INDOTECH
Indonesian Journal of Education And Computer Science
Vol. 1, No. 2, Agustus 2023
Hal 73-81
E-ISSN : 2987-2650
P-ISSN : 2987-7644
Site : https://jurnal.intekom.id/index.php/indotech

# Internet Of Things Based Milling Machine Design Using Esp8266 Nodemcu

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**Article Info**

***Article history:***

Received August 15, 2023
Revised August 15, 2023
Accepted August 31, 2023

**Kata Kunci:**

Mesin giling berbasis *IoT*,
NodeMCU ESP8266,
Kendali jarak jauh,
Pemantauan *real-time*,

***Keywords:***

IoT-based grinding machine,
NodeMCU ESP8266,
Remote control,
Real-time monitoring,

**ABSTRAK**

Penelitian ini memaparkan rancangan dan pembangunan mesin giling berbasis Internet of Things (IoT) menggunakan NodeMCU ESP8266. Tujuan utama proyek ini untuk mengintegrasikan teknologi IoT dalam mesin giling guna meningkatkan kendali, pemantauan, dan efisiensi proses giling. Dengan menggunakan NodeMCU ESP8266 sebagai mikrokontroler yang terhubung dengan jaringan WiFi, mesin giling dapat diakses dan dikendalikan secara jarak jauh melalui perangkat yang terhubung ke internet. Pengguna dapat mengakses platform ini untuk memantau kondisi mesin dan mengontrolnya sesuai kebutuhan. Dalam penelitian ini, fokus diberikan pada desain rangkaian, pengembangan perangkat lunak, dan integrasi sistem secara keseluruhan. Hasil pengujian ini dilakukan dengan mengirimkan perintah motor dc hidup, monitoring nilai kecepatan motor dc, monitoring status giling, tombol penutup penampungan, dan tombol reset. Hasil pengujian menunjukkan bahwa mesin giling berbasis IoT ini mampu memberikan kontrol yang lebih baik, pemantauan real-time, dan efisiensi dalam proses penggilingan. Dengan demikian, penelitian ini menggambarkan penerapan IoT yang sukses dalam dunia industri mesin, membuka peluang untuk pengembangan lebih lanjut dalam bidang ini.

***ABSTRACT***

This study presents the design and development of a grinding machine based on the Internet of Things (IoT) utilizing NodeMCU ESP8266. The primary objective of this project is to integrate IoT technology into the grinding machine to enhance control, monitoring, and grinding process efficiency. By using NodeMCU ESP8266 as the microcontroller connected to a WiFi network, the grinding machine can be accessed and remotely controlled through devices connected to the internet. Users can access this platform to monitor the machine's condition and control it as needed. In this research, the focus is on circuit design, software development, and overall system integration. The testing results are performed by sending commands to start the DC motor, monitoring the DC motor's speed value, monitoring the grinding status, lid closure button, and reset button. The testing results indicate that this IoT-based grinding machine provides better control, real-time monitoring, and efficiency in the grinding process. Thus, this research portrays a successful implementation of IoT in the machinery industry, opening opportunities for further development in this field.

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## 1. INTRODUCTION

The growth of science and technology is currently growing rapidly along with the progress of the human mindset which is increasingly advanced today. The speed with which humans accept technological sophistication is greatly influenced by several factors such as the existence of technological facilities, the convenience of using them, and the adoption of technology that continues to grow [1]. These conditions inspired the authors to create a sophisticated device product that is economical and efficient with qualitative results. Because it cannot be avoided that the presence of technology in our lives is very helpful, especially when it comes to work [2].

