**MICRO WIND POWER GENERATOR**

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FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

**BORANG PENGESAHAN STATUS LAPORAN**

**PROJEK SARJANA MUDA II**

**MICRO WIND POWER GENERATOR**

**Tajuk Projek**  :  …………………………………………………………………………

**Sesi Pengajian**  :

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|---|---|---|---|---|

NORAISAH BINTI ABU

Saya  …………………………………………………………………………………….

(HURUF BESAR)

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2.  Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.

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Tarikh  : ………15 JUNE 2012……………...

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Tandatangan    : …………………………………………….
Nama Penyelia  : …………………………………………….
Tarikh         : …………………………………………….

## To my beloved parents

Abu bin Sam and Ramlah binti Ras

## My siblings

Faridah Hani, Muhamad Fadli, Abd Hadi and Amir Asraf

## My supervisor

Dr. Kok Swee Leong

## All my friends

**For their support, motivation and inspiration…**

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# ABSTRACT

This project is to invistigate and study on how electric energy can be harversted from kinetic energy and used to charge other electronic devices. Before start to build the hardware of micro wind generator, the design and simulation using software will be done to test the result. Then a prototype will be constructed to give an insight and demonstrate the whole process and therefore giving out the results that support the objectives. Performance of the prototype is observed and will be decide whether it needs to be improved on certain aspects.

This micro wind generator uses brushless DC fan that acts as an electrical power generator to convert mechanical rotation, as a source of kinetic energy into electrical energy with alternating current. The other specification is that it uses off-grid application which isolated electricity network. A capacitor is used to store electrical charges generated by the generator which can be used in applications that could provide safety wireless monitoring of a wind tunnel for workers working in underground or passenger of mass rapid transit (MRT). In this project, the results demonstrate the potential of the device in powering low power electronic devices. In this case, the power supply to multivibrator circuit which consists of two red LEDs. The blinking of the LEDs is an indication of transmitting and receiving data from wireless sensing applications.

# ABSTRAK

Projek ini adalah untuk menyiasat dan mengkaji bagaimana tenaga elektrik boleh dihasilkan daripada tenaga kinetik dan digunakan ke atas alat-alat elektronik yang lain. Sebelum mula membina penjana mikro angin, rekaan dan simulasi akan dilaksanakan sebelum membina penjana tenaga yang sebenar.. Di akhir projek, prototaip akan dibina untuk membuktikan kebolehgunaan serta menghasilkan keputusan yang menyokong objektif. Prestasi prototaip diperhatian semasa proses berjalan dan penambahbaikan beberapa aspek akan dilakukan.

Penjana mikro angin menggunakan penjana tanpa berus kipas DC yang bertindak sebagai penjana untuk menukarkan putaran mekanikal kepada tenaga kinetik yang merupakan sumber penjanaan tenaga elektrik dalam bentuk arus ulang alik. Cirri- cirri yang lain adalah digunakan di tempat yang diluar kawasan yang terasing daripada jaringan elektrik. Kapasitor digunakan untuk menyimpan tenaga elektrik yang dijana untuk kegunaan seperti pengawasan tanpa wayer dalam terowong penyaluran udara untuk keselamatan pekerja bawah tanah serta penumpang transit laju massa (MRT). Keputusan eksperimen projek ini, membuktikan potensi kebolehgunaan peranti penjana kuasa ini melalui litar pemberbilang getar tak stabil yang mengandungi dua diode pemancar cahaya. Hasil kelipan dua diode tersebut menunjukkan aplikasi penghantaran and penerimaan isyarat penderia.

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DC   -      direct current

UV   -      ultraviolet

AC   -      alternating current

BJT   -      bipolar junction transistor

LED   -      light emitting diode

GaAs   -      gallium arsenide

EMF   -      electromotive force

HDL   -      hardware description language

FPGA   -      field-programmable gate array

CPLD   -      complex programmable logic device

PCB   -      printed circuit board

VSM   -      virtual system modeling

NaOH  -         Natrium hydroxide

FeCl3  -          Ferric chloride

# CHAPTER I

## INTRODUCTION

This art will discuss briefly on the introduction of the project. It includes the purpose of the project, scope of the work, problem statement and advantage acquire from the project.

## 1.1    INTRODUCTION

Nowadays, the usage of electricity has becoming a must in human daily life, especially when almost everything needs electric to activate the applications. The widely

used fossil source contributes to human health and produce hazardous wastage that hardly to eliminate in the future. Wind power is one of the renewable energy that can be utilized as electric source and provide clean energy [1]. The simple electronic device such as sensor and microcontroller that having a low operating voltage is suitable to apply to this end-generator part.

