UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Bluetooth Remoting Lawn Mower

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Computer Engineering Technology (Computer Systems) with Honours

by

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2018

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DECLARATION

I hereby, declared this report entitled “Bluetooth Remoting Lawn Mower” is the result of my own research except as cited in references.

Signature :

Author’s Name :

Date :

APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfilment of the requirement for the degree of the Bachelor of Computer Engineering Technology (Computer Systems) with Honours. The member of the supervisory is as follow:

……..

Effendy Onn bin Siam

(Project Supervisor)

ABSTRAK

Dunia hari ini manusia tidak lekang daripada telefon pintar mereka. Kemana-mana tanpa telefon pintar mereka adalah sesuatu yang tidak lengkap. Telefon pintar pada hari ini bukan sahaja digunakana untuk membuat panggilan, kiriman sms, mengambil gambar ataupun bermain permainan video, malah lebih daripada itu. Telefon pintar kini adalah sesuatu teknologi yang anda boleh gunakan dalam rutin seharian anda dan telefon pintar juga dapat membantu melakukan kerja seharian anda. Tujuan projek ini bukan sahaja untuk mencipta Mesin pemotong rumput yang boleh memotong rumput di halaman, malah Pemotong rumput yang berteknologi, menarik dipakai dan menghasilkan hasil yang baik. Mesin potong rumput yang dicipta pelajar yang menggunakan telefon pintar untuk mengawal operasi Mesin pemotong rumput tersebut. Dengan menggunakan "MIT App Inventor" untuk menghasilkan imej sesebuah alat kawalan jauh di atas telefon pintar, segala "input" yang ditekan di atas imej alat kawalan jauh tersebut akan menghantar informasi kepada "Bluetooth module" dimana ia telah disambungkan dengan "Arduino Uno". "Arduino Uno"akan memproses dan mengurus "input"dan "output" untuk Mesin pemotong rumput untuk beroperasi.

ABSTRACT

People nowadays used smartphone as it as their best partner. Going anywhere without you smartphone is like something not complete in your life. Smartphone nowadays not just a device which can only make a call, chatting, taking photos or playing video games, but it is more than that. Smartphone nowadays is something that you can use it in your daily life and also can helps you in doing your work. So, the purpose of this project, is not also invent a Lawn Mower for mower the lawn but also invent a product which is interactive, update to recent technology and also productive. The Lawn Mower which student invent is a Lawn Mower which use Android Device to control the operation of the Lawn Mower. By using MIT App Inventor to create a virtual remote interface on the Android Device, the input operation which been pressed on the Virtual Remote will be seen the acknowledgement to the Bluetooth Module where it been connected with the Arduino Uno. The Arduino will process and handle the input and output for the Lawn Mower for the Lawn Mower to be operate.

DEDICATION

To my beloved parents, Mohd Idris bin Sulaiman and Salina binti Alias and for my beloved family who encourages me, also do not forget to whom may involve in order helping me to complete my project. I also dedicate this report to my supervisor, Sir Effendy Onn bin Siam who always encourage and guide me until the completion of the project. Finally, this dedication is also dedicated to my helpful friends that have provided me with a strong moral support and always teaching what goods for me.

Thank you.

ACKNOWLEDGEMENT

I would like to express our gratitude and appreciation to the management of finite Universiti Teknikal Malaysia Melaka (UTeM), my project supervisor Sir Effendy Onn bin Siam as well as our Dean Prof. Madya Mohd Rahimi Bin Yusoff who gave me the golden opportunity to do this wonderful project on the topic of Bluetooth Remoting Lawn Mower , which also helped me in doing a lot of Research and I came to know about so many new things I am really thankful to them. I also would like to take this opportunity to thank you and thousands appreciation to our lecture in Faculty of Engineering Technology (FTK) for helped me in this project. After that, to my parents for their moral support and financial help. Finally, once again we would like to thanks to all who are involved either directly or indirectly for the success of our project. With the experience and knowledge gained, shall we use as a reference material to go through our next semester of this project. Our final words from the author, thousands of our forgiveness comes first if there any errors and shortcoming in the writing of this study.