In everyday life humans often do grinding activities for example in industrial activities. This activity is carried out not only in large industries but also small industries. An example of MSMEs around us who carry out grinding industrial activities is the tempe home industry. Tempe and its processed products are very potential products from an economic point of view [3]. Usually, there are industrial activities that use traditional methods and use machines. The traditional method is still using a manual milling tool, which is like using human power by pounding until smooth for grinding peanuts, and for grinding soybeans, namely by stepping on it with your foot so that the peanuts are split into two pieces. Of course this method will take a very long time and is not efficient. Therefore we need a machine that is able to utilize mechanical power which functions to do certain jobs to help humans in working on products [4]. Along with the times, this wet peel method has been replaced with a grinding machine because it considers production efficiency, time and results [5]. This is because the Indonesian people's consumption of soy-based products is dominated by tempeh (50%), tofu (40%), and other processed products such as tauco or soy sauce [6]. There are two types of engines used, one of which is using a diesel engine that uses fuel oil to drive the engine. And using a dynamo motor engine which is continued by a pulley (pulley) using a V-belt as a link to the grinder. So that there is a rotation of the grinder used for grinding meat [7].

Besides that, the dynamo motor machine can also use the Internet of Things. In addition to expanding knowledge about technology, IoT also speeds up and simplifies operating processes such as turning on and turning off machines via cellphones [8]. Not only turning on and turning off the machine when using the Internet of Things, we can control the speed of the machine so that we can adjust it according to the needs of the grinding process. In this study the authors used the NodeMCU ESP8266 microcontroller as a communication module that connects the internet to the machine. NodeMCU has packaged the ESP8266 into a compact board with various features such as a microcontroller + Wi-Fi access capability as well as a USB to serial communication chip. So to program it, you only need a precision USB data cable extension that is used as a data cable and Android charging cable [9].

The operating voltage of the ESP-8266 is 3.3V. Therefore, when using an additional microcontroller, it is recommended to choose an Arduino board that has a 3.3V voltage source.

However, it is more advisable to make a separate level shifter to manage the communication and voltage source of this wifi module. This Wifi module has a Microcontroller and GPIO which allows many developers to develop firmware that allows the use of this module independently without the need for additional microcontrollers. This firmware is used to ensure standalone performance of this wifi module. [10].

## 2. METHOD

This study uses a direct monitoring concept prototype method and allows repeated changes to be made until the desired results are achieved. So this prototype method makes it possible to display the view directly. The location of this research is in the Tempeh Manufacturing Home Industry. In general, the planning of the design of the tool is as follows:

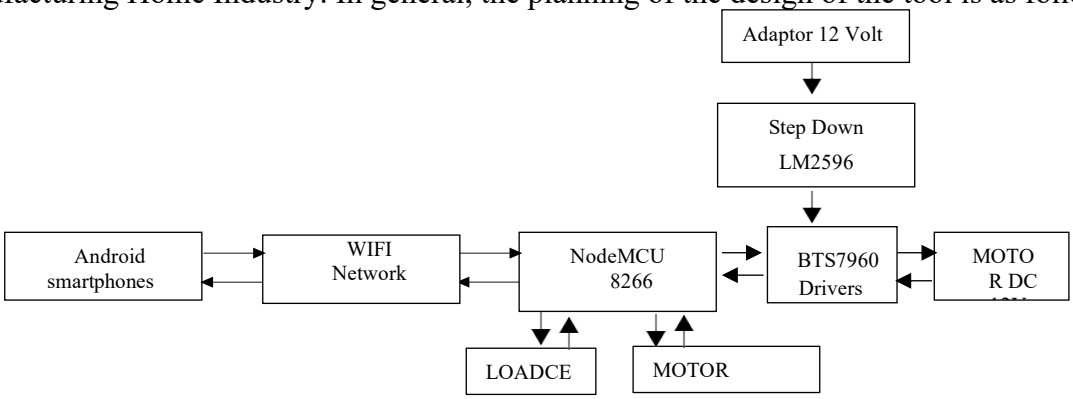


Figure 1. System Block Diagram on the NodeMCU ESP 8266 Board

### 2.1 Flowchart

The following is the flowchart design used in this study:

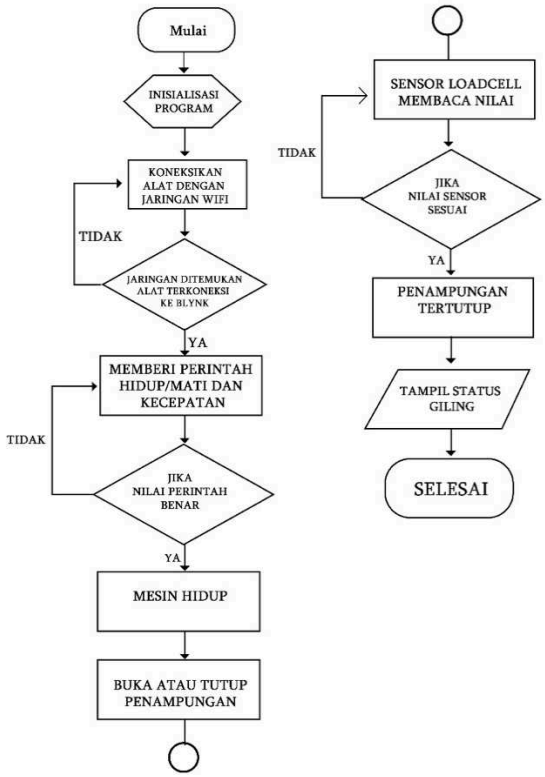


Figure 2. Drive and Fogging System Flowchart

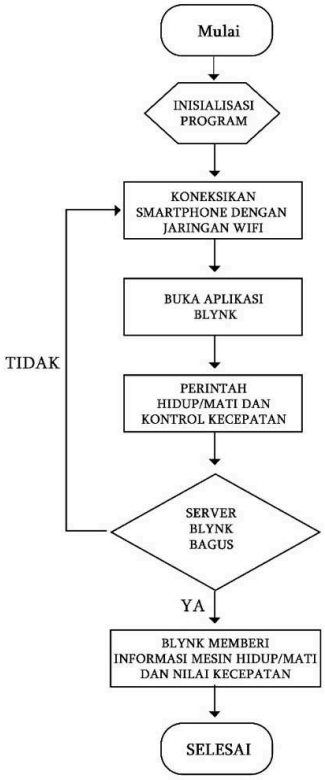


Figure 3. Blynk Server Flowchart

## 3. RESULT ANDA DISCUSSION

Testing in this study was carried out in several ways, namely testing software, hardware. This test aims to determine whether the tool designed is in accordance with the target to be achieved.

### 3.1 Software Testing

The point is to confirm whether the NodeMCU ESP8266 Microcontroller is operating properly in the device. This test involves writing command programs on the microcontroller and sending data from the computer to the microcontroller. In order to do the installation, first of all, you need to connect the computer with the downloader via a USB cable to the microcontroller circuit. To test the device using commands, you can follow the following steps:

1. The initial stage is carried out by running the Arduino software. Once the application is initialized, the interface will appear with a look similar to that shown in the image below:

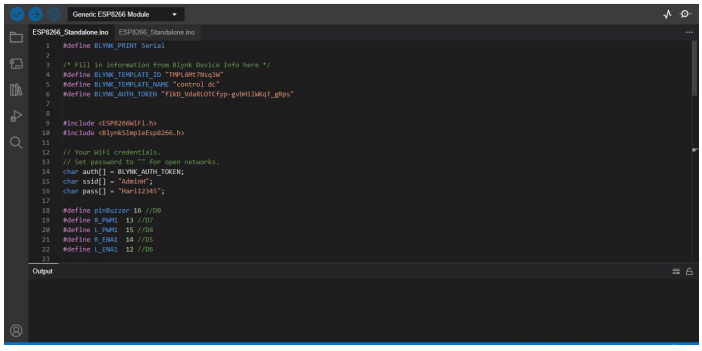


Figure 4. Arduino Software Display.

