INTEGRATE BODY TEMPERATURE DETECTION SYSTEM WITH SMART TOUCH DEVICE

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A report submitted in partial fulfillment of the requirement for the awarded of the Degree of Bachelor of Computer Science (Software Engineering)

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APRIL 2010

ABSTRACT

Nowadays health is really important to everyone, since world has been attacked by lots of infected disease such as bird flu and H1N1. All people in the world are seeking the best solution to avoid that kind of infected disease. Integrate Body Temperature Detection System with Smart Touch Device is a system that is able to capture and store data from patients using sensor via wireless connection to the system. The patient needs to touch or put the finger on the Smart Touch Device. So, for in case of infected disease, the doctors or nurses no need to touch the patients. The sensor will connect to the system via wireless. This system is developed in order to help any hospital or health centre to manage the measurement of body temperature especially for Hospital Tengku Ampuan Afzan (HTAA). By developing this system, the management of hospital or health centre performs in systematic through its function requirements. The users of Integrate Body Temperature Detection System with Smart Touch Device are doctors and the patients of HTAA. This system was developed using Microsoft Visual Basic 6.0 and Microsoft Access 2003 as the database platform and the methodology used in developing this system is Extreme Programming (XP) and integrate with sensor.

ABSTRAK

Dunia hari ini dikejutkan dengan pelbagai masalah penyakit berjangkit seperti selesema burung dan selesema babi (H1N1). Semua lapisan masyarakat mencari pelbagai cara bagi mengelakkan penyakit berjangkit ini. *Integrate Body Temperature Detection System with Smart Touch Device* adalah satu sistem yang boleh menyukat dan meyimpan data pesakit menggunakan sensor dan dihubungi secara tanpa wayar dengan sistem. Pesakit perlu meletakkan jari atas *Spot Sensor*, jadi dengan ini masalah penyakit berjangkit akan dapat diatasi kerana doktor yang bertugas tidak perlu menyentuh pesakit kerana sensor tersebut berhubung secara tanpa wayar. Sistem ini di bangunkan bagi membantu mana-mana hospital dan pusat kesihatan untuk menguruskan penyukatan suhu badan terutamanya Hospital Tengku Ampuan Afzan (HTAA). Dengan mambangunkan sistem ini, pengurusan data bagi hospital dan pusat kesihatan dapat dijalankan secara sistematik melalui fungsi semua permintaan. Pengguna-pengguna *Integrate Body Temperature Detection System with Smart Touch Device* ialah doktor dan pesakit HTAA. Sistem ini dibangunkan menggunakan *Microsoft Visual Basic 6.0* dan *Microsoft Access 2003* bagi pangkalan data, serta metodologi yang digunakan dalam sistem ini ialah *Extreme Programming (XP)* dan berhubung dengan sensor.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	TITLE PAGE	
	SUPERVISOR'S DECLARATION	**i**
	STUDENT'S DECLARATION	**ii**
	DEDICATION	**iii**
	ACKNOWLEDGEMENT	**iv**
	ABSTRACT	**v**
	ABSTRAK	**vi**
	TABLE OF CONTENTS	**vii**
	LIST OF TABLES	**xi**
	LIST OF FIGURES	**xii**
	LIST OF APPENDICES	**xv**
	ABBREVIATIONS	**xvi**
1	**INTRODUCTION**	**1**
	1.1 Background	2
	1.2 Problem Statement	3
	1.3 Objective	3

1.4	Scope	4
1.5	Thesis Organization	4

2	**LITERATURE REVIEW**	5

2.1	Concept of the System	5
	2.1.1 Temperature	5
	2.1.2 Body Temperature Measurement	6
	2.1.3 Body Temperature	7
2.2	Existing System	8
	2.2.1 Ultrasonic Sensor Disk for Detecting Muscular Force	8
	2.2.2 Sensor Technologies for Monitoring Metabolic Activity in Single Cells	10
	2.2.3 Stereoscopic Vision System Using On Sensor Pre-Processing	12
	2.2.4 In-Situ Ion Mobility Spectrometer Sensor System for Detecting Gaseous VOCs in Unsaturated Soils	14
2.3	Technology	18
	2.3.1 Sensor	18
	2.3.2 Wireless	19
2.4	Methodology	21
	2.4.1 Rapid Application Development	21
	2.4.2 Extreme Programming	22

