SENSORY THERAPEUTIC DEVICE FOR AUTISTIC CHILDREN

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SENSORY THERAPEUTIC DEVICE FOR AUTISTIC CHILDREN

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for Bachelor of Electronics Engineering Technology (Industrial Electronics) With Honours

by

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This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) With Honours. The member of the supervisory is as follow:

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ABSTRAK

Gangguan spektrum autisme (ASD) adalah gangguan seumur hidup yang mempengaruhi bagaimana orang berkomunikasi dengan orang lain, reaksi sosial, dan tingkah laku berulang dari segi aktiviti dan mungkin dikaitkan dengan masalah lain seperti kecacatan intelektual atau masalah kesihatan. Oleh itu, projek ini adalah kajian tentang "Peranti Terapi Sensori untuk Kanak-kanak Autistik" dimana ia akan membantu kanak-kanak autistik mempelajari pengetahuan asas dan memperkuat kemahiran deria. Objektif projek ini adalah untuk merancang prototaip alat terapi sensori yang dapat membantu ahli terapi pekerjaan dalam pekerjaan mereka untuk membantu kanak-kanak autisme, untuk membangunkan alat yang dapat memperkuat kemahiran deria kanak-kanak autisme dan membina LED dalam rangkaian yang dapat bantu kanak-kanak autistik untuk mempelajari pengetahuan asas mengenai warna. Alat terapi sensori menggunakan Arduino Uno sebagai mikrokontroler untuk mengawal input dan output. Input adalah butang tekan untuk membantu kemahiran menyentuh mereka, outputnya adalah pembesar suara untuk kemahiran mendengar dan LED untuk kemahiran melihat. Peranti terapi ini akan membantu kanak-kanak autis menekan butang mengikut urutan warna LED yang hidup serta rentak suara yang kedengaran.

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ABSTRACT

Autism spectrum disorder (ASD) is lifelong disorders that affect how people communicate with others, social reactions, and repetitive behaviour in terms of activity and may be associated with other issues such as an intellectual disability or health problems. Therefore, this project synopsis about "Sensory Therapeutic Device for Autistic Children" that it will assist the autistic children to learn the basic knowledge and reinforce the sensory skill. The objective of this project is to design a prototype of a sensory therapeutic device that can help occupational therapist in their work to help autism children, to develop a device that can reinforce the sensory skill of autism children and construct a LED in the circuit that can help autistic children to learn the basic knowledge of colour. The sensory therapeutic device used an Arduino Uno as a microcontroller to control the input and output. The input which a push button is to assist their touching skill, meanwhile the output is a speaker for listening skill and LED for sighting skill. This therapy device will help autistic children pressing buttons according to the sequence of LED colour appear and the beat of sound that can be heard.

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DEDICATION

This appreciation is dedicated to the person who helps me during my time of finishing this Final Year Project. Firstly, I would like to thank my beloved parents and my family for always giving me support. Besides, thanks to my supervisor, lectures, friends who were given their ideas, information, guidance, and support behind me.

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LIST OF SYMBOLS

V	-	Voltage
A	-	Ampere
W	-	Watt

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LIST OF ABBREVIATIONS

NASOM	National Autism Society Malaysia
ASD	Autism Spectrum Disorder
LED	Light Emitting Diode
NO	Normally Open
NC	Normally Close
BDP	Bachelor's Degree Project

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Autism spectrum disorder is a child symptom can occur in various form from mild, moderate, and severe. Autism is a lifelong disorder that affects children in terms of difficulty interacting and communicating with others. It can also cause autism children to behave repetitive movements and activities, become uncontrollable emotions at the change in everyday routine, and have an abnormal response to a certain situation.

Signs of autism can be shown in the early 12 months such as some babies do not babble by age 1. Other children may grow up in social skills and normal language in a temporary time but begin to regress when autism appears. It is called regressive autism. Children with autism may be sensitive to touch sense, certain smells, colours, extreme temperatures, and loud noise.

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Children with autism can be helped by starting therapy at an early age and it will help children with autism improve their skills. The therapy can be performed by parents or teachers to help them behave in action, music therapy, learn basic knowledge, and helping them learn how to communicate with people. For instance, communicate with your child during the daily activities, create opportunities for children to interact with others, hide a favourite toy so your child will approach you and ask for it.

Therefore, this project focuses to design and develop the device of therapy sensory device to assist the autism children. This device is implanted on autistic children who have been categorized into several classes. The design and development based on three important criteria which are sense of touch, sense of sight and sense of hearing. This therapy device will help autism children pressing buttons according to the sequence of LED colour is on and the beat of sound. As a child with ASD has a strong memory, this device is very helpful in giving a positive impact where they can apply in daily lives.

1.2 Problem Statement

The method of therapy for children with autism is to help them behave in action, music therapy, learn basic knowledge, and helping them learn how to communicate with people. It is a basic therapy for them used worldwide. Nowadays, technology has advanced in a device such as a tablet or virtual reality. It can develop the device in learning the alphabet very easily to autistic children. The device also will add visuals with listening skills and touching skills through the interactive keypad.

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The problem that may acquire to the autism children is children with autism often repeated behaviour in terms of moving the body over and over and focusing on one or two things only. Children with autism may have sensory disturbance problems to the sense of touch, sense of sight, and sense of hearing. Autism children may have a problem in the ability to interpret information, learning, and understanding something. Therefore, the project support autism children that may have a problem in terms of attraction, sensory, and cognitive.

1.3 Objectives

After the problem statement have been determined, the project object can be made as follows.

1. To design a prototype of a sensory therapeutic device that can help occupational therapists in their work to help autistic children.
2. To develop a device that can help autistic children to learn the basic knowledge of colour by using the push button, LED, LCD, and speaker.

1.4 Scope of Research

This project will be testing at the National Autism Society Malaysia (NASOM). The function of this project is to help the autism children in learning basic knowledge of colours and object very easily. The device also will add audio to help with listening skills and touching skills through the push button. The scope of this project will target several issues based on this objective of this project. Below is the list of scope:

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1. Develop and design the device not too big and easy to use by autistic children.
2. Programmed the Arduino with the input button for touching skill.
3. Programmed the Arduino with the output speaker for listening skill and LED for sighting skill.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter is to study the literature review from the previous research. It is necessary to find the article and journal that related to the project because understanding is needed to finish this project. This chapter is the idea on the previous study on project of autism spectrum disorder (ASD).

2.2 Autism Spectrum Disorder (ASD)

Autism spectrum disorder (ASD) are lifelong disorders that affect how people communicate with others, social reactions, and repetitive behaviour in terms of activity and may be associated with other issues such as intellectual disability or health problems. It occurs in children between 1-2 people in 1000 and 4 times more frequently in children. These symptoms usually occur before the 3-year-old. People with autism may have a sensory disorder to sound, touch, colour learning and need lifelong support.

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2.3 Severity Level of Autism

Autism spectrum disorder (ASD) is defined as having continual lack in social communication and social interaction. The present Diagnostic and Statistical Manual of Mental Disorders 5 (DSM 5) has divided into three varying degrees severity levels of