ADVERTISEMENT RUNNING LIGHT

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SUPERVISORY VERIFICATION

"I/We hereby certify that I have read and understood the following project thesis. To my/our opinion, this thesis is sufficient in terms of scope and quality to archive partial fulfillment of the requirements of for the Degree of Bachelor in Electronic Engineering (Industrial Electronic)."

Signature: 

Name of Supervisor 1: FAUZI BIN MOHD. JOHAR

Date: 15-05-06.

Signature: .....

Name of Supervisor 2: .....

Date: .....

ADVERSTISEMENT RUNNING LIGHT

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This Report Is Submitted In Partial Fulfillment of Requirements For the Bachelor Degree of Electronic Engineering (Industrial Electronic)

Fakulti Kejuruteraan Elektronik Dan Kejuruteraan Komputer

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"Saya akui laporan ini adalah hasil kerja saya sendiri kecuali ringkasan dan petikan yang tiap-tiap satunya telah saya jelaskan sumbernya."

Tandatangan : .....

Nama Penulis : CHONG WAI YUNG

Tarikh : 30 APRIL 2006

DEDICATION

This report is dedicated to all my loved, and the God above.

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My beloved, who kept me through it all,

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ABSTRACT

This project presents the design and implementation of a prototyped stand-alone photovoltaic power system that is conceived to cater to the operations of an automatic outdoor or indoor lighting scheme. Preliminary loads include dc compact LED light for various application including garden lighting, road side lighting and interior house decoration. Due to the non-critical load, a basic regulation process suffices. To achieve this, the system uses a built-in regulator. The balance-of-system is realized with the utilization of a specially devices solar power center. It comprises a photovoltaic charge controller and low-voltage load disconnection circuit. The former deice regulates the flow rate of electricity from the photovoltaic module to the battery and the load. This combined with the latter will function to maximize the battery's service life and ultimately the system. A load switch coupled to a timer circuit and a battery low-voltage warning indicator from the final pieces of whole system. Charge controller will connected to PIC Microcontroller to program lightning pattern color under the rainbow. A linear constant current circuit will provide variable regulation current to maximize load lighting. Simulation, experimentation and the finale of hardware implementation will be included to verify the practically and feasibility of this project. From this initiative, simple power generation via photovoltaic technology can be utilized for the benefits of masses. This system requires very low maintenances and can be erected in the urban or rural for hassle free outdoor lighting or indoor lighting. With environment in mind, this small step will be significant milestone for the gradual change towards renewable energy resources.

ABSTRAK

Projek ini melibatkan rekabentuk dan implementasi sebuah prototaip bagi sistem *photovoltaic* yang bebas. Sistem ini direka khas untuk penggunaan lampu luar yang mempunyai ciri automatik. Jenis pelampuan adalah LED yang akan digunakan dalam aplikasi bagi menggantikan jenis lampu *compact fluorescent light (CFL)* dan lampu pijar. Dari segi fungsinya, ia boleh disesuaikan kepada pelbagai kegunanaan seperti lampu jalan, lampu trafik dan papan iklan atau papan arah. Disebabkan oleh beban yang tidak kritikal, maka proses regulasi voltan yang asas sudah memadai. Bagi mencapai proses ini, sistem ini menggunakan sebuah *built-in regulator* bagi tujuan pengecasan bateri dengan sempurna dengan hanya *solar panel* yang mempunyai keluaran kuasa yang rendah. Litar ini terdiri daripada bahagian pengawal cas dan cip pengawal yang mengawal perubahan warna pelangi. Bahagian pertama merupakan *step-up voltage* dimana mampu meninggikan kuasa *solar panel* yang dihendaki manakala bahagian kedua adalah pengawal cas dengan meregulasikan voltan untuk mengecas bateri pada voltan yang sesuai. Secara tidak langsung, gabungan kedua-dua litar ini akan memaksimakan jangka hidup bateri dan menjimatkan kos dalam jangka masa yang panjang. Bahagian akhir sekali adalah mengandungi cip kawalan untuk mengawal perubahan warna pelangi di mana program adalah tersedia dalam cip (PIC). Dalam merealisasikan sistem lampu berasaskan teknologi *photovoltaic*, proses simulasi, eksperimentasi dan pemasangan akan dilaksanakan agar dapat mengesahkan praktikaliti dan feasibiliti projek ini. Inisiatif ini menggunakan secara penuh kemampuan tenaga suria dan memudahkan penjanaan kuasa rendah bagi manfaat sejagat. Pendek kata, sistem ini dapat diutilitasi di kawasan bandar atau luar bandar serta hanya memerlukan penjagaan minima. Demi kepentingan bumi kita, projek ini merupakan langkah kecil dalam usaha menggalakkan penukaran daripada sumber tenaga fosil kepada sumber boleh dikitar semula.

