

**DESIGN A GATE CONTROLLER MODULE FOR
THYRISTOR**

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**SCHOOL OF ELECTRICAL SYSTEMS ENGINEERING
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DESIGN A GATE CONTROLLER MODULE FOR THYRISTOR

by

MUHAMMAD LUTFI BIN CHE WAHAB

Report submitted in partial fulfillment
of the requirements for the degree
of Bachelor of Engineering



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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 Mr Tunku Muhammad Nizar Bin Tunku Mansur. All literature sources used for the writing of this thesis have been adequately referenced.

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APPROVAL AND DECLARATION

This project report titled Design A Gate Controller Module For Thyristor was prepared and submitted by Muhammad Lutfi Bin Che Wahab (Matrix Number : 081070596) and has been found satisfactory in terms 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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REKAAN *GATE* KAWALAN MODUL UNTUK PENERUS TERKAWAL SILIKON

ABSTRAK

Projek ini merupakan projek berasaskan sebuah perisian dan pelaksanaan perkakasan. Projek ini memerlukan rekaan kepada kawalan modul untuk Thyristor untuk sistem pembelajaran. Projek ini juga meliputi penjelasan dari tatacara keadaan operasi dan gerbang litar parameter termasuk sudut kelambatan dan penangguhan masa 'turn-on' dan 'turn-off' fasa. Rekabentuk litar akan mencari bentuk gelombang penukar penerus setengah gelombang terkawal, penukar penerus gelombang-penuh dan 'AC-AC converter'. Jadi, akan kelihatan bentuk gelombang berbeza apabila menggunakan pengawal modul ini. Gerbang Penerus Terkawal Silikon SCR boleh mengukur beberapa parameter nilai yang berbeza sudut begitu cepat dan begitu mudah untuk proses pembelajaran. Litar kawalan direka bentuk menggunakan perisian PSIM dan perisian Orcad dan mengandungi beberapa sub-litar seperti litar kawalan utama SCR dan litar penukar. Sudut tembakan dikawal dengan mengubah voltan arus terus (AT) rujukan yang dibandingkan dengan isyarat voltan gergaji yang dihasilkan oleh litar penjana tanjakan sebelum ianya dijadikan masukkan kepada *gate* penerus terkawal silikon. Voltan arus ulang alik (AU) sinusoid dibekalkan kepada litar penerus penghubung penuh. Untuk memastikan operasi SCR, simulasi dijalankan menggunakan perisian Psim. Akhir sekali, litar-litar tersebut dibangunkan dan keputusan eksperimen dibandingkan dengan keputusan simulasi.

DESIGN A GATE CONTROLLER MODULE FOR THYRISTOR

ABSTRACT

The project is a software and hardware based .This project is about to design a gate controller module for Thyristors for teaching purpose and also includes the explanations of the settings of operation condition and gate circuit parameters including firing angle and time delay of turn-on and turn-off pulses. The circuit design to find the waveform the controlled half-wave rectifier converter, full-wave rectifier converter and the AC-AC converter. The Thyristor gate controller (SCR) can measure of some parameters for different value of angle so fast and so easy for teaching reason. The control circuit is designed using Psim Software and OrCad and consists of multiple sub circuits such as SCR circuit main controller and transformer circuit. The firing angle is control by adjusting reference direct current (DC) voltage which is compared with a saw tooth voltage from a ramp generator circuit before it is feed into the gate of Thyristors. A sinusoidal alternating current (AC) voltage is supplied to the full bridge rectifier circuit. To verify the operation of a SCR circuit, a simulation is performed using Psim software. Lastly, the circuit was developed and the experimental results are compared with the simulation results.

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