WORKER HEALTH MONITORING SYSTEM BASED ON SOCSO STANDARD

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ABSTRACT

Worker Health Monitoring System is a monitoring system that uses to monitor the patient in PERKESO Rehab Centre. The purpose of this project is to automate the training equipment that used to train the physical body of the patient and this reduce the human resources of PERKESO Company. It is also able to increase the accuracy of the measurement and provide a more detail output graph, and analysis can be easily made. This monitoring system is developed using 270 limit switch on each pin at the back of the equipment and read the rod location using Arduino Mega. Rod fill in the pin is provided with digital input 1, and these data are transferred to Visual Basic for displaying GUI interface. The result from this project is the rod location can be displayed in real time on the Visual Basic software. The visual basic are also able to record the transition time of rod automatically once the transition of the rod is completed. The output graph will be displayed once the patient has completed the test. The graph can be viewed in terms of each repetition and the total time used are displayed at the bottom of the graph. In conclusion, this project can improve the life of patients in PERKESO Rehab Centre and increase the functionality of training equipment.

ABSTRAK

Sistem Pemantauan Kesihatan Pekerja adalah satu sistem pemantauan yang digunakan untuk memantau pesakit di Pusat Rehab PERKESO. Tujuan projek ini adalah untuk mengautomasikan peralatan latihan yang digunakan untuk melatih tubuh fizikal pesakit dan ini dapat mengurangkan sumber manusia di Syarikat PERKESO. Ia juga dapat meningkatkan ketepatan pengukuran dan menyediakan lebih tepat output graf dan analisis dapat dibuat dengan mudah. Sistem pemantauan adalah menggunakan 270 suis had pada setiap pin di belakang peralatan dan menggunakan Mega Arduino untuk membaca lokasi rod. Rod yang dimasukkan dalam pin adalah input digit 1 dan data ini akan memindah ke Visual Basic untuk memaparkan dalam GUI interface. Hasil daripada projek ini ialah lokasi rod dapat dipaparkan masa-nyata pada Visual Basic. Visual Basic juga boleh merekodkan masa peralihan rod secara automatik sebaik sahaja peralihan rod itu selesai. Output graf akan memaparkan sekali pesakit telah berjaya menyelesaikan ujian. Di bahagian bawah graf juga boleh di lihat dari segi setiap pengulangan dan jumlah masa yang digunakan Kesimpulannya, projek ini dapat meningkatkan kehidupan pesakit dalam PERKESO Rehab Centre dan meningkatkan fungsi peralatan latihan.

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LIST OF ABBREVIATION

Acronym	Definition
PERKESO	Pertubuhan Keselamatan Sosial Malaysia
SOCSO	Social Security Organization
EKAM	External Knee Adduction Moment
ET	Elliptical Trainer
PT	Physical Therapy
IMU	Inertial Measurement Unit
UG	Universal Goniometer
ASSESSOR	Assistive Sensor Suite for Sports and Rehabilitation
IMIC	Innovative Movement Therapy in Childhood
GUI	Graphical User Interface
VR	Virtual Reality
PITS	Pediatric Interactive Therapy System
ISIS	Intelligent Schematic Input System
ARES	Advanced Routing and Editing Software
PCB	Printed Circuit Board
PC	Personal Computer

CHAPTER 1

INTRODUCTION

1.1 Background

PERKESO Rehabilitation Centre is a project that has started since the year 2008 and after one year of planning process and finally it becomes well-known in Malaysia. Their mission is to assist workers by testing their ability based on SOCSO standard and prevent early retirement from their job. To test their ability, a few training equipment was built in Rehab Centre to help them to train their physical body. Based on the occupation of the worker, different kind of test using a different type of equipment are provided for them and guide them to recovery. However, these equipment are functioned manually and requires the operator of PERKESO to observe the performance of the patient. Therefore, a monitoring system is used to replace the human to improve the functionality of the equipment.

1.2 Problem statement

There are a few problems arise from this equipment in which it produces inaccurate results. Many types of error will easily occur during human observation when they need to observe the shifting rod process thoroughly. The equipment in Rehab Centre need human intervention such as to start and stop the timing of observing the patient task. Nevertheless, this equipment also requires a lot of human effort due to a large amount of training equipment. In my opinion, the human resources should be saved and use it for other more important matter. Moreover, these equipment are lack of information that use to display their performances.