OBJECTIVE

The objective of this project is to design and implement a controller based PV system and PIC to drive LED (Load) for advertisement signboard outdoor lighting application and achieve the following:

- Provide cost effective and hassle free lighting solution to outdoor lighting problems.
- To provide environment friendly, sustainable products to enhance the quality of life.
- To develop a greater public enthusiasm for and involvement is science and the environment wit our interactive science products.
- To intro low current and energy saving.
- Safety, DC Voltage operated.
- Running light functions are available.
- Design and pattern are available.
- Long life LED more than 100 000 hours approximate 10years
- Minimal or no maintenance
- Solar Panels are guaranteed for 15 years and the Deep Cycle Batteries for 5 years.
- No bills to pay and Cost effective

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LIST OF ABBREVIATIONS

A-Si	Amorphous Silicon Cells
CIS	Copper Indium Dieseline
CdTe	Cadmium Telluride
DC	Direct Current
GaAS	Gallium Arsenide
Ge	Germanium
IC	Integrated Circuit
ICSP	In-Circuit Serial Programming
I/O	Input or Output
Li-ion	Lithium-ion
LVD	Low Voltage Regulated Load Disconnect
LVP	Low Voltage Programming
MAC	Multiply-Accumulate
MMT	Migratable Memory Technology
NiCd	Nickel-Cadmium
NiMH	Nickel-Metal Hydride
OTP	On-Time Programmable
SLA	Sealed Lead Acid
SQTP	Serialized Quick-Turn Programming
SW	Switch Button
UHF	Ultra High Frequency
VR	Voltage Regulation
VRLA	Valve-Regulated-Lead-Acid

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CHAPTER I

LITERATURE STUDY

1.1 INTRODUCTION

This chapter discusses about literature discourse and review of a stand alone photovoltaic lighting system control by PIC microcontroller. Throughout the world, there have been many researches about the concept and implementation of this system which is deemed suitable for all types of lighting application such as road side lighting, garden lighting, advertisement and interior house decoration.

Literature reviews are based in information obtained from valid sources such as books, articles of relevance, published paper or any other source deemed appropriate. One of the more famous sources for literature reviews from IEEE, denoting the Institute of Electrical and Electronics Engineers which is based in New York, USA. The forms of literature include standards of practice, proceeding paper or conference papers such as those from the Power Engineering Conference.

1.2 PHOTOVOLTAIC SYSTEM

Photovoltaic system can be cauterized in three main types; they being stand alone, utility-interactive system and bi-modal systems. The first operate independent of the utility grid and includes hybrid systems. The second is connected to the grid while the third has an ability to function like the first two but not simultaneously, in a book by author Jenny Nelson in year 2003, entitled "The Physics of Solar Cell", a solar photovoltaic energy conversion is a one step conversion progress which generates electrical energy from light energy. The effectiveness of a photovoltaic device depends upon the choice of light absorbing materials and the way in which they are connected to the external circuit.

In other definition given by Richard D. Dorf, Editor-In-Chef of "The Engineering Handbook", solar power system are usually classified by technology- solar thermal and photovoltaic systems are the principal types. Photovoltaic usually use the energy in sunlight directly to produce electricity; in solar thermal power systems, the sun heats the transfer medium such oil, by technology- solar thermal and photovoltaic systems are the principal types. Photovoltaic usually use the energy in sunlight directly to produce electricity; in solar thermal power systems, the sun heats the transfer medium such oil, by technology- solar thermal and photovoltaic systems are the principal types. Photovoltaic usually use the energy in sunlight directly to produce electricity. [16]

A photovoltaic system consists of solar cell electrically connected to each other in support structure to form a module. Modules are designed to supply electricity at the certain voltage, at 12 volts. The current produced is directly dependent on how much light strikes the module. In general, the larger area of a module or array is, is the more electricity will be produced. Photovoltaic modules and array reduces DC electricity. They can be connected in both series and parallel to produce any required voltage and current combinations.

