Appropriate Technology for Palm Sugar Choppers Based on the Internet of Things

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Abstract. Gula aren, or gula merah, or gula kawung is a sweetener made from nira derived from the male flower clusters of the sugar palm tree. Palm sugar is usually also associated with any type of sugar made from nira, which is the liquid released from the flowers of trees from the palm family, such as coconut, palm, and siwalan. The powdered version of palm sugar is often also referred to as ant sugar or crystal sugar. This Internet Of Things (IoT) based palm sugar stirring process uses Internet Of things technology, Bluetooth and push buttons. The manufacture of palm sugar tools aims to simplify human work. This tool is controlled using the Mit App Inventor application found on Android. There is an AC motor as an automatic stirrer drive on the tool. To control each component using NodemcuESP32programmed using Arduino IDE, built using the adafruit Io server. On iot and Bluetooth there are 3 buttons on the android application, namely ON1, ON2 and ON3 with a total time of 3,600 seconds, the time data will be displayed on the LCD display. manual button on the tool that controls with a 2 channel relay as an electric switch, the manual button can be turned off immediately if you feel the palm sugar is ripe, using fire as a heat source and using MG995 servo to turn on the gas stove fire and power supply as a voltage source.

Keywords: Internetc of Things, Mit App Inventor, Motor AC, NodemcuEsp32, ArduinoIDE, Adafruit IO

1. Introduction

The rapid development of technology in the current era of globalization has provided many benefits in progress in various social aspects. The use of technology by humans in helping to complete work is a necessity in life. This technological development must also be followed by developments in Human Resources, Humans as users of technology must be able to utilize existing technology,as well as the subsequent development of these technologies. Human adaptation to new technologies that have developed is mandatory through education. This is done so that the next generation is not left behind in terms of new technology. That way, technology and education are able to develop together along with the new generation as the successor to the old generation. Some

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ways of adaptation can be realized in the form of training and education. Technologyalso plays a role in the industrial world such as in UMKM.

If technology is applied in the UMKM industry, information technology makes it very easy for humans to produce, process data and disseminate information. So that information technology in this era is very fast in development.The development of information technology so that human labor can switch to machine power. Apart from its speed, machine power is also more guaranteed accuracy and success in work. UMKM stands for micro, small and medium enterprises. UMKM care productive economic businesses run by individuals or small business entities. So that UMKM can be concluded as an economic business carried out by the lower middle class. Palm sugar is one of the food needs of almost every Indonesian community, both for household needs and for industrial needs. With the increasing variety and development of community needs, the need for brown sugar has recently increased.

This increase is certainlyThis requires efforts to fulfill it, one of which can be achieved by exploring sources of raw materials that can be made into palm sugar. Palm sugar is one of the main raw materials in the process of making cukopempek, which is one of Palembang's specialties. This is the livelihood of the "Jasmine Aren" micro business located on Jalan Sultan M. Mansyur Perum Bukit Permai Blok D Makarayu Palembang City. In the process of making palm sugar in Micro Business "Jasmine Aren" palm sugar is used as one of the staples in the process of making brown sugar. The palm sugar needs to be stirred to make it easier to mix or disrupt all the ingredients for making brown sugar. The process of stirring palm sugar used by Micro Business "Jasmine Aren" still uses manual labor. This causes the production process to still be classified as ineffective. Realizing this fact, the solution to improving the production system is from the manual method to using the utilization production method.Effective and efficient appropriate technology, namely by using a palm sugar mixer machine can be the first step in helping to increase brown sugar production. To reduce these problems

2. Design system

This design is an activity in designing and realizing the function of a tool by considering added value for the user. Designing is a very important stage in completing the final report. In designing and manufacturing this tool several initial steps will be taken. The most important initial steps in design are making block diagrams, making schematic diagrams, making circuit schematics, and the prototyping process. Then the next step is to select components and characteristics that are suitable for the final stage, namely mechanical manufacturing. To select components, a sheetbook is needed which can help in knowing the specifications of the components to be used in order to obtain good design results.

The aim of this design is to obtain a circuit that is appropriate and works well by considering the characteristics of the components used. This design is also very helpful in the process of selecting the components used for the tool to be made. Apart from that, with the design, the completion stages can be carried out well and systematically to produce a tool that has an accurate design structure and is in accordance with what has been made in the proposal. The design can also be a benchmark for further discussions later by paying attention to the use of components that are easily available

on the market. The following is a circuit design created with the aim of making it easier to install components because the location of the components is already known.

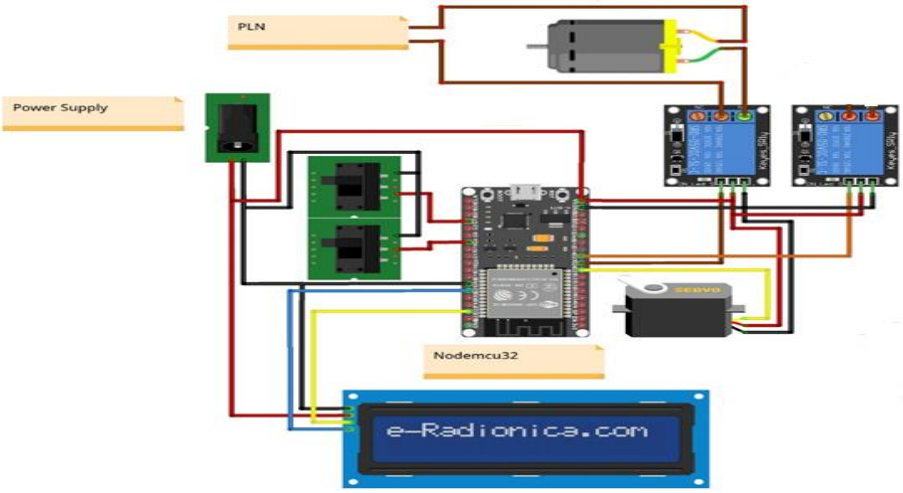

Fig.1. Design of a Complete Series of Palm Sugar Mixer Tools Based on the Internet of Things

Internet of Things based palm sugar stirrer is The working principle of the tool for designing an almost the same as the way a traditional palm sugar stirrer works, namely by stirring the palm sugar raw material continuously without stopping. The palm sugar raw material will be put into a large frying pan as a container for mixing the palm sugar. This mixing process uses a fire stove as a heat source. This tool will work when the adapter is connected to electricity.

The stove flame is regulated using IoT-based Android or Bluetooth. Then the stirring timer can also be set via smartphone, and the system will work. The i2c LCD functions to display data on the time used in the palm sugar mixing process, and the timer or time spent in the palm sugar mixing process, the data of which will also be sent to the smartphone. This palm sugar mixer machine will work when the electric motor is turned on, the mixer shaft will rotate.

The process of stirring palm sugar will stop automatically according to the time previously set via smartphone. The time required for the palm sugar mixing process is 60 minutes for 5kg of palm sugar. If there is internet interference during the mixing process, there is a button that can be pressed manually so that the mixing process can continue. This manual mode can be adjusted to the time we want for the stirring process by pressing the on/off button on the tool. When the stirrer shaft rotates, the palm sugar will mix itself. After the palm sugar is cooked. Then the palm sugar will be processed to the next stage, namely the cooling stage for approximately 15 minutes. After the palm sugar feels a bit cold, proceed to the molding stage, namely by putting the cooked palm sugar into the mold that has been provided. The mold is given a little oil so that the palm sugar does not stick. . This molding process takes 30 minutes for the palm sugar to harden and form. Then the palm sugar is ready to be packaged and marketed.

Next, the image below is Design of a Complete Series of Palm Sugar Mixer Tools Based on the