UNIVERSITI TEKNIKAL MALAYSIA MELAKA

PORTABLE PCB ETCHING MACHINE WITH DEVELOPING OF INTERNET OF THING(IOT).

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronics Engineering Technology (Electronic Industry) with Honours.

by

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APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronic Engineering Technology (Industry) with Honours. The member of the supervisory is as follow:

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ABSTRACT

This project is about the design of portable machine for PCB by using the microcontroller with the implementation of IOT (internet of things). The design is to make the work easier and to shorten the processing time. During the etching process begins, it takes a lot of waiting time to complete it. Futhermore, by developing IoT, there will be no shortage of workers. Additionally, when refilling chemicals for ecth, the machine does not issue a warning to indicate that the operating limit of the machine is in excessive extent, it requires the sensor to detect the limit.Therefore, the Internet of Thing can solve the problem. The Internet of Thing (IoT) is a very exclusive product for this era where everything is about doing the work only through smart hardware platforms. The data from various types such as Arduino, Raspberry Pi, Orange Pi etc.For cloud-based services such as Firebase, Amazon Web Service, Canne and Blynk.This etching machine platform is arduino, where arduino is a microcontroller that acts as a processor. Internet bridge objects are esp8266 to make it connected to the internet or wifi.The cloud-based services for this project is Blynk.By applying the internet,the machine will be smarter, monitors, remotely control and receives notifications via wifi to smartphone. For sensors, the sensor to be used is an ultrasonic sensor.This machine will tell the warning through smartphone by sending notification if the chemical reach the limit.After that,this machine will start at the setting time and send notification to the smartphone. This machine will also stop at the setting time and send notification to the smartphone.

ABSTRAK

Projek ini adalah mengenai reka bentuk mesin mudah alih untuk PCB dengan menggunakan mikrokontroler dengan pelaksanaan IOT (internet of thing). Reka bentuknya adalah untuk menjadikan kerja lebih mudah dan memendekkan masa pemprosesan. Semasa proses etch bermula, ia memerlukan banyak masa menunggu untuk menyelesaikannya. Selain itu, dengan membangunkan IoT, tidak akan ada kekurangan pekerja.Selain itu,semasa mengisi semula bahan kimia untuk ecth,machine tidak mengeluarkan amaran untuk memberitahu bahawa had mesin beroperasi berada dalam takat berlebihan,ianya memerlukan sensor untuk mengesan batas tersebut . Oleh itu, Internet of Thing boleh menyelesaikan masalah ini. Internet Thing (IoT) adalah produk yang sangat eksklusif untuk era ini di mana segala-galanya adalah tentang melakukan kerja hanya melalui platform perkakasan pintar. Data dari pelbagai jenis seperti Arduino, Raspberry Pi, Orange Pi dll. Untuk perkhidmatan berasaskan awan seperti Firebase, Amazon Web Service, Canne dan Blynk. Platform mesin etch ini adalah arduino, di mana arduino adalah mikrokontroler yang bertindak sebagai pemproses . untuk meanghubungkan arduino dengan wifi,Esp8266 digunakan untuk ia bersambung ke internet atau wifi.Dengan menambahkan ia kepada internet, mesin akan lebih pintar, yang boleh memantau, menjadi kawalan jauh dan menerima dan menghantar pemberitahuan melalui wifi kepada telefonpintar.Untuk sensor, sensor yang akan digunakan ialah sensor ultrasonik. Mesin ini akan memberitahu amaran melalui telefon pintar dengan menghantar pemberitahuan jika bahan kimia mencapai had. Mesin ini akan bermula pada masa yang ditetapkan dan menghantar pemberitahuan kepada telefon pintar. Mesin ini juga akan berhenti pada masa yang ditetapkan dan menghantar pemberitahuan kepada telefon pintar.

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A great deal of guidance and help was required for the success and final result of this project from many, and I am delighted to have this completed throughout the entire project. All I did is because of such supervision and help, and I wouldn't forget to thank them.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

This general section will provide an outline of how the web-based pcb etching machine system (IoT) was developed. Next, a description of background and problem statement about portable pcb etching machine with developing of Internet of thing(IoT). It'll then be followed by a objectives the study and the range of scope for portable pcb etching machine with developing of Internet of thing(IoT). It is going to focus on machine and the appropriate system scheme portable pcb etching machine with developing of Internet of thing(IoT).Moreover,how to make the machine to attach with Internet of Thing such as mobile apps and web server to control start and end button, set timer,control speed and receive notification via smartphone or web server.