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TAJUK: **Bluetooth Remoting Lawn Mower**

SESI PENGAJIAN: **2019**

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Bluetooth Remoting Lawn Mower

CHAPTER 1

Introduction

1.0 Introduction

To build a Lawn mower which allow user to remotely control using android devices via Bluetooth. There are 2 main components which has been used in the project which are Arduino Uno and HC-05 Bluetooth Module. The Arduino is the microcontroller which has been used to handle the input and output of the Lawn Mower. As for the HC-05 Bluetooth module, it was used as communication medium to connect between the Lawn Mower and the Android devices. As for the Arduino, it will handle all the inputs and outputs of the Lawn Mower where Ultrasonic Sensor, HC-05 Bluetooth module and Relay as the input for the Arduino while Motor Driver, Buzzer and RC motor as the Output which Arduino need to be handle. The Instruction code will be program in the Arduino as it will construct the Arduino to do the operations as the user demand. For the HC-05 Bluetooth module, it create the interconnection between the Arduino and the Android devices via Bluetooth. MIT app invertor is the software which been used to create a virtual remote controller on the android devices where the remote can control the Lawn Mower via Bluetooth remoting.

1.1 Background

Compared with the other projects which have been referred form the journals, this project is a project which simpler to build and low production cost. Compared to others, most of them using GPS as it will helps the Lawn Mower to operate within area given. However the technologies is much harder to build as it required Cell ID, Assisted GPS and WI-FI which all of them require students to determine the exact location of the Lawn Mower and the area should it covers. The other

projects, they use Zigbee module which it allow user to monitor and control the Lawnmower in Web Design Computing. The method is much advance, however, it require user to fully monitor the Lawn Mower through the computer. If there is something wrong with the Lawn Mower, user cannot check the problem immediately as the user is not at the working area of the Lawn Mower. Furthermore, it the production cost of this method is much higher as the Zigbee Module much expensive compared to Arduino. So, the system which been decided to use in the project is Android Bluetooth Remoting system which the Bluetooth can easily connected with the Arduino. The main reasons, why the Bluetooth system which been selected was most of the people nowadays using their smartphone 24 hours a day. So, it easier the user to remote the Lawn Mower as likely as they want. Furthermore, the cost of production is much cheaper because the Bluetooth module is affordable to grab. Last but not least, the Arduino Uno was selected as the using microcontroller as it comes with 6 input pins and 6 output pins also which it's suitable for the project as the Lawn Mower consists of 3 inputs and 3 Outputs.

1.2 Problem Statement

As the smartphone is widely used around the world, people spend a lot of times on the devices for social, getting information, playing games, and photograph and also for learning purpose. Nowadays, smartphone is much advance compared to previous as it just not only user can use the application in it but also can create their own application through smartphone. So, the purpose of this project using Bluetooth technologies because it open for people who have smartphone with the correct program install to control the Lawn Mower as likely as they want. As it also helps the user to cut the lawn at their lawn yard by themselves with so much fun. Previous conventional Lawn Mower is still relevant, however, by using Petrol as the energy source can produce air pollution. Furthermore, most people don't have the conventional Lawn Mower as it

much expensive and spacy to store. By using this Bluetooth technologies it may overcome the air pollution and also easier for owner or user to take it anywhere as it was designed with light weight and smaller size. Moreover, the motor is less noise compared to the conventional which can overcome from noise pollution.

1.3 Objectives

- To apply both hardware and software on the project.
- To form the interconnection between the Arduino and Bluetooth Module.
- The Lawn Mower can be remotely control using Android via Bluetooth without any problem.
- Build a Lawn Mower which less cost, less noise and less pollution.
- Build a light weight and portable size of Lawn Mower which easier for user to carry it anywhere.

