanpa wayar menggunakan Zigbee kepada pelayan dimana satu perisian akan digunakan untuk merekodkan bacaan kedalam pangkalan data. Data tersebut boleh dibaca menggunakan program yang dibangunkan menggunakan Visual Basic. Sebuah laman sesawang yang membolehkan segala data dapat diperiksa dari masa kesemasa dan juga untuk tujuan paparan bacaan telah direka. Sebarang peranti yang mempunyai sambungan ke Internet boleh mengakses laman sesawang tersebut dimana pemantauan kualiti udara dan cuaca boleh dilaksanakan secara berterusan.

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ABSTRACT

The Low Cost Internet-Connected Air-Quality and Weather Surveillance System enables current air-quality and weather condition to be monitored remotely using internet-connected devices. This system utilizes two weather surveillance sensors which are temperature sensor and humidity sensor, and also an air quality monitoring sensor. The data obtained by all the sensors will be sent to a microcontroller to be displayed on a Liquid Crystal Display (LCD). The data will also be wirelessly transmitted using ZigBee to a server where software is used to record and log the reading into a database. The respective data can be read using a program developed by using Visual Basic. A website that can access the database periodically and displays the reading is created. Any internet-connected device can access the website, allowing constant monitoring of air-quality and weather remotely.

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LIST OF ABBREVIATION

LCD	-	Liquid Crystal Display
PC	-	Personal Computer
PIC	-	Peripheral Interface Controller
ISM	-	Industrial, Scientific And Medical
RTS	-	Request To Send
ADC	-	Analog To Digital Converter
CLK	-	Clock
UART	-	Universal Asynchronous Receiver/Transmitter
USB	-	Universal Serial Bus
EEPROM	-	Electricity Erasable Programmable Read-Only Memory
RISC	-	Reduced Instruction Set Computer
DC	-	Direct Current
MHz	-	Mega Hertz
CPU	-	Central Processing Unit
PWM	-	Pulse Width Modulation
SSP	-	Synchronous Serial Port
PSP	-	Parallel Slave Port
BOR	-	Brown-Out Reset
VREF	-	Voltage Reference
ICSP	-	In-Circuit Serial Programming
WDT	-	Watchdog Timer
ICD	-	In-Circuit Debug
T/C	-	Thermocouple
RTD	-	Resistance Temperature Detector
RH	-	Relative Humidity

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HVAC	-	High Voltage Alternating Current
PCB	-	Printed Circuit Board
IC	-	Integrated Circuit
ICD	-	In Circuit Debugging Function
SPI	-	Serial Peripheral Interface
RC	-	Resistor / Capacitor
LP	-	Low Power
HS	-	High Speed
I/O	-	Input / Output
NTC	-	Negative Temperature Coefficient
LED	-	Light Emitting Diode
DB	-	Data Bus
R/W	-	Read / Write
IDE	-	Integrated Development Environment
WPAN	-	Wireless Personal Area Network
GPRS	-	*General Packet Radio Service*
GSM	-	Global System For Mobile Communications
CDMA	-	Code Division Multiple Access
WAN	-	Wide Area Network
USART	-	Universal Synchronous Asynchronous Receiver Transmitter
CPU	-	Central Processing Unit
ADC	-	Analog-To-Digital Converter
GUI	-	Graphical User Interface
COM	-	Component Object Model
WMI	-	Windows Management Instrumentation
RAM	-	Random-Access Memory
ROM	-	Read-Only Memory
MCLR	-	Master CLeaR
ppm	-	part per million
PCB	-	Printed Circuit Board
PPE	-	Personal Protection Equipment
UV	-	Ultra Violet

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AQI	-	Air Quality Index

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CHAPTER I

INTRODUCTION

1.1 Project Introduction

The Low Cost Internet-Connected Air-Quality and Weather Surveillance System enable data to be automatically uploaded in the internet. This system utilizes application of three various weather surveillance sensors such as temperature sensor, humidity sensor, and air quality monitoring sensor. The reading obtained by all the sensors will be sent to a microcontroller thus displaying the data on a Liquid Crystal Display (LCD). By implementing the ZigBee (wireless transmission medium) with range of 40m indoor/urban range and 120m line of sight outdoor, the data will also be sent to a Personal Computer (PC) where software is used to record and log the reading onto a database. The respective data can be read using Visual Basic. A website that accesses database periodically and display reading on the World Wide Web is created.

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