	2.4.3	Waterfall	23
	2.4.4	Agile	23
	2.4.5	Scrum	24

3	**METHODOLOGY**		**28**

3.1	Selected Project Method		28
	3.1.1	Exploration	30
	3.1.2	Planning	30
	3.1.3	Iteration	31
	3.1.4	Productionizing	31
	3.1.5	Maintenance	31
3.2	Proposed System		33
3.3	Software Approach		35
	3.3.1	Microsoft Visual Basic 6.0	35
	3.3.2	Microsoft Access 2003	36
3.4	Hardware Approach		37
	3.4.1	Smart Touch Device	37
3.4	Use Case		39
3.5	Entity-Relationship Diagram		41
3.6	Data Flow Diagram (DFD)		42
3.7	Data Dictionary		45
3.8	Hardware and Software Requirements		46

4	**IMPLEMENTATION**		**49**
	4.1	Test Result	49
		4.1.1 Capture Data	49
		4.1.2 Patient Review	52
		4.1.3 Graph	54
		4.14 Analyze Graph	56
5	**RESULT AND DISCUSSION**		**59**
	5.1	Result Analysis	59
	5.2	Project Constraint	61
		5.2.1 System Constraint	61
		5.2.2 Development Constraint	62
	5.3	Suggestion and Enhancement	63

6	**CONCLUSION**		**64**
	4.1	Summary	64
	4.2	Archive Objective	65
	4.3	Lesson Learnt	65
		4.3.1 Project Planning	66
		4.3.2 Time Management	66
		4.3.3 Communication Skills	66
REFERENCE			**67**
APPENDICE			**69**

LIST OF TABLES

TABLE NO.	TITLE	PAGE
2.0	Advantages and Disadvantages of Methodologies	25
3.0	Data Dictionary for Table Patient	45
3.1	Data Dictionary for Table MedicalInfo	45
3.2	Data Dictionary for Table BodyTemp	46
3.3	Data Dictionary for Table MeanTemp	46
3.4	Hardware Requirements	47
3.5	Software Requirements	48

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
2.0	Sensor suit with embedded sensor disks	8
2.1	Common Cell Metabolites and Relevant Sensing Methods	12
2.2	User Interface for the IMS Sensor System	16
2.3	Preliminary Spectra of TCE and PCE from the IMS	17
2.4	Sensor	18
2.5	Wireless	20
3.0	XP Life Cycle Phase	29
3.1	Architecture for Body Temperature Detection System	33
3.2	Flowchart of the proposed system	34

3.3	Smart Touch	37
3.4	Sensor Spot	38
3.5	Use case for Integrate Body Temperature Detection System with Smart Touch Device	39
3.6	Sequence Diagram for Integrate Body Temperature Detection System with Smart Touch Device	40
3.7	Entity-Relationship Diagram	41
3.8	Data Flow Diagram (DFD) for context diagram Integrate Body Temperature with Smart Touch Device	42
3.9	Data Flow Diagram for Level-0 of Integrate Body Temperature System with Smart Touch Device	44
4.0	Capture Data	50
4.1	Patient Review	52

4.2	Graph for Body Temperature	54
4.3	Graph Analysis for Body Temperature	56
4.4	Message Box of Graph Analysis for Body Temperature	57

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	Gantt Chart	66
B	Database Design	69
C	User Manual	73
D	Recommendation Letter	83

ABBREVIATIONS

CSF	- Critical Success Factor
GUI	- Graphical User Interface
IT	- Internet Technology
JAD	- Joint Application Design
RAD	- Rapid Application Development
SDLC/ SLC	- Systems Development Life Cycle
VB	- Visual Basic

CHAPTER 1

INTRODUCTION

The Integrate Body Temperature Detection System with Smart Touch Device is an integrate system with database that is able to capture and store patient data by using sensor. The patient will put their finger at the Smart Touch, and then the Smart Touch will integrate with the system. So, the doctor just needs to put the patient's finger on the Smart Touch. The Smart Touch will connect to the system via wireless.

This system is developed in order to help any hospital or health centre to manage the detection of body temperature especially for Hospital Tengku Ampuan Afzan. By developing this system, the management of hospital or health centre performs in systematic through its function requirements.

The Integrate Body Temperature Detection System with Smart Touch Device will help the doctors and nurses to get the data from patients easily and can avoid any problems such as the patients do not want to be disturbed and the patients are infected by dangerous disease. So, not only save the doctor's life it also saves others.

1.1 Background

Biofeedback is a non-medical process that involves measuring a subject's specific and quantifiable bodily functions such as blood pressure, heart rate, skin temperature, sweat gland activity, and muscle tension, conveying the information to the patient in real-time. This raises the patient's awareness and therefore the possibility of conscious control of those functions [1].

Biofeedback is a treatment technique in which people are trained to improve their health by using signals from their own bodies. Physical therapists use biofeedback to help stroke victims regain movement in paralyzed muscles. Psychologists use it to help tense and anxious clients learn to relax. Specialists in many different fields use biofeedback to help their patients cope with pain [2].

