

**DESIGN AND DEVELOPMENT OF INNOVATIVE  
CEILING FAN CLEANER**

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DESIGN AND DEVELOPMENT OF INNOVATIVE CEILING FAN CLEANER

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## **STATEMENT OF AWARD FOR DEGREE**

### **1. Bachelor of Engineering Technology**

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## **SUPERVISOR'S DECLARATION**

We hereby declare that we have checked this thesis and in our opinion, this thesis is adequate in terms of scope and quality for the award of degree of Bachelor of Engineering Technology in Energy & Environmental

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## **STUDENT'S DECLARATION**

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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## **ABSTRACT**

Most of South East Asia especially in Malaysia, ceiling fans will be installed even though some houses use air conditioning as their cooling system. Ceiling fans create a tremendous amount of air flow, and dust is thrown around the room. The air always has a great deal of dust in it where larger particles can see, and microscopic. Large volume of the circulating air hits and collects dust on the blades of the fan. The traditional ways of cleaning the ceiling fan required users use a wet cloth and get up to the height of ceiling fan using a step ladder or use an extension rod with a brush. However, these methods are dangerous because a user may fall down from the ladder and cause environment hygiene problem. Furthermore, a user need to take more time to finish clean all the fan blades by using a non-suitable material which most of the dust will falls down to the floor during cleaning activities. Therefore, a portable ceiling fan cleaner are developed for the ease of operation in cleaning ceiling fan blades. The extension hose of vacuum cleaner can be attached to the ceiling fan cleaner to suck the dust and grimes from the blades without use a step ladder or stool. This design also can reduce time consumption in cleaning ceiling fan blade which took less than four (4) minutes. Next, a fan is used for thermal comfort which create a wind chill and give lower temperatures directly. By using the best material, all types of dust can be removed in a matter of minutes hence create high velocity of wind speed of fan blades and feeling cold which gives a good comfort for human daily activities.

## ABSTRAK

Kebanyakan Asia Tenggara terutama di Malaysia, kipas siling akan dipasang walaupun sesetengah rumah menggunakan penyaman udara sebagai sistem penyejukan mereka. Kipas siling mewujudkan sejumlah besar aliran udara, dan debu dibuang di sekeliling bilik. Udara sentiasa mempunyai banyak habuk di mana zarah-zarah yang lebih besar dapat dilihat, dan mikroskopik. Jumlah besar mengelilingi udara dan mengumpul habuk pada bilah kipas. Cara tradisional membersihkan kipas siling adalah pengguna perlu menggunakan kain basah dan sampai ke ketinggian kipas siling menggunakan tangga atau menggunakan batang dengan berus. Walau bagaimanapun, kaedah ini berbahaya kerana pengguna mungkin jatuh dari tangga dan menyebabkan masalah kebersihan persekitaran. Selain itu, pengguna perlu mengambil lebih banyak masa untuk menyelesaikan semua bilah kipas dengan menggunakan bahan yang tidak sesuai dan sebahagian besar habuk akan jatuh ke lantai semasa aktiviti pembersihan. Oleh itu, pembersih kipas siling mudah alih dicipta untuk memudahkan operasi dalam membersihkan bilah kipas siling. Hos sambungan pembersih vakum boleh disambungkan ke pembersih kipas siling untuk menyedut debu dari bilah tanpa menggunakan tangga atau bangku. Reka bentuk ini juga dapat mengurangkan penggunaan masa dalam membersihkan bilah kipas siling yang mengambil masa kurang dari empat (4) minit. Seterusnya, kipas digunakan untuk keselesaan termal yang membuat angin yang sejuk dan secara langsung memberi suhu yang lebih rendah. Dengan menggunakan bahan yang terbaik, semua jenis habuk boleh dikeluarkan dalam beberapa minit dan seterusnya menghasilkan kelajuan angin yang tinggi dari bilah kipas dan rasa sejuk yang memberikan keselesaan yang baik untuk aktiviti harian manusia.