1.1 Background of Study

Etching is the process of using strong acid or mordant to clean up the unprotected part of a metal surface.The etching process now this day may be used other chemical material,microwave plasma,converyor and many other in this industry.All this machine could possibilities create to be a fast cleaning process and also be the one who is more top of the cleaning.For sophisticated cleaning etching process is possibilities needed to carefully monitored to make the quality product of the PCB board from time to time eventhough after working hour by monitoring at home or anywhere.For study and understanding of this project,etching machine process the develop of etching machine process to make a better quality of the product can not be done because it is higher costing.

The objective of this initiative is to create a scheme that can connecting the etching machine with a wireless network by controlling and receive notifiacation via smartphone or web server.Other than that,the focus of this project is to monitoring the machine while doing the process by display through smartphones or web server and sending the data through cloud computing

1.2 Problem statement

PCB etching machine is the process of etching usually will required a lot of times until the process is finish to ensure the quality.It is wasting a time and energy of human being just to wait the process until it finish. Besides that,the workers will need to leave the machine without a monitoring in case emergency happen to the workers and no replacement for that time shift. It will affect the timing, quality and production of PCB if it is delayed to release and reinsert the new PCB.Futhermore,the etching machine usually heavy and not easily to carry everywhere.It will waste a energy and time to move the machine from other place to other place.Other than that,when changing the ferric chloride,there is no alarm or notification to tell if the ferric chloride reach the limit for the machine to start the process.

1.3 Objective

Based on the statement of issue mention,a few objective that can be achieve. The objective for this venture can be fulfilled is:

1. To develop machine to monitor the machine process until the process is finish.
2. To apply the IOT technology as a medium for the user to set time and receive notification about sensor detection and when machine start and already done etching via smartphone or web browser.

3. To apply an arduino microcontroller to develop into this machine to create an internet of thing(Iot).
4. To develop the portable machine that can easily lifted,carried away and setup to any place,everywhere.

1.4 Scope

Based on the objective,there has few scope This could be the case to achieve.The several scope for this project is:

1. To focus the use of internet of thing(IoT) through smartphone or webserve help the users to control and monitoring form far away thus make the production a lot faster and better.
2. To focus on application of Iot to make it receive notification when sensor detect and setting time.
3. Arduino is an open-source software where it’s a platform that give a user a space to create their own instruction in the Arduino board.
4. As the etching machine,it will be use the simple way of etching just to make the portable etching machine that can be bring anywhere.

1.5 Expected Result

As for this project's expected outcome of develop the portable etching machine with internet of thing(IoT) is it will work well so that the machine can be use anywhere.Also,can be control and monitoring from far away via smartphone and web serve.Next,after finishing the process the machine willgive an notification via smartphone and web serve.

CHAPTER 2
LITERITURE REVIEW

2.0 Introduction

These section is a literature review that have been to summarize all related factors work For each investigation on portable etching machine with developing of Internet of Thing(IoT). Most of the data is collected from the journal, article, and adequate website.A background and how portable etching machine with developing of Internet of Thing(IoT) this section will cover. In addition, this section will also summarize the role of portable applications for PCB Etchimg device connecting to Thing(IoT) Internet.. Moreover, this section will be addressed as summarize to some of past study in connection with PCB Etching machine and any Internet of Thing(IoT) project type.

2.1 Past Related Project Research

2.1.1 Internet of Things (IoT): Integration of Blynk for Domestic Usability

This is about the usage of Blynk for Domestic Usability such as home automation,industrial automation and others..It also show the step by step on how to make the IoT product by using Blynk and other of main hardware component such as arduino and esp8266.For blynk there is three major component that is Blynk apps for interfacing of various project,Blynk server it is in charge of all communications between your mobile phone and devices and Blynk libraries it allows communication on every common hardware platform.

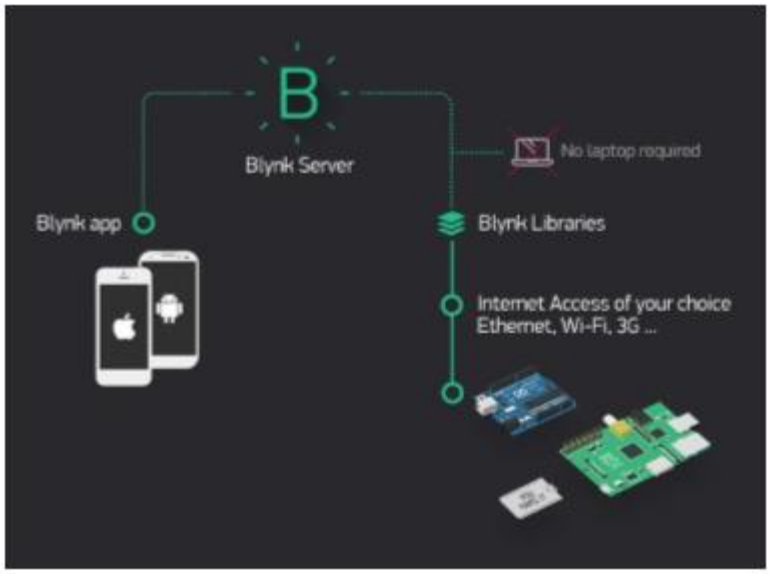

Figure 2.1: Architecture of the Blynk cloud.