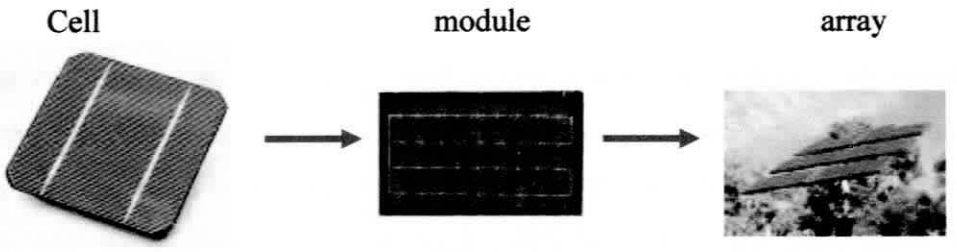

Figure 1.1: Photovoltaic system

A photovoltaic involves an array combined with number of other components, collectively known as balance of system. These components vary according to the type of service required and whether the system is needed only during hours of sunlight or also at night. Some form of energy storage is needed for the system operate at night.

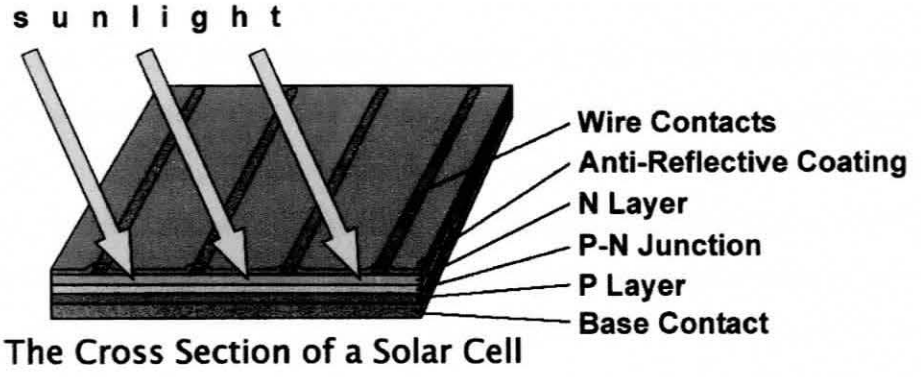

Figure 1.2: The sunlight reflect on the PV Module

1.2.1 Cell Types

Solar cell represents the fundamental power conversion unit of a photovoltaic system. Many types of solar cell are now available on the market, through the bulk of the material and structures in the quest to extract maximum power from the device while keeping the cost to minimum. Devices with efficiency exceeding 30% have been demonstrated in the laboratory. The efficiency of commercial devices however is usually less than half this value.

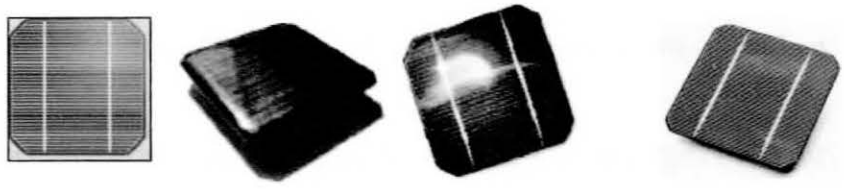

Figure 1.3: Solar Cell in different shapes

Crystalline silicone holds the largest market. Monocrystalline silicone cells are the oldest and most efficiency type of photovoltaic cell. They are produced by slowly extracting large, pear-shaped crystal from a liquid silicon bath. This crystal is sliced into extremely thin "wafers" about thickness of fingernail, and processed into solar cells. As the wafers are nearly identical in structure, they yield highly efficiency cells of over 15%; nevertheless, its robustness is marred by the production process which is energy extensive, slow, and expensive.

To reduce the cost, these cells are now often made from multi or polycrystalline silicon. As opposed to extracting a single crystal from silicon bath, these cells are formed by pouring hot, liquid silicon into molds or casts. Once cooled, and hardened, the silicon blocks are sliced in a similar fashion to the single crystal described above. Compare to single crystalline cells, polycrystalline cells are less expensive to produce because their manufacturing process does not require many careful hours of rotating silicon material. However, they are less efficient than single crystalline cells, averaging