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## LIST OF ABBREVIATION

<b>Abbreviation</b>	<b>Meaning</b>
cm	centimeter
<b>µm</b>	micrometer
mm	millimeter
g	gram
t	time (second)
A	area (m <sup>2</sup> )
E	energy (J/s)
D	diameter (m)
EU	European Union
N	Newton
kg/m <sup>3</sup>	kilogram per cubic meter
g/cm <sup>3</sup>	gram per cubic centimeter
m/s	meter per second
RM	ringgit
°C	Celsius

# CHAPTER 1

## INTRODUCTION

### 1.1 PROJECT BACKGROUND

A fan is a device that is held in the hand and moved back and forth to cool a person and that is usually shaped like a segment of a circle and composed of material such as feathers or paper mounted on thin rods or slats moving about a pivot so that the device may be closed compactly when not in use (Webster, n.d.). Ceiling fan usually located at the top of the house. Ceiling fans create a tremendous amount of air flow, and dust is thrown around the room. The air always has a great deal of dust in it where larger particles can see, and microscopic. Over time, a large volume of the circulating air hits and collects on the blades of the fan. The accumulation of dust on ceiling fan blades is not random. Most dust particles carry an electrical charge, and therefore can be attracted to one another where a dust ball is simply an accumulation of charged dust particles that have a fatal attraction (Larson, n.d.). Majority of community have more than one of ceiling fan in their house, but it is difficult to clean since the height of the ceiling fan are high.

The purpose of this project is to create an ergonomic ceiling fan cleaner and create the equipment that easy to operate. A ceiling fan cleaner use to clean each blade of the ceiling fan. Since using ladder, is quite difficult and dangerous because of the height, this ceiling fan cleaner are able to solve the problems. A solution to the cleaning of blades of a ceiling fan proposes using a mechanism or device that can be slipped onto the blades with a handle attached there so that the person cleaning the fan blades can manipulate this cleaning device from the floor by moving the device back and forth along the blade from the floor. There is also an arrangement similar to this in which a vacuum cleaner has been attached to the cleaning device to vacuum the dust from the blades (Bellardini & Tullio, 1994).

Due to the presently known dangerous of cleaning arrangements, the dust on the fan blades tend to accumulate to a large extent because the user doing the cleaning does not desire to climb step ladders or does not have the device to slip over the fan blades for

cleaning the same. Therefore, attachment of the ceiling fan cleaner to the vacuum cleaner will suck all the dust and avoid the dust from spreading all over the room which can affect health.

Ceiling fans are standard device for ensuring that a room gets proper ventilation especially in high humidity of Malaysia's climate and this project is about the simple cleaning system and economical manner. Ceiling fans are considered as the most effective ventilation methods in distribution air in the room for long-term cooling plan and they will be installed in every house even though some houses are using an air conditioning as their cooling system. This is because Malaysia situated near the equator caused a tropical climate with high temperatures and rainfall all year around but National Environment Agency (NEA) said that temperatures do not differ much from month to month and daily range of temperature is small. Ceiling fans are widely used in offices, houses, restaurants and many other types of buildings to circulate air and reduce the heating costs. But, Malaysia's people leave the dust in ease without considering the dust is interpreting that it may harm them. Thermal comfort is a condition of mind that expresses satisfaction with the thermal environment (Raish, n.d). It is depending on many factors which are temperature, humidity and air speed. Temperature control is the most concerned by residents and people right now because low temperature is the first choice for Malaysia's people. This also became a reason Malaysia's people loves air-conditioner that can control temperature while air speed can be increased by using ceiling fan. When more air-conditioners installation, more contribution to global warming and also deplete the ozone layer because of refrigerants. Moreover, people nowadays are lazier because of rushing in time and they are easy to get tired after back from work. Therefore, this project is also to overcome the human laziness and cleaning the fan is done regularly. The oversight of this project may seem simpler one, but this project involves two applications and suitable for all people to do.

## **1.2 PROBLEM STATEMENT**

A ceiling fan is a mechanical fan, usually electrically powered, suspended from the ceiling of a room that uses hub-mounted rotating paddles to circulate. Ceiling fan typically rotate more slowly because since the blades of ceiling fan are exposed to the air so the surface of blades is easier getting dirty by thick layer of dust. Regular cleaning process using ceiling fan cleaner are needed to make sure it always clean and the dust do not spread everywhere.

However, cleaning the ceiling fan by manually is complicated. It is because the height of ceiling fan is difficult to reach to clean it. Therefore, a user needs a ladder or stool to clean ceiling fan blades. Moreover, cleaning manually using a normal cloth causes the dust spread everywhere because the material did not hold the dust efficiently. Furthermore, clean ceiling fan manually also consume much time since the cleaning process cannot wipe both side of blade at the same time and need to clean the falling dust after cleaning.

Therefore, an updated version of ceiling fan cleaner is created where it can attach with the extension of hose provided by any brand of vacuum cleaner to reach the blade of ceiling fan. A user can remove the dust from the floor without step ladder and do not sweep the falling dust anymore after finish cleaning ceiling fan. Lastly, this updated version of ceiling fan cleaner also can wipe both side of the blade which can reduce the time consumption by using the most efficient material.



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