Arduino is using because arduino is simple to use, , free Documentation of the source and great society of Arduinos.Also,esp8266 is being use to make a connection between arduino and blynk server.(Doshi, Shah, & Shaikh, 2017)

2.1.2 Automatic PCB Inspection Systems

This project is a project to detect the defect of printed circuit board(PCB). It can extract subjective elements and deliver quick and quantitative dimensional evaluations. This implies improved performance at a reduced price. Automatic visual testing has become component of the setting of manufacturing based on the following criteria.

Procedures for PCB defect identification can be widely Electric / contact split in two groups methods and electrical methods non-electrical / non-contact testing be very difficult because the design is complicated and difficult to detect defects. Another method is automatic visual / optical inspection. This method can detect bare board faults different from short open, for example error in line thickness, pan mousebites and trancemailing.. It can recognize defects such as

spec, line width, line spacing, evasions, pin holes and many others. This AOI is not confined by inspection of the design grid and can also inspire artwork and provide a strict product.

Another method is X-ray imagery where it is used for quick and accurate measurement. X-ray imagery can also detect such hairline cracks that escape other inspection methods. Also Scanned-beam laminography is a A cross-sectional X-ray technique imagery that divide top and bottom or any other layers layers that provide imagery. The last method is the thermal imaging system, which indicates a hot point in operating PCBs with shorts and excessed components. Ultrasonic imaging is the best method to detect solder joint defects like internal void, crack, and dissbands.(Moganti & Ercal, 2002)

2.1.3 Wireless Sensor Networking, Automation Technologies and Machine to Machine Developments on the Path to the Internet of Things

The Internet of Things (IoT) is the next significant innovation in the portfolio of Internet computing In addition to the technological challenges, IoT has many economic and social challenges. This latter is a result of the high prevalence of IoT-based technological artifacts and implementation of apps for machines without or without the minimal human participation. In many industries, the technological developments that shape IoT visions are obvious including computers, telecommunications, construction and logistics.

The use of the internet has become increasingly common in Europe, Asia and the USA around the world. The National Intelligence Council, according to the US. A universe in which machines relieve the sisyphean strain of data entering was created through an automatic collection, storage and treatment of all the appropriate information about humans in the first internet of the things.. Several collaborative research efforts have been conducted in Europe. The projects for

FIREworks were European Union (EU)-funded coordination and support action to address interoperability and linkages between test bed Europe's operations and associated worldwide projects. His job is now transferred to the FIRE initiative to speed up the spread of revolutionary study concepts technologically innovative by experimenting large-scale federal validation test bed installations.

The last decade was used extensively for RFID tags for communication engineering in the near field, also recognized as NFC. This particular technology makes tracking, stock management efficient and also lightweight items anti-theft security easy and reliable.

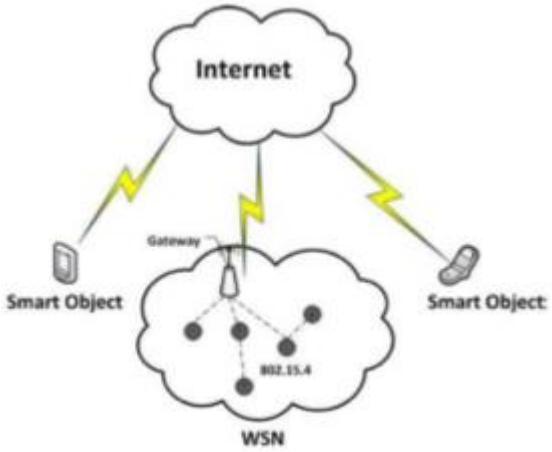

Figure 2.2:Intergration of WSN into IOT

WSN is one of the IoT paradigms ' main components.Advantages of remote access goes beyond the connection of WSN and other components because heterogeneous data technologies can cooperate and serve.. The deployment of configured WSNs for Internet access, however, poses new challenges, to which many of the benefits of such integration need to be addressed in advance. The most effective, scalable and flexible approach forms a network access point which allows multiple network gateway nodes to connect to the Internet (figure 2.2). There are many internet connection approaches to WSNs.