Biofeedback is a technique in which people are trained to improve their health by learning to control certain internal bodily processes that normally occur involuntarily, such as heart rate, blood pressure, muscle tension, and skin temperature [3]. These activities can be measured with electrodes and displayed on a monitor viewable by both the patient and their health care provider [3]. The monitor provides feedback to the participant about the internal workings of his or her body. Biofeedback is an effective therapy for many conditions, but it is primarily used to treat high blood pressure, tension headache, migraine headache, chronic pain, and urinary incontinence [3].

1.2 Problem Statement

The problems occur in detection body temperature is listed as followed:

1. Currently the body temperature of patients are measured manually, it is difficult in order to capture the data from patients.
2. Difficult to generate graph for patient's body temperature to see the rate.

1.3 Objective

The objectives by developing the Body Temperature Detection Using Smart Touch are followed:

1. To capture the data from patients using Smart Touch and connected to the database and system. The data from patient include the body temperature.
2. To generate graph for body temperature.

1.4 Scope

The Body Temperature Using Smart Touch is developed for Hospital Tengku Ampuan Afzan (HTAA). The users of this system are staffs of the HTAA. This system is able to measure the body temperature of patients. In addition, this system is able to capture and store data from patients using sensor and connected to the system. The system will automatically generate a graph for body temperature. The Body Temperature Detection Using Smart Touch is a standalone system that catches input from microchip of sensor and developed GUI using Microsoft Visual Basic 6.0 and Microsoft Visual Basic 6.0.

1.5 Thesis Organization

This thesis consists of four (6) chapters. Chapter 1 presents on introduction of this system. Meanwhile, Chapter 2 presents literature review. Chapter 3 elaborates on the methodology in the system, while Chapter 4 about implementation and Chapter 5 explained about Result and Discussion. The last chapter is Chapter 6 which explained about conclusion.

CHAPTER 2

LITERATURE REVIEW

2.1 Concept of the Systems

2.1.1 Temperature

Temperature is a measure of the average energy of motion, or kinetic energy, of particles in matter. When particles of matter, whether in solids, liquids, gases, or elementary plasmas, move faster or have greater mass, they carry more kinetic energy, and the material appears warmer than a material with slower or less massive particles. Kinetic energy, a concept of mechanics, is the product of mass and the square of a particle's velocity. In the context of thermodynamics, it is also referred to as thermal energy and the transfer of thermal energy is commonly referred to as heat. Heat always flows from regions of higher temperature to regions of lower temperature. [4].

2.1.2 Body Temperature Measurement

The body temperature can be measured in many locations on human body. The mouth, ear, armpit, or rectum is the most commonly used places. Temperature can also be measured on the forehead. The forehead is the ideal part of the body from which to take a temperature because it is supplied by the temporal artery, which receives blood through the aorta and the carotid artery, guaranteeing a considerable flow of blood. Moreover the forehead is the only part of the body close to the brain which is not covered in hair. [6]

Body temperature is only one way of monitoring your health. Besides temperature, other basic measurements to monitor your health include your pulse, breathing rate (respiration), and blood pressure. These basic measurements are called your vital signs. A fever can make people feel uncomfortable. To treat the discomfort of a fever, wear light clothing and use light blankets or other bedding. Fever-reducing medications can lower body temperature. Unless a fever is high enough to call a health professional, fever-reducing medication is not necessary but may help you feel more comfortable. When reading medical information that mentions body temperatures, note whether the temperature is listed as an oral or rectal temperature. Many books and other information about children's health list all body temperatures as rectal temperatures, because this method is preferred for measuring body temperature in a young child. If a body temperature is listed but neither oral nor rectal is specified, you may assume it is an oral temperature. [6].

2.1.3 Body Temperature

Normal human body temperature is a concept that depends upon the place in the body at which the measurement is made, and the time of day and level of activity of the body [7]. It is often measured on a thermometer. In a healthy adult it is normally 36.9°C/98.4°F [8]. Temperature is increased after eating, and psychological factors also influence body temperature. Body temperature is regulated by the hypothalamus in the brain. It serves as a thermostat, initiating physiological measures to lose or gain heat. Heat is conserved by constriction of the small arteries supplying blood to tiny capillaries near the surface of the skin. This reduces blood flow in the capillaries. To lose heat, small arteries dilate, increasing blood flow in the capillaries. Heat is lost from them. As sweat is produced the evaporation of the water from the sweat cools the skin.

2.2 Existing System

2.2.1 Ultrasonic Sensor Disk for Detecting Muscular Force

Ultrasonic Sensor Disk for Detecting Muscular Force is an innovative sensor suit which, just like a wet suit, can be conveniently put on by an operator to detect his or her motion intention by non-invasively monitoring his or her muscle conditions such as the shape, the stiffness and the density [9]. This sensor suit is made of sop and elastic fabrics embedded with arrays of MEMS sensors such as strain gauges, ultrasonic sensors and optical fiber sensors, to measure different kinds of human muscle conditions. Its superior performance was reported through experiments in which the sensor was applied for the assisting device for the disable. The ultrasonic sensor disk is one of the sensor disks embedding the sensor suit [9].