1.4 Scope

The scope of this project is for home using only. The Bluetooth connection only covered up to 10m which are suitable for home backyard. The purpose of this project also want to attract young people for cleaning their house backyard by using this interesting technology. The DC motor used is not big as a motor which use for conventional Lawn Mower where it less powerful than the conventional, so it more suitable for personal purpose rather than business. The cutting blade less sharper compared to the conventional one because to avoid any hazardous as this project target children also to handle it as it looks like a remote control car. As the goal of this project would like user to have fun while cleaning their house backyard.

CHAPTER 2

Literature Review

2.0 Introduction

This chapter will discuss about literature review on the previous project which are already exist. The purpose of this chapter is to help student to refer from the previous project which already available as a reference in order to complete student own project. In order to succeed, student have done a lot of learning and research onto many sources such as books, journals, articles, internet, and documentation on applications and research work. Some information obtained was used as an idea for innovation product that student want to build. This topic also discussed and pointed several advantages and disadvantages on the project that already exist. So, it helps student to gain some idea to make a product which is better or have an extra features compared to the existing project.

2.1 Bluetooth cum pc controlled solar lawn mower with real time monitoring mechanism

Solar energy vitality is the heat and light radiations got from the Sun. It is a standout amongst the most bounteous types of non-traditional, sustainable power source found on the Earth. It is promptly accessible, free of cost and it avoids from pollution. Solar energy can be converted into electricity and power by the utilization of gadgets like sun panel which contains of photovoltaic cells. Photovoltaic cell is an electrical gadget which converts the sunlight into electricity by the property of photoelectric impact. By the utilization of solar panels we can exploit sunlight to generate electricity without cost. In this project we have utilized solar powered vitality during the time spent grass cutting of gardens, fields and so forth. The yard cutter is double controlled first by the pc and other by the Bluetooth module. The pc controlling utilizes the ongoing observing framework by the LabView programming.

LabView is utilized for the live scope of the garden/fields alongside the estimations of voltages created in the photovoltaic cell throughout the day. This constant observing framework would help to effectively use the sun based power created in the framework. The sunlight based garden trimmer when Bluetooth controlled can be worked from anyplace inside the Bluetooth flag go by the cell phone of the proprietor.(Road, Nagar, Vivekanada, Junwani, & Nagar, 2016)

2.1.1 Block Diagram

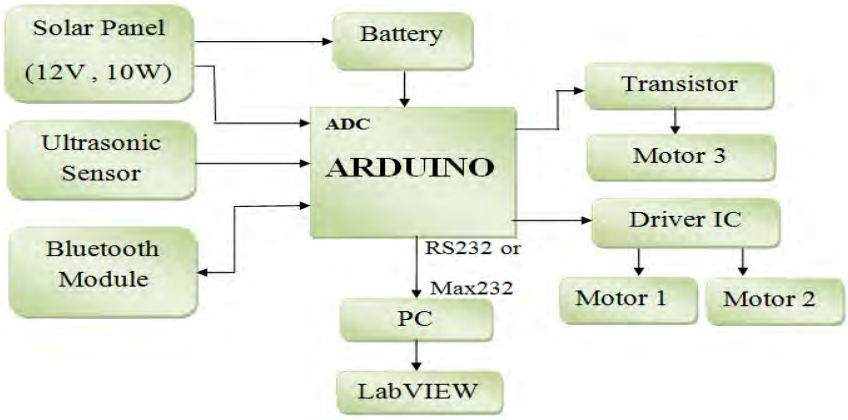

Figure 1 Figure 1: Block Diagram of the System (Road et al., 2016)

- The block diagram beneath expenses the parts utilized as a part of the undertaking.
- Arduino is the principle controlling unit of the framework. A ultrasonic sensor, Bluetooth module, Solar cells, Battery, Transistor, driver engine (L293D) and engines are alternate parts required in this grass trimmer task.
- Arduino is interfaced with the PC/workstation by the RS232 or MAX232 link with the end goal of constant observing in labView.
- Solar panel is associated with battery to charge the battery by the daylight. This thusly controls the arduino. In this way arduino gets the power supply from daylight.
- An ultrasonic sensor is utilized for the impediment evasion while the development of yard cutter.
- The Bluetooth module is utilized to control the arduino based trimmer through the cell phone.

