UNIVERSITI TEKNIKAL MALAYSIA MELAKA

AUTOMATED GRASSCUTTER USING VOICE RECOGNITION

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Robotic and Industrial Automation) with Honours.

by

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I hereby declared that this PSM report is a result of my own work, as clearly stated in the sources of reverences and sources is explained and stated. “

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ABSTRACT

Grasscutter without a doubt is one of the important home appliances especially among the country side. The existing grasscutter machine in agriculture field usually using kerosene as their fuel source to operate the machine. However, by using fuel source, combustion process will occur and will pollute the environment with toxic gas which can lead to thinning of ozone layer and disease. Moving to improvement of grasscutter machine, we can conclude that with the improvement of the machines comes greater prices. This will make the people comes hard to buy the expensive one. Due to the high price, many people will buy the cheaper machines which they can afford. This can be seen easily in Malaysia where we can see many people will use the string trimmer to cut the grass. The string trimmer is a semi manual machines which requires humans to use it to cut the grass. The machines are quite heavy and after a period of time using the machines; it will lead to shaking and back-ache of the user. This will lead to serious safety issues. The idea of controlling a grasscutter machines is quite simple with the use of arduino and some electrical devices. The grasscutter machines is control by Arduino which control the directions to moves forward,backward,right,left and stop. The control of direction is being help with the use of L298N motor driver which receive the signal from the arduino to control the direction of the motor. Besides, it use a simple voice recognition that all user can et from Google Playstore to communicate with the grasscutter machines. The motor have two roles in this system which is to control the direction of grasscutter and also the cutting process of the machines. At last, the goal of creating this grasscutter machines is to create a low cost machines where all people can buy it thus preventing a health issues to the user and also creating a low budget grasscutter machines where all user can afford.

ABSTRAK

Pemotong rumput tidak boleh dinafikan lagi sebagai salah satu mesin yang amat penting dalam alatan rumah terutamanya di kawasan luar Bandar dan kampung. Mesin potong rumput yang sedia ada sekarang kebiasaannya menggunakan minyak kerosene sebagai bahan api untuk menggunakan mesin tersebut. Namun begitu, dengan menggunakan bahan api seperti kerosene, ianya akan menghasilkan asap yang bole menyebabkan penipisan lapisan ozon dan juga penyakit berbahaya. Seiringdengan kemajuan teknologi mesin potong rumput, harha juga akan turut meningkat. Hal ini menyebabkan ramai pengguna membuat keputusan untuk membeli mesin potong rumput yang murah. Hal ini dapat dilihat terutamanya di golongan Malaysia kerana ramai pengguna Malaysia menggunakan mesin potong rumput semi manual. Mesin potong rumput yang manual memerlukan pengguna memakai mesin tersebut untuk memotong rumput. Dengan penggunaan di jangka masa yang lame, ianya akan menyebabkan menggigil satu badan dan sakit belakang. Tuntasnya, muncul sebuah idea untuk menghasilkan sebuah mesin potong rumput yang menggunakan Arduino. Fungsi Arduino adalah untuk mengawal pergerakan mesin seperti ke hadapan, ke belakang dan seterusnya. Beberapa alat elektronik juga digunakan untuk mengawal arah pergerakan seperti L298n motor driver yang menerima signal dari Arduino untuk mengawal arah motor berpusing. Selain itu, ia juga dilengkapi dengan system pengecaman suara untuk mengawal pergerakan mesin potong rumput tersebut. DC motor dalam system ini mempunyai dua fungsi iaitu untuk mengawal pergerakan mesin dan juga sebagai pivot untuk memotong rumput. Idea ini dicipta untuk mengelakkan masalah kesihatan kepada pengunna dan juga menghasilkan mesin potong rumput yang mampu dimiliki oleh semua golongan pengguna.

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CHAPTER ONE

INTRODUCTION

1.1 Background of study

This chapter will discuss about the overview of the study. The overview consists of background of the study, problem statement, objective and scope of study based on the project title.

This project is a study about the design and improvements of a grass cutter technology. The function of this machine is to cur grass especially at houses, garden and sport field. The idea of this project is to combine a programmable function to a robotic car in order to create a controllable grass cutter. There are several criteria in engineering aspects that must be considered to develop a prototype of this machine. The title of this project is called automated grass cutter using voice recognition. This machine can be classified into two main part which is making an automated grass cutter and the other part is controlling it using Bluetooth low energy concept .This machine are also designed by reviewing a few aspects such as durability and suitability of this machine for the grass type in gold field or gardens. The first step that need to be take in order to build this machine is by designing the body of this machine using adobe illustrator or AutoCAD. The simulation of this machine can be run using proteus software in order to check the connection between microcontroller and output devices. After the connection is verified, then the microcontroller can be implemented to the machine as a completed design .At the end of the research, the result of analysis of the structure will be discussed for the design selected.