This project is important to harvest energy and provide electricity supply to underground lamp for worker and maintenance purpose. The electric source and equipment for underground workers are hardly reached and rarely undergo for maintenance process. So this project is to harvest energy without depending on the electricity from source. The other importance of this project is to ensure the workers safety and guide the workers underground to the exit. This micro wind power generator can also be a supply to sensor alarm to monitor the oxygen and air flow inside the air tunnel. Besides that, this generator promotes the utilizing of green technology as electric source which better than any chemical or fossil electricity source that produce hazardous waste to human health.

The aim of this project is to generate the small scale energy from wind power and optimize the energy into the form that is useful to daily life and could be a source that could operate  small device that contribute to workers safety. The electronic circuit has to be design to fit into the application that is suitable for the function wanted. For the generator hardware, recycle brushless fan have been used to catch he wind flow from the wind tunnel.

## 1.2    OBJECTIVE

The objectives of the project are:

1. To investigate the wind energy by knowing the way to harvest wind energy and convert it into electricity form.
2. To develop generator hardware by modifying a brushless DC fan that could generate small scale application voltage.
3. To construct an application that enable users to charge electronic devices.
4. To test the performance of the micro- wind generator on various wind velocities.

## 1.3    SCOPE AND METHODOLOGY OF THE WORK

There are 4 steps to develop the project.

1. Study about the problem statement:
   - ➢ Find information from books, journals, internet and asking for supervisor advice.
   - ➢ Study about wind energy and wind generator.
   - ➢ Study about the wind generator that have been established or have been done by other and figure out the problems that usually occur.

2. Design and build the hardware part:
   - ➢ Simulate the generator circuit using Multisim software.
   - ➢ Test the circuit on breadboard.

3. Design software programming:
   - ➤ Design circuit using Proteus software.
   - ➤ Test run and troubleshoot the program.
   - ➤ Request the components for this project

4. Test run and troubleshoot:
   - ➤ Building the hardware circuit based on Proteus circuit.
   - ➤ Tests run the project and troubleshoot if needed.

5. Fabricating the circuit
   - ➤ Print out the designed circuit from Proteus software on a transparency film.
   - ➤ UV expose to the board with the printed thin film
   - ➤ Developing- remove the sensitized photoresist to remove the copper.
   - ➤ Etching- to remove the unwanted copper on the board
   - ➤ drilling

## 1.4      PROBLEM STATEMENT

1. Wasted wind energy

   - ➤ Wind exists around us but the knowledge to utilize the energy still very uncommon in our country.
   - ➤ To optimize the wind energy especially at the windy places such as island, mountain, and in air tunnel

2. It can be a backup electric charger for small electronic devices.

   - ➤ To charge an electronic device there must be an electric source to plug in the device.

➢ To open the possibility of charging the devices even outside the grid.

3. Provide friendly environment source for electricity application.

➢ The main source that been used for decades mostly in all country in the world depend on the fossil fuel source which include petroleum, coal and natural gas. The combustion of the fossil fuel would produce carbon dioxide that contributes to the global warming and causing the temperature of the earth rise in response.

➢ Wind energy is an energy that harvest from the wind blow and convert it into electrical form. As it is does not burning any substance, it won't produce any waste that could harm environment.

4. To solve energy problem especially in remote area when energy is very hard to obtain.

➢ The rural area- the rural area is a place that is hard to find electricity. Normally they have not received the electricity supply from the national grid as they are far away in the wood or isolated from the main land.

## 1.5      PROJECT BASIC OPERATION:

```
Micro wind  →  Rectifier  →  Energy  →  DC application
generator                    storage
```
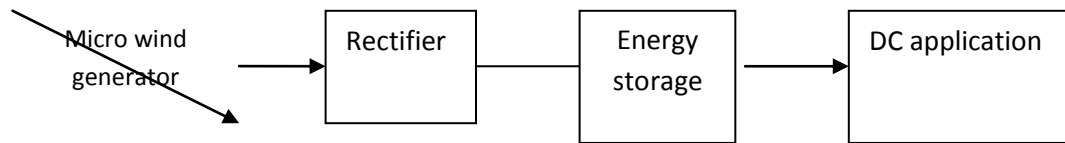
Figure 1.0: block diagram of micro wind generator

The project seek to supply a backup energy to small scale source device. It aim to provide direct current (DC) up to 3V and above and store the energy into capacitor. Micro wind generator build by using blades, generator (which is a brushless fan),full-wave bridge rectifier and DC circuit application.

The micro wind generator will produce alternating current (AC) and forwarded to rectifier to convert the AC to DC form. Capacity will in the same time being charge and store the energy for the multivibrator application.. The electronic application is using DC.