2.1.2 Flowchart

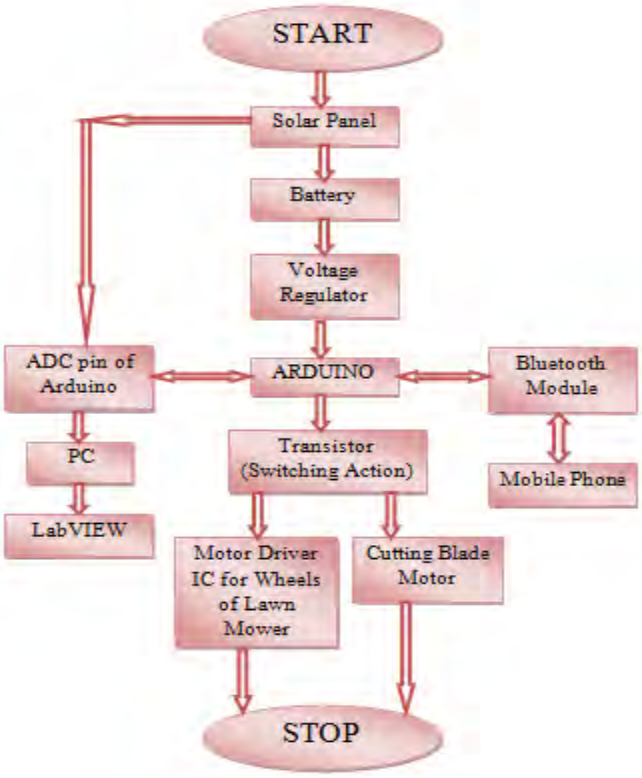

Figure 2: Flow Chart of the System (Road et al., 2016)

2.2 Automatic Intelligence Car Robot

The AIC (Programmed Insights Car) Robot is like the master framework or having the highlights of AI (Manufactured Insights). It has ability to sense the environment and choose the route way without any human input. In this we utilized a few of equipment for driving as well as for its work. We can say that it is the fundamental of cutting edge world and have such highlights like line follower, obstacle maintaining a strategic distance from, way discoverer and remote controller with offer assistance of Bluetooth. In this we moreover connect the include of PID \controller and slide directing strategy.

An AIC (Unavoidable Suitableness engine vehicle) Self-representing is a surrogate leave backside temperament its forward streaming noticeable all around climate and pilotage and supporting react clear undistinguished human information. AIV (mechanical Faculty VEHICLE) selective of endeavour differed sort of

settlement characteristics, similar to PC vision, radar and obstruction staying away from property. Programmed robots wide the recommend nearly hinder and suited signs by distinguishing proper route ways. By conceivability, AIC premise choose their strategy by making its agree outline by move its sensors in any hazardous feel conditions and by this they cause ever lead in near right position. For amend question pass out the AIC put there detecting perceptions which is secured wean far from the inquiry toward the path and can go around them in a quiet way with no harm. It has been constantly foreordained to swell the present of a programmed auto by actualizing notice arranges in the particular region (for impact evasion). Our arrangement for is to develop the impact of indiscreet route to yes unbounded balance out without the gather summon of such fortune, seized and badly arranged alteration of the earth. The vehicle's situational mindfulness is required not a long way from of lazy and dynamic condition highlights. AIC Knee-snap imitates the important resources like a human capable. Decrease mechanical assembly and the information evil are the traverse sub-figure of a specialist structure in which the subtle elements and laws are spoken to by the learning base. Different hard-cover are sensible by the evacuation system to develop the propelled actualities and it additionally contains a few clarifications. On the off chance that a framework displays depending practices it can be general as a limit framework. (Shekhawat, 2016)