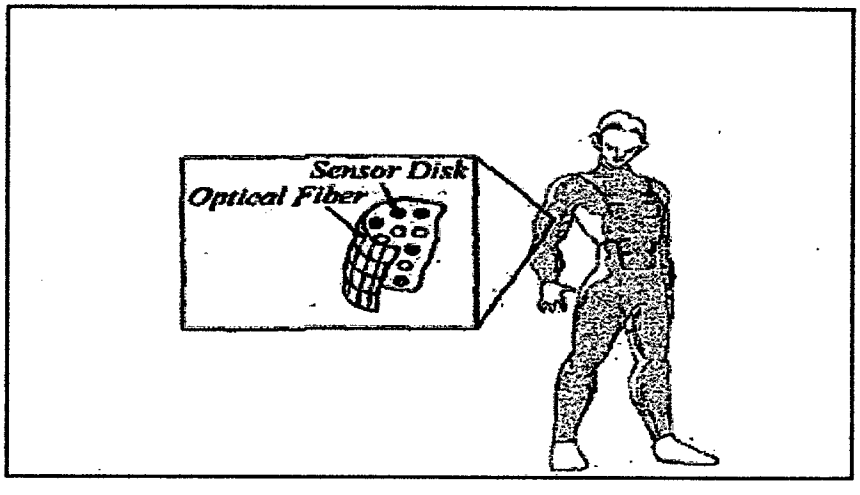

Figure 2.0: Sensor suit with embedded sensor disks

This sensor is based on an original principle and non-invasively detects activity of specify muscle. It is clear that the square of ultrasonic transmission speed is in proportion to the elasticity of the object and in inverse proportion to the density. It is estimated that the elasticity and density of the muscle increase or decrease as the muscle is energized. Then, it is hereby expected that the muscular activity is measured by the ultrasonic sensor. A sensing system that detects the motion intention of and loading on an operator plays a critical role in a human (operator)-machine system. An innovative haptic sensing system with a distributed sensing capacity is proposed based on the fact that human motion is actuated by certain muscles, and thus the shape, stiffness, elasticity and density of the muscles change accordingly with the motion and loading conditions of the human body. The sensor disks are made of strain gauges, ultrasonic sensors and other types of sensors for measuring stiffness, elasticity and density of the muscles [9]. The optical fibers embedded in the sensor suit will act as distributed sensors to capture the motion and the shape of the muscles.

In this way, different types of sensor are integrated in the sensor suit and the data from the entire different sensor are fused in order to achieve accurate and reliable measurement of the operator's motion. The sensor suit is not only easy to put on, but also auto adaptive to an individual operator. More importantly, it perfectly and comfortably fits the body of the operator without impeding motion against the operator. The disks are embedded in a cuff made of soft fabric that is wrapped around the operator's soft tissue surface. The stiffness of the muscle is detected by measuring the change in pressure on the sensor using a pair of strain gauge. This sensor is developed on basis of the characteristics of ultrasonic wave and muscular activities.

2.2.2 Sensor Technologies for Monitoring Metabolic Activity in Single Cells

A review of solid-state chemical and electrochemical sensors to detect metabolic activity at the extra cellular, single-cell level is presented in the context of the development of lab-on-a-chip research instrumentation. Metabolic processes in cells are briefly reviewed with the goal of quantifying the role of metabolites within the cell [10]. Sensors reviewed include both research and commercial devices that can non-invasively detect extra cellular metabolites, including oxygen, carbon dioxide, and glucose. Metabolic activity can also be sensed non-selectively by measuring pH gradients [10]. Performance metrics, such as sensitivity, sensor size, drift, time response, and sensing range, are included when available. Highly suitable sensor technologies for monitoring cellular metabolic activity include electrochemical sensors, scanning electrochemical microscopy, ion-sensitive field effect transistor sensors, and solid-state light-addressable potentiometric sensors. [10] Other less-suitable, but still potentially viable, solid-state sensing technologies are also reviewed briefly, including resonant chemical sensors (surface acoustic wave and quartz crystal microbalance), conductivity or impedance sensors, and sensors with multiple transduction stages. Specific biological applications which benefit from detection of extra cellular metabolic events at the single-cell level are discussed to provide context to the practical use of these sensor technologies; these applications include case studies of various diseases like cancer, diabetes, mitochondrial disorders and so on, cell and tissue differentiation; cell and tissue storage; cell life cycle and basic cellular processes; and developmental biology.