1.2 Problem Statement

Trimming a grass is a work that usually need a lot of effort especially in a field, houses and garden. However, humans have improved the grass cutter technology that can improve the works done by the user and minimizing the effort. However, due to money crisis, high-tech grass cutter which is fully automated grass cutter is high in price and not all people can afford to buy it .So, they have to use a semi-manual grass cutter to cut the grass. However, by using a semi-manual grass cutter leaves a toll on the human body such as back pain. As a solution, we decide to design and fabricated a new type of machine that is easy to handle and low cost.

1.3 Objective

The main objective of this project is to design an automated grass cutter using voice recognition .The specific purposes for this project are:

i. To develop a schematic design of the improved grass cutter machine
ii. To implement the uses of Bluetooth technology to the design to use voice recognition as a controller to control the machine.
iii. To conduct analysis for critical part of the design

1.4 Scope of Study

This section will gives a briefing about what this project cover and not based on the project title. The following scope are what is considered to be study in this section:

i. The system of the grass cutter machine is control by using Arduino controller
ii. The designing procedure by using AutoCAD Software
iii. The concept of Bluetooth low energy that is going to be implemented in the machine control system

1.5 Project Outline

Chapter 1 is consist of the introduction of the project such as the background of the study, problem statement, objective of the study and the scope of the project.

In chapter 2, this part will explained about the type of grass cutter and the improvement of grass cutter technology. Besides that, it also will explain about the Bluetooth technology that will be implemented to the machine as a controller Finally, it will review about previous research that is considered as a reference that can be improvise.

In chapter 3, it consists on how the study and experiment are conducted. Besides that, it will review about the method used, the material needed to build this project and also the sketch of this project design.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter basically will discuss about the previous journal and articles that related to the main project about the automated grass cutter using voice recognition. As stated on the title, there are certain parameter that we can consider to be reviewed and discussed.

There are several type of grass cutter that existed since a long time ago. Due to the advance of human technology, there are two main concept of grass cutter which is manual and automated. Referring to the technology of grasscutter, there are two types of manual grass cutter which is semi-manual grass cutter and fully manual grasscutter. Semi-manual grass cutter also called manual grass cutter machines. The manual grass cutter machine works using kinetic energy produced by the user by mechanical concept. Example of semi-manual grass cutter is a grass trimmer. It use petrol to supply power to the machine in order to turn the blade cutter or the monofilament line. However, it was designed as a handheld device which require a human body to operate it. Thus, it referred as a semi-manual grasscutter. Example of fully manual grassutter is a scythe or a sickle. This type of grasscutter does not have a machine mechanism attach to it and it requires full workforce from the human body. Thus, it has a toll on the user.

The automatic grass cutter can be classified in two types in terms of power supply which is supply by electrical motor or combustion engine. The machines that use electrical motor usually is small in size and fully automated that uses sensor to detect the grass that need to be cut. This device that acts as a robot that only exists to cut the

grass is powered by battery. Nowadays, there are many machines that used electronic board to program a machine for their processing systems are also called intelligent technology. However, machines that used petrol as to run the machine is usually large in size and it running in single ride mechanical machine.

2.1 Types of grasscutter

2.1.1 Scythe

Figure 2.1: Scythe

The first tool that were used to cut grass is scythe. The scythe has a simple design containing a long wooden handle with a curved blade attached perpendicularly to the end of the wood.The scythe was invented in about 500 BC and appeared in Europe during the 12th and 13th centuries. Using the scythe as a tool to trim the grass is called mowing (Amber shukitis & Erik Kortum).

Mowing is done by holding the top handle in the left hand and the central one in the right, with the arms straight, the blade parallel to the ground and very close to it, and the body twisted to the right. The body is then twisted steadily to the left, moving the scythe blade along its length in a long arc from right to left, ending in front of the mower, thus depositing the cut grass to the left. Mowing proceeds with a steady rhythm, stopping at frequent intervals to sharpen the blade. The correct technique has a slicing action on the grass, cutting a narrow strip with each stroke .One of the common mistakes is beginner tends to chop nor hack the grass. Besides, they tend to slice the grass in wide area at once. This acts is very ineffective and will gives extra work. Next, the blade can be easily blunt if they cut the grass too close to the ground. This is

because the soil will contaminate the blade and blunting it.