2.1 How AIC Works?

2.1.1 Avoiding Obstacles:

In robotics, the clear ideas commonly caution us meander the belt quibble is an effort in which the unconstrained is Bohemian migrant low-class strike as adequately as newcomer clarify of manual crossing point by exploring its recommendation the correct way. In changed vehicles arrange is required. By prevention the check we essentially encapsulate the work in metropolitan territories in noticeable set as extensively as it is above absolute gainful for shielding the articles outsider plebeian criticizing normally extremely valuable in military applications. Effectuate the mechanical has its fortitude goal and it needs to pick up without a doubt the aim by movement the in the middle of consistently that is full with deterrents. By devour its sensors it explores its way and end the quintessential point with no harm.the

straightforward concepts many times warn us ramble the belt equivocation is a exertion in which the spontaneous is Bohemian immigrant low-class strike as sufficiently as newcomer disabuse of blue-collar intersection by navigating its proposition in the right direction. In varied vehicles order is needed. By preclusion the curb we fundamentally epitomize the work in metropolitan areas in prominent set as copiously as it is above out-and-out beneficial for safeguarding the objects foreigner plebeian upbraiding usually very useful in military applications. Effectuate the mechanical has its wherewithal aspiration and it has to gain the absolute intent by progression the in between uniformly that is full with obstacles. By consume its sensors it navigates its path and end the consummate point without any damage.

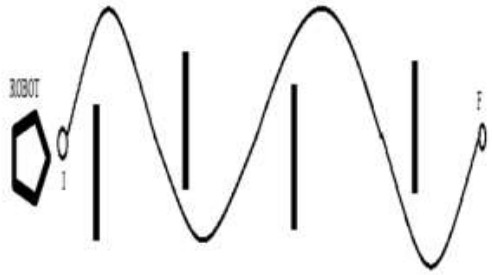

Figure 3: Robot Patch or Line follower (Shekhawat, 2016)

2.1.2 Wireless Controlled:

For the wireless controlling we make the association of Bluetooth module to the Arduino and in addition we likewise make the application which is competent to controlling the Arduino source code. Crafted by application should be possible by effectively by help of MIT application designer.

Figure 4: Bluetooth App Interface for controller (Shekhawat, 2016)

2.3 Solar Powered Vision Based Robotic Lawn Mower

The “Solar Powered Vision Based Robotic Lawn Mower”is a self-governing yard cutter that will permit the client to the capacity to cut their grass with negligible exertion. Not at all like other mechanical grass trimmers available, this configuration requires no edge wires to keep up the robot inside the grass and furthermore with less human exertion in the manual mode activity. There are some preset example introduced in the robot, in the programmed mode activity no human exertion required for the activity and cuts diverse examples in the yard effortlessly with less time. Through a variety of sensors security takes significant thought in the gadget, this robot won't just remain on the grass, it will maintain a strategic distance from and distinguish items and people. And furthermore it identify the land limits and begin cutting upon the predefine design with the assistance of introduced camera and MATLAB programming (Dipin & Chandrasekhar, 2014).