1.3 Objectives

The aim of this project is to provide an autonomous system for PERKESO Company and reduce their work and further enhance the accuracy of the equipment. Therefore, the objectives of the project are listed below:

i) To save human resources and to replace the original equipment with an automated system.
ii) To calculate the average transition time of rod between zones.
iii) To improve the accuracy of the equipment and avoid human error.

1.4 Scope of project

This project is focusing more on increasing the functionality of the original equipment by using a hardware prototype and Visual Basic as the software medium. *Arduino* is used to connect both hardware prototype and Visual Basic to process the output.

Secondly, this project only focuses on how to display the current 15-rod position on Visual Basic and display error when patient transfer the rod to the wrong position.

Lastly, this project also adds time transition of shifting rod process. This transition time will calculate for one repetition and calculate its average time. The average time will

be compared with the time that is set by SOCSO standard and determine the status of the patient.

1.5 Significance of project

The aim of this project is to help Rehab Centre to save their human resources and enable them to focus on other important tasks. Instead of using human resources, everything is autonomous by using Visual Basic through Arduino platforms and this system is a real-time recording system. The patient can use this equipment to their ability anytime without the help of the worker of PERKESO. This real-time system has greatly increases the accuracy up to 0.1 seconds of recording the transition time of the shifting rod process, Visual Basic also display the graphical output, which is easier to compare between the transitions of each rod process. These time transition of the rod is undeniable proof for the operator of PERKESO to know the ability of the patient. With these advantages, the system is not only fast and accurate, but it also improves the efficiency of PERKESO Company.

1.6 Thesis outline

Chapter 1 presents the introduction of the project. A simple explanation of this project will be written here. It also includes the background, problem statement, objectives, scope of the project and the thesis outline of the project.

Chapter 2 presents the basic theory of shift register, Arduino and also Visual Basic. The theory will include on how to display information on Visual Basic and how to connect all of this hardware through Arduino platform. Each of the theory will be proven by doing a literature review and further improvement from it.

Chapter 3 presents the methodology part of the project. Flow chart of the project and procedure will be presented in this chapter along with a description.

Chapter 4 presents the result and discussion of the project. Analysis of project will be clearly explained in this section.

Chapter 5 presents the conclusion of this project. The summary of the result and analysis will be discussed here. The future improvement of the project also involved in this chapter.

CHAPTER 2

LITERATURE REVIEW

This chapter will briefly discuss all the related research of several Rehab Centre and how they improve the life of the patients. Database of the current project is also included in the literature review.

2.1 Database in PERKESO

2.1.1 Work rehabilitation

Work rehabilitation is a structured program of improving physical strength of condition exercise and functional task either with real or simulated job activities. They provide a transition between acute care and return to work while addressing the safety issues, physical tolerance, work behavior and abilities.

They accept most of the patient with a condition such as traumatic injuries of the hand, upper limb, lower limb or spine injuries. They also accept repetitive strain injuries or back pain or any other work related injuries that require rehabilitation for returning to work.

They provide services such as pain management, work capacity such function capacity evaluation, cognitive function evaluation, and work simulated evaluation.

Firstly, they analyze the job or occupation by identifying risk factor and provide a recommendation for changes to the physical layout of the workstation. Next, they organized a return to work program by identifying or modifying tasks and come out with a suitable plan to facilitate a smooth and timely return to work. They also provide work injury prevention services by educating their employees to help them to understand their responsibilities for prevention of work injuries. Lastly, they also provide work counselling by identifying employee work interests as well as their strength and weakness.

2.1.2 Type of training test

Table 2.1 shows the type of test which taken from PERKESO Rehab Centre. There are many different types that did not include into the table since it is out of the scope. Table 2.2 above show the repetition and time limit; each test has a different time limit and repetition due to the distance of the panel to panel.

Table 2.1 Type of test and position of rod transition

Position Test	Start		End	
	Panel	Start	Panel	End
Axial Rotation	6	B	4	B
Crouching	2	C	3	C
Kneeling to standing to kneeling	2	C	3	B
Kneeling upper level reach	2	B	3	B
Standing horizontal reach	1	B	4	B
Upper level reach	2	A	3	A