INFRARED COLLISION AVOIDANCE MOBILE ROBOT

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INFRARED COLLISION AVOIDANCE MOBILE ROBOT

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 Puan Nur Adyani Bt. Mohd Affendi. 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 Infrared Collision Avoidance Mobile Robot was prepared and submitted by Jasrin Medeh (Matric Number: 071090248) and has been found satisfactory in terms and scope, quality and presentation as partial fulfillment of the requirement for the Bachelor of Engineering (Electrical System Engineering) in University Malaysia Perlis (UniMAP).

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ROBOT BERGERAK INFRAMERAH ANTI-PERLANGGARAN

ABSTRAK

Penderia merupakan salah satu alat penting dalam rekacipta robotik. Terdapat pelbagai jenis penderia yang mana digunakan untuk melaksanakan tugas-tugas tertentu melalui pelbagai teknik pengukuran, serta pelbagai cara untuk berhubung dengan litar kawalan. Secara umumnya, terdapat dua kategori penderia, iaitu penderia aktif dan penderia pasif. Dalam aplikasi robot bergerak, penderia digunakan bagi membantu robot mengenalpasti keadaan persekitarannya. Salah satu keupayaan yang mesti dimiliki oleh robot bergerak ialah keupayaan untuk mengelak dari berlanggar dengan halangan. Projek ini adalah untuk mencipta robot dengan sistem anti-perlanggaran. Penderia inframerah (IR) IR01A digunakan bagi tujuan ini. Penderia inframerah merupakan salah satu penderia yang tergolong dalam kategori penderia aktif. Beberapa penderia IR01A akan dipasang pada sisi keliling robot bergerak tersebut dan akan dihubungkan bersama ke litar kawalan yang mana akan memberitahu robot tersebut bahawa terdapat ‘sesuatu di luar sana’, dan kemudiannya mengarahkan robot untuk mengelakkan perlanggaran. Cip PIC16F877A digunakan sebagai pengawal mikro pada litar kawalan dan bahasa pengaturcaraan C digunakan sebagai bahasa pemasangan PIC tersebut. Hasil projek ini ialah dengan voltan maksimum 4.15 V dibekalkan pada penderia inframerah tersebut, robot bergerak dapat mengesan dan mengelak halangan yang diletakkan pada jarak 10 cm di hadapannya.

INFRARED COLLISION AVOIDANCE MOBILE ROBOT

ABSTRACT

Sensors nowadays are one of the main parts in the development of robot. There are many types of sensors which usually used to accomplish different function by applying different measurement techniques, and using different interfaces to a controller. Basically, there are two categories of sensors, which are active and passive sensors. In mobile robot application, sensors are used to help the mobile robot identify its surroundings. One of the ability that mobile robot must have is ability to avoid from collide with any obstacles around it. This project is about to develop a mobile robot with the collision avoidance system. To do this, the IR01A infrared (IR) sensor is used. IR sensor is one type of sensor which is including in active sensors category. Several IR01A sensors mounted around the periphery of this mobile robot and linked together to a control circuit which can tell the robot that 'something is out there', and direct to robot to divert against collision. The PIC16F877A chip is used as the microcontroller in the control circuit and C language is used as the assembly code for the PIC. The outcome of this project is with maximum voltage of 4.15 V supplied to the IR sensor, the mobile robot able to detect and avoid the obstacles positioned at 10 cm in front of it.

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N. T. S.	Not to scale
CPU	Central Processing Unit
CAD	Computer Aided Design
PCB	Printed Circuit Board
PIC	Programmable Interface Controller
GND	Ground (electrical connection)
GPS	Global Positioning System
IR	Infrared
RF	Radio Frequency
VR	Speed of right wheel
VL	Speed of left wheel
DC	Direct Current
t	time (sec)
θ	angle (degree, °)
Ø	vector element of angle
L	the Lagrangian
K	Kinetic Energy (Joule, J)
P	Potential Energy (Joule, J)
ω	omega or angular velocity
m	mass (kg)
g	gravitational acceleration (ms^{-2})
h	height (m)
$\dot{v}$	vector element of velocity
cm	centimeter