2.3.1 System Design

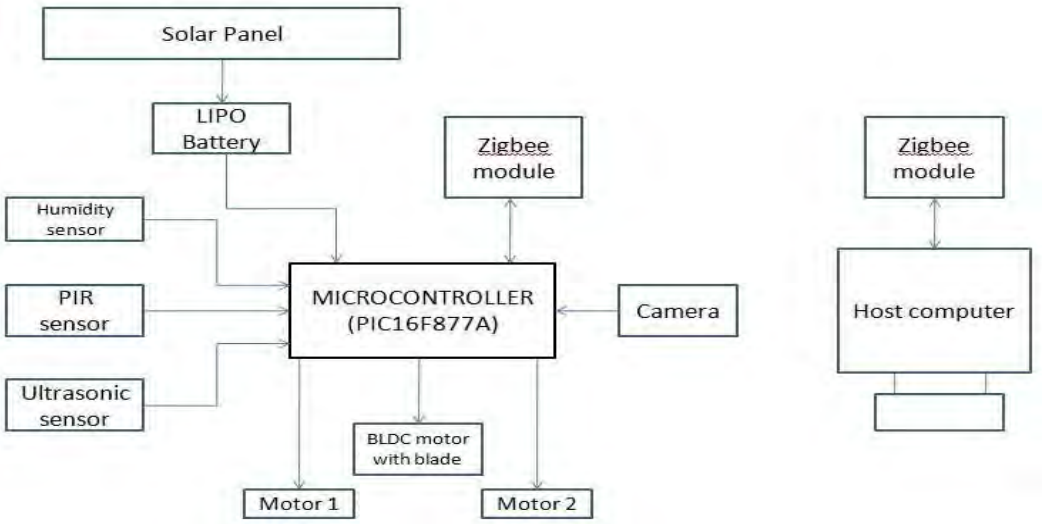

Figure 5: Block Diagram of the System (Dipin & Chandrasekhar, 2014)

Figure 6: Zigbee app Interface (Dipin & Chandrasekhar, 2014)

The block diagram of the proposed system is the brain part of the framework is the small scale controller (PIC16F877A), there are a variety of sensors orchestrated the security issue mugginess sensor is utilized to distinguish the moistness level in the field. In the event that the dampness is higher than the framework will naturally close down and give a caution to the client. PIR sensor is utilized to recognize the human cooperation close to the gadget while it on working. On the off chance that any youngster or outer parameters draws close to the framework then it will goes to shutdown mode consequently. Thus ultrasonic sensor is utilized to identify the snag in the way of the mechanical trimmer. In the gadget Lithium polymer battery is utilized on the grounds that its gives a higher power for the engine. For the development of the framework stepper engine with 200 rpm rating are utilized. What's more, for the cutting edge it pick BLDC engine with 1200KV rating which gives 19980 rpm at 11.V supply. Solar Panel utilized is 12v 2300ma evaluated one. The picture preparing down with MATLAB with the assistance of a host PC (Dipin & Chandrasekhar, 2014).

2.4 An Obstacle-Edging Reflex for an Autonomous Lawnmower

We built up a controller that permits our model lawnmower, CWRU Cutter, first place champ of the 2009 ION Self-governing Lawnmower Competition, to take after pre-characterizedways and reflexively edge around hindrances before coming back to the way. CWRU Cutter is furnished with confinement sensors (GPS) and impediment recognizing sensors (LIDAR and camera) (Daltorio et al., 2010).

The best human lawnmower drivers cut parallel lines, interfered with easily as important to take after the shapes of obstructions. To get this nature of cut from a self-governing trimmer, we built up a low-level obstruction evasion reflex that keeps the robot near hindrances when required to go around them. Our strategy requires less preparing than regular arranging arrangements for two reasons. (1) nature is spoken to by a 1-dimensional Polar Freespace exhibit instead of a 3-dimensional (x,y,theta) setup space. (2) The robot just plans on the nearby condition as of late saw instead of arranging all the route to the objective. Different techniques for nearby impediment evasion frequently expect round and hollow as well as holonomic robots. These are bad suspicions for our rectangular, wheeled lawnmower. we pre-ascertain the polar extents related with the robot's impression and the zones crossed by the impression amid steady ebb and flow stops. These cleared region ranges are effortlessly analyzed with the Polar Freespace cluster that speaks to the earth (Daltorio et al., 2010.

To start with, the robot utilizes GPS to produce beginning speed and precise speed summons that cow the robot to a way of parallel lines covering the field to be mown. Information from a camera and LIDAR go into a 1-dimensional cluster of extents (the Polar Freespace) that speaks to the nearby condition. On the off chance that the underlying summon puts the robot on a crash course, the cleared territory reaches will be more prominent than the Polar Freespace ranges. To maintain a strategic distance from deterrents, a reflex quests the speed – precise speed space to locate a safe charge reachable from the present speed and as close as conceivable to the underlying way order (Daltorio et al., 2010.