2.1.2 Land mower

Figure 2.1.1: Land mower

Muhd Khairrul amry, 2013has studied about the history of the land mower. He stated that the man who invented the land mower is Edwin Budding in 1830 from Gloucestershire, England. Edwin created the land mower in order to cut the grass in sports grounds and large gardens. The machine was patented in 1830 after gettingApprovalfrom the British. The land lawn mower works once the land mower is pushed from behind. The irongear wheels transmitted power from the rear roller to the cutting cylinder, permitting the rear roller to drive the knives on the cutting cylinder; the quantitative relation was 16:1. Another roller placed between the cutting cylinder and also the main or land roller may well be raised or lowered to change the height of cut. The grass clippings were hurled forward into a tray-like box.

2.1.3 Side wheel Machines

Figure 2.1.2: Side Wheels Machines

The side wheels machine is an innovation from the land mower machines. They also had cast iron wheels at each side to drove the cutting cylinder directly by means of ratchets inside the castings. The different from the previous inventions is this machine does not have a metal rear roller.Besideshe cost to make this type of machine is cheaper and the material is very light.Thus,the machine is becoming more popular than the previous.

2.1.4 String trimmer

Figure 2.1.3: String Trimmer

The string trimmer was designed by an American entrepreneur, George Charles Ballas in 1971.This machine also is named 'weed eater '.He get the idea to build this machine when going to the car wash. He apply the technique of needle-like -bristles of

the brushes when washing his car. Thus ,he tried placed a length of fishing line through the hole of tin can and attached it to the spinning part of motorized grass edger. For Ballas ideas,he used the concept of rotating the fishing line at a high speed using the power from the gasoline engine that driven the propeller.

When the propeller rotate the string, it produces a high sped rotation that exerts the centripetal force to prevent the string from flying off in the straight line under the inertia law. String trimmer usually used in a small area because the design itself is created for home garden .It is suitable for small area because it can't operate without a human as an operator and has a small cutting section. This machine also can be classify as a semi-manual machine because it need a human to works.

However, there are some disadvantage of using this machine such as it will cause back pain due to the user need to carry the machine on their back .Besides, when operating in a big area, it will take a lone time to get the work don't because it has a small cutting section and will require a lot of workers to get the job done. Other than that, when operating this machine it requires the operator to have safety wear such as goggles, hearing protection, safety boots and a long sleeves cloth as proper personal protective equipment (PPE).The operator also must aware of their surrounding in order to avoid from accident such as flying rock and debris that can injure onlookers or damage property (Muhd Khairrul Amry, 2013).

2.2 Type of components.

2.2.1 Microcontroller

Shaaban (2000), has study about the basics of the microcontroller. Microcontroller is a small integrated circuit that acts as a microcomputer .It is used to give and store functions. Besides that, it is also used to control product and devices

remotely such as microwave, industrial automation and aerospace industry (Gunther Gridling&Bettina Weis, 2007).There are many types of microcontroller that is being used nowadays such as Arduino, sk40c and etc. However, they are low in cost which is good for practical works.

2.2.2 PIC microcontroller

Most of the common microcontroller that being used is PLC (Programmable Logic Controller) and PIC (Peripheral Interface Controller).The input information are being stored and processed according to the program instructed and executed as an output. (Techopedia.com) states that peripheral interface controller (PIC) is a type of microcontroller component that is used in the development of electronics, computers, robotics and similar devices. The PIC was produced by Microchip Technology and is based on Harvard Computing architecture, where code and data are placed in separate registers to increase input/output (I/O) throughput. Besides that, PIC is also known as a programmable interface controller (PIC) and programmable intelligent computer (PIC).

The PIC was developed to improve the performance of standard I/O operations from a computer peripheral devices. The PIC itself stands for small size pc that has the ability to store memory and instructions in order to create a task. A PIC has been design to have a built in memory, data bus and microprocessor for processing all I/O operations. The built in memory are consists of temporary and permanent memory which is random access memory(RAM) and erasable programmable read-only memory(EPROM).Besides, it also contain a flash memory which is used to perform multiple task such as READ,WRITE and ERASE functions.

The table 2.2.2 below shows some of PIC microcontroller features:

Table 2.2.2 PIC Microcontroller Features

	Features
1	Digital Input Output (I/O) ports
2	On-chip timer with 8-bit prescaler
3	Power-on reset
4	Watchdog Timer
5	Power saving SLEEP mode
6	High source and sink current
7	Direct, indirect and relative addressing modes
8	External clock interface
9	RAM data memory
10	EPROM or Flash program memory

When choosing a suitable type of PIC microcontroller, there are many criteria that are considered to be taken such as:

i. Number of I/O pins required
ii. Required peripherals (e.g., USART, USB)
iii. The minimum size of ram
iv. Speed
v. Physical size
vi. Cost