Certain best practices regarding topology and the type of traffic were proposed, based on the quality criteria of each application. If no traffic differentiation or strict delay limitations are achieved, random topology ensures Saving much stronger power (83 %), output (19%) and the The shipping proportion of packets (6 %) to star topology, Random topology The finest topology.(Gazis, Sasloglou, Frangiadakis, & Kikiras, 2012)

2.1.4 Surface Mounted PCB Cleaning Process Improvement and Its Impact on Manufacturing System Performance

This thesis shows a project on the Vicor Corporation in Andover, MA, which is the result of research in the Vicor Corporation's manufacturing facility in Andover, MA, that produces electronic systems solutions for the highly specialized electronics industry.

PCB cleaning is the process by which soldering flux residues and other stray particles have been removed from the surface of PCB following the SMT process. The stream of metal oxide in the soldering paste reacts and forms metal salts. PCB cleaning is the process of removal from the PCB surface after the SMT process of the solder flux residue and other stretched particulates. The flow of the pulp reacts with metal oxide and forms metal salts.

Time and temperature are two key parameters that affect cleaning process efficiency. The longer a product becomes exposed to turmoil, the better the cleaning. Temperature has an influence on cleaning by changing the solvent's surface tension, altering flux residue solubility, increasing the reaction rate and/or activating the chemical present in the solvent.

The cleaning method has two main methods: agitation and chemical methods. The agitation methods have three main methods: centrifugal cleaning,

in-line cleaning and ultrosonic cleaning. The centrifugal cleaning of simple DI water to chemical solutions containing surfactants or solvents after using the agitation induced by the centrifugal force in a liquid medium.

The second largest method to be mentioned is Chemical methods. This method uses only acid that tends to reduce the surface tension of DI water so that it can reach the product's minute pockets and remotely accessible areas.(Rajendran, Chun, Supervisor, Hardt, & Ralph, 2011)

2.1.5 Method and apparatus to clean and cleanliness test printed circuit boards

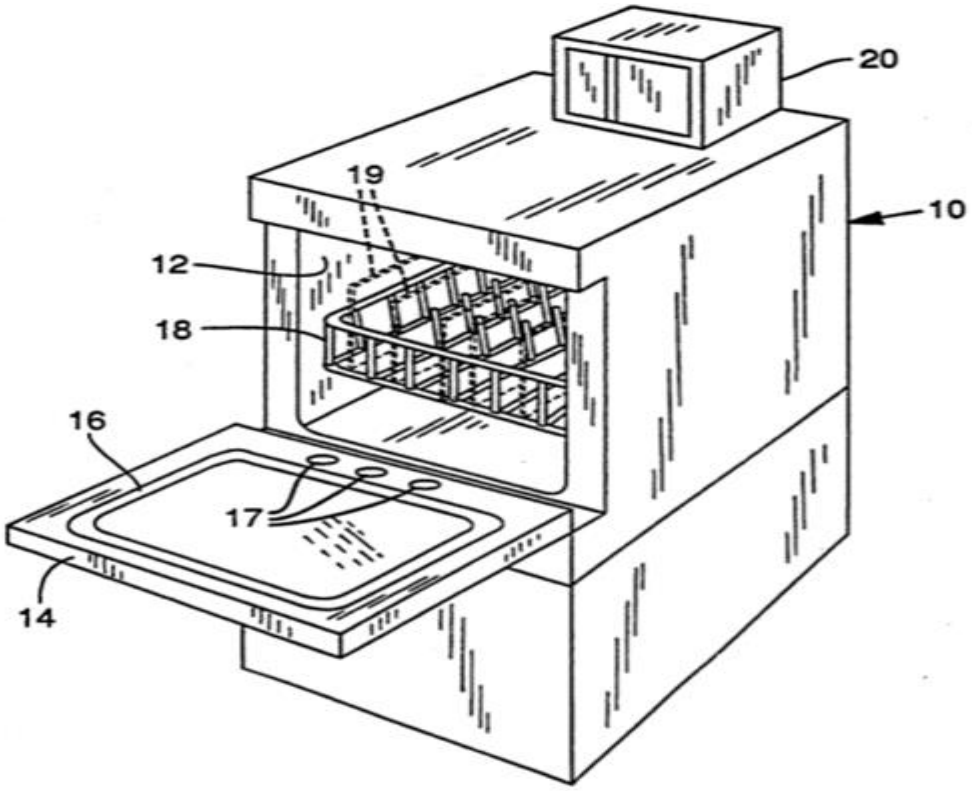

Figure 2.3:Cleaning machine for PCB board.

This machine is typically used to clean the PCB board, which is commonly used to solder the circuit to remove any defects in any PCB board. The device