UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Microcontroller-based Remote Control Speed for Ceiling Fan

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Automaion and Robotics) with Honours.

by

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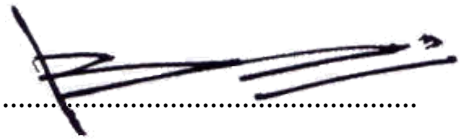

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I hereby, declared this report entitled Microcontroller-based Remote Control Speed for Ceiling Fan is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Industrial Automaion and Robotics) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Penyelidikan ini memfokuskan pada masalah mendasar, terutama yang berlaku terutamanya dalam kehidupan seharian di rumah. Biasanya, ia dilakukan secara manual untuk menghidupkan dan menukar kelajuan kipas yang diperlukan oleh pengguna. Maksudnya, dengan sentuhan fizikal, ini tidak memberi masalah kepada seseorang yang masih muda, tetapi perkara seperti ini sukar bagi mereka bagi seseorang yang sudah tua kerana pengatur kelajuannya cukup tinggi dan jauh. Kelajuan Kawalan Jauh Mikrokontroler Kipas Siling ini direka untuk digunakan di rumah atau di tempat kerja untuk memudahkan pengguna menukar kelajuan kipas tanpa mengganggu kerja mereka saat ini, sambil memberikan hasil yang sama dengan kaedah penukaran yang berbeza. NodeMCU ESP8266 dikuasakan oleh peranti ini dan Arduino berfungsi secara automatik mengikut pemasa yang ditetapkan oleh pengguna. Kaedah yang digunakan dalam projek ini adalah menggunakan telefon android untuk mengawal dan mengubah kelajuan kipas, yang akan menghantar isyarat ke NodeMCU ESP8266 ketika pengguna menekan butang mula pada telefon mereka, yang kemudian akan mengarahkan Arduino untuk menyampaikan kawalan voltan ke motor kipas. Pembangunan projek ini akan mengurangkan pergerakan pengguna dan tidak perlu pergi jauh untuk mengubah kelajuan kipas. Oleh itu, pembangunan projek ini akan membantu mengatur kelajuan kipas dengan cara yang lebih maju, sejajar dengan perkembangan ir4.0 yang pesat.

ABSTRACT

This research focuses on fundamental problems, especially those that occur especially in daily life at home. Usually, it is done manually to turn on and change the fan speed required by the user. That is, with physical touch, this does not pose a problem to someone who is still young, but things like this are difficult for them for someone who is old because the speed regulator is quite high and far. This Ceiling Fan Microcontroller Remote Speed is designed for use at home or at work to make it easier for users to change fan speeds without interrupting their current work, while providing the same results with different conversion methods. The NodeMCU ESP8266 is powered by this device and the Arduino works automatically according to the timer set by the user. The method used in this project is to use an android phone to control and change the fan speed, which will send a signal to the NodeMCU ESP8266 when the user presses the start button on their phone, which will then direct the Arduino to deliver voltage control to the fan motor. The development of this project will reduce the movement of users and there is no need to go far to change the fan speed. Therefore, the development of this project will help regulate the fan speed in a more advanced way, in line with the rapid development of ir4.0.

DEDICATION

To my beloved parents Mr. Mansor Bin Mat Isa and Mrs. Peridah Binti Bakar, for their support and prayers. My supervisor, Dr. Mohd Badril Bin Nor Shah, is fully appreciated for advising and assisting with this project.

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LIST OF SYMBOLS

A, a	-	Amphere, amp
RPM	-	Revolution Per Minute
CM	-	Centimeter
V	-	Voltage
1	-	Length
m	-	Mass
N	-	Rotational velocity
P	-	Pressure
x	-	Displacement
z	-	Height
T	-	Torque
q	-	Angle
V	-	Velocity

LIST OF ABBREVIATIONS

IDE	Integrated Development Environment
I/O	Input/Output
PWM	Pulse Width Modulation
AC	Alternating Current
DC	Direct Current
IR	Infrared
OLED	Organic Light Emitting Dode
UART	Universal Asynchronous Receiver Transmitter
SCL	Serial Clock
SDA	Serial Data
PIR	Pyroelectric Infrared Detectors
NO	Normally Open
NC	Normally Close
COM	Common

CHAPTER 1

INTRODUCTION

1.1 Project Background

A ceiling fan is a mechanical ventilator mounted on a room or roof, usually powered by electricity, suspended from the ceiling of the room, which uses spinning blades placed in the middle to circulate air. The purpose of fan action is to efficiently cool people by injecting slow motion into a room's otherwise still, hot air. Fans do not reduce air temperature, like air conditioning devices, but produce a wind chill effect through sweat evaporation in the summer. In fact, they heat up the air slightly because of the waste heat from the motor and the friction between the moving air. Fans use significantly less energy than air conditioning, as the cooling air is thermodynamically expensive. Similarly, a ceiling ventilator can also be used to reduce the stratification of warm air in a room, forcing it to affect the sensations and thermostat readings of both occupants, thus improving the climate control's energy efficiency.

The way a ceiling fan is operated depends on its manufacturer, fashion, and the period in which it was produced. Working strategies incorporate, pull-chain, pull-cord control, variable-speed control, wall-mounted control, Remote Wireless Command. Recent years have seen remote controls becoming an inexpensive alternative to power ceiling fans. The remote handheld transmits infrared signals to a fan-installed receiver unit, which interprets and acts on the signals.

For speed control, a few method of voltage are always be used, such as resistive/rheostat control, capasitor control, DIAC/TRIAC-based control and transformer control.

1.2 Problem statement

It will be convenience to user if the fan can be converted to remoted controlled type without replace to high end type. A ceiling fan with remote control is quite expensive, therefore by providing the speed regulator that can be controlled remotely, the low end ceiling fan can be converted in remote controlled type.

1.3 Objectives

The aims of this project are:

a) To develop circuit based on NodeMCU and Arduino it could wirelessly monitor the speed of a ceiling fan.

b) To design algorithm that can control ceiling fan speed based on signal from remote control.

c) To verify the efficacy of the designed circuit and algorithm.

1.4 Scope of Project

The scope of the project briefly outlined the limits of this project where it focuses on single phase induction motors, microcontroller programming with

Arduio IDE, simulation and developing the hardware prototype. The specifics of the scope of the project are clarified as:

a) **Single Phase Induction Motors**

This type of motor is commonly used in ceiling fan since it is cheap and easy to control. Thus in this project, a microcontroller-based speed control for ceiling fan will be developd based on this type of motor.

b) **Arduino IDE**

Arduino IDE software will be used to write program code for this project The program uploading, data collection and performance monitoring of the microcontroller also will be done by using this software.

c) **Proteus 8**

To facilitate the development of the device, the developed circuit and algortihm will be simulated virtually by using Proteus 8 software.

d) **Hardware**

To verify the efficiency of the designed circuit and algorithm, a hardware prototype is developed.