2. The next step in programming the Arduino Uno Microcontroller is to generate program code according to the needs of the device. The illustration of this step is explained in the following image:

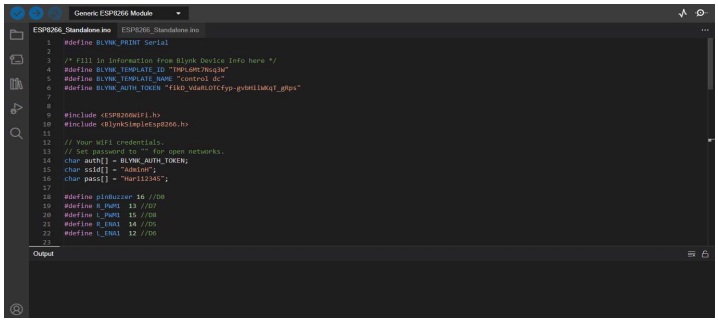

Figure 5. Program Display

3. Before proceeding to the microcontroller installation stage in the program that has been set, it is important to save the program that has been made before running the compilation process. The program storage process can be found in the following figure:

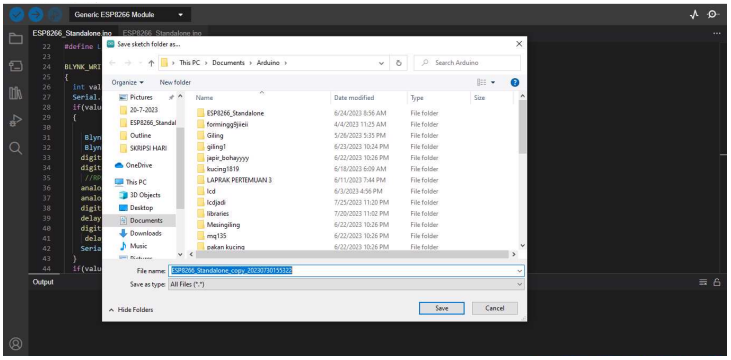

Figure 6. File Storage Process

4. To proceed to the microcontroller installation stage, make sure the program has been tested by clicking the "Compile" button or using the icon that functions to configure the program into the Microcontroller Chip. At this stage, you can check for errors in the created program. If successful, a "No errors" message will appear. The compilation process can be observed in the following figure:

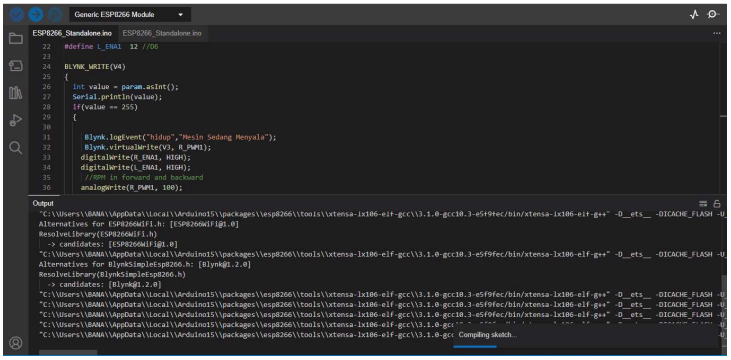

Figure 7. Compile results

3.2 Device Testing

If all the circuits that are ready are designed in "Design of Milling Machines Based on Internet of Things Using Nodemcu Esp8266", the next process is the unification of all the circuits that have been completed. The following is a picture of the results of the system design:

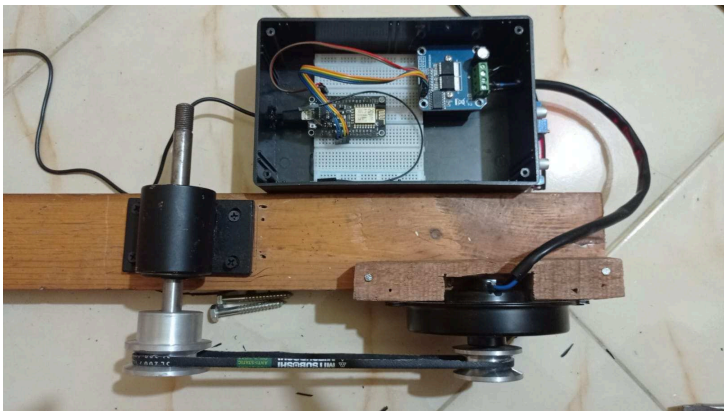

Figure 8. Overall from Hardware

After all the components are installed and the program has been successfully designed, the next step involves testing the device. This testing process is carried out in stages, moving from one circuit to the next. The aim is to ensure satisfactory performance of the microcontroller circuit. At this stage, testing is directed to verify whether the microcontroller circuit is functioning properly. The implementation of this test involves giving the program to the NodeMCU ESP8266 microcontroller. This part of the test can be carried out by transferring the program from the computer to the NodeMCU ESP8266 microcontroller. First of all, the downloader is first connected to the computer via a USB port. Application programs are written using C language on the Arduino software, then compiled and transferred to the microcontroller. If the data transfer process runs without errors, this indicates that both the downloader and the microcontroller are in good condition.

3.3 Final Results

On the results of this test, a test is carried out by sending the command for the dc motor to start, monitoring the speed value of the dc motor, monitoring the milling status, the shelter closing button, and the reset button as follows:

1. Research results by sending the command for the dc motor to start, the smartphone will display on the widget the position to the right:

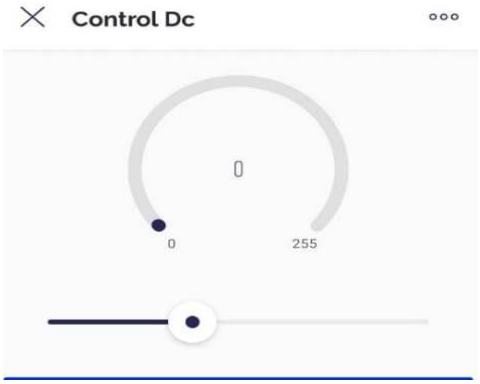


Figure 9. Research Results Sending DC Motor Commands On

2. The test results by sending the command to open the peanut shelter cover, the smartphone will display the shelter button as shown below.

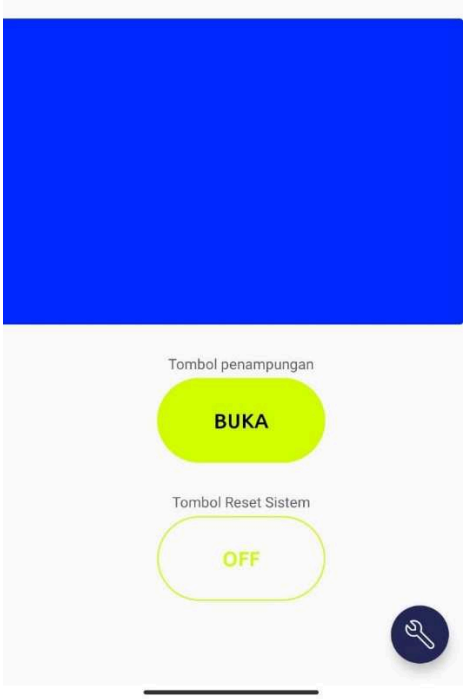


Figure 10. Test results for the open button on the shelter

3. The test results by sending a system reset command, the smartphone will display a reset button as shown below.


Figure 11. System Reset Button Test Results

4. The results of the speed value monitoring test, the smartphone will display a gauge like the image below.


Figure 12. Speed Value Monitoring Test Results

## 4. CONCLUSION

The lm2590 voltage reducing circuit serves to provide a voltage supply from the battery to the BTS7960. the output of this step down circuit is 5 volts. This tool can be used easily to assist the production process or manufacture of raw materials. the dc motor is controlled via the bts7960 motor driver which is given commands by the NodeMCU ESP8266 microcontroller. NodeMCU ESP8266 functions as a processor, receiver and sender of data on IoT-based milling machine tools.

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