THE DEVELOPMENT OF MINI GANTRY

by

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DECLARATION SHEET

I hereby declare that my Final Year Project Thesis is the result of my research work under supervision of Melaty binti Amirruddin. All literature sources used for the writing of this thesis have been adequately referenced.

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APPROVAL AND DECLARATION SHEET

This project report titled development of a charge controller using Microcontroller was prepared and submitted by Mohd Azli bin Mohammad Bahrun (Matric Number:081071296) and has been found satisfactory in term of scope, quality and presentation as partial fulfillment of the requirement for the Bachelor of Engineering (Electronic Industrial Engineering) in University Malaysia Perlis (UniMAP).

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MEREKACIPTA MESIN PENGANGKAT BEBAN

ABSTRAK

Sebuah mesin pengangkat beban ini selalu digunakan dalam industri ringan dan industri berat. Sebagai contoh industri elektronik dan industri mengangkat kontena di pelabuhan. Mesin ini digunakan untuk memudahkan pekerja memindahkan barang dari satu tempat ke tempat yang lain. Kelebihan mesin pengangkat beban ini ialah ia dapat memudahkan pekerja untuk mengangkat barang yang berat ataupun ringan dengan lebih cepat dan bijaksana. Selain itu, ia juga dapat mengurangkan tenaga pekerja dan menjamin keselamatan pekerja. Projek ini terbahagi kepada 2 bahagian utama, iaitu perisian dan perkakasan. Bahagian perkakasan mesin pengangkat beban terdiri daripada aluminiun plat, sporket, rantai, tali, dan bering. Bahagian perisian pula terdiri daripada mikro pengawal jenis PIC 16F877, skrin LCD, pengesan objek, bekalan kuasa 12V, motor arus terus dan suis sesentuh. Program yang digunakan untuk mesin pengangkat beban berfungsi ialah bahasa C. Ciri-ciri utama dalam projek ini menggunakan PIC mikro pengawal untuk 2-dof mesin pengangkat beban yang kecil. Kedudukan pengiraan mekanisma mesin pengangkat beban telah dilakukan. Kemudian, pengukuran nilai sebenar dan parameter sudut masukan dibandingkan. Pengiraan lebih lanjut dilakukan untuk menghasilkan bentuk masukkan perintah untuk mengurangkan ketidakseimbangan getaran. Pembangunan mesin pengangkat beban mini ini menggunakan mikro pengawal PIC telah berjaya dilaksanakan dan memberikan pengetahuan asas tentang operasi mesin pengangkat beban di beberapa keadaan industri.

DESIGN THE DEVELOPMENT OF MINI GANTRY

ABSTRACT

The mini gantry is often used in small industries and big industries. For example, the electronics industry and raise the container port industry. It is used for workers to work conveniently to move the loads from one place to another place. The main advantage of mini gantry is it can reduce workers' energy consumption because the mini gantry can help to lift the heavy and smalls load quickly and intelligently. Besides that, the mini gantry can improve the work safety and reducing labors. The project is divided into two main parts which are hardware part and software part. The hardware components comprise of aluminums plate, sprocket, chains, ropes, and bearing. The software tools are the Programmable Integrated Control (PIC) 16F877 microcontroller type, Liquid Crystal Display (LCD) screen, sensor infrared distance, power supply 12V, direct current (DC) motor and limit switch. The main feature in this project is using PIC micro-controller for small gantry 2-dof. The program used in PIC 16F877 microcontroller is C program. The position calculations of gantry mechanism have been performed. Then, the actual measurements of positions and angle input parameters are compared. Further calculations are performed to generate the input shape commands to reduce unbalanced vibrations. The development of mini gantry using PIC Microcontroller was successfully implemented and provides principal knowledge about the mini gantry operation at several conditions of industries.

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PWM	Pulse-Width Modulation
Vout	output voltage
PCB	printed circuit board
SMPS	Switched Mode Power Supply
'η'	efficiency
msf	load with factor safety
D	diode
DC	Direct Current
AC	Alternating Current
PIC	programmable Integrated Circuit
ω	Angular velocity
V	voltage
Gnd	ground
F	frequency
T	Tension
P	Power
Rpm	rotate per minute
τ	torque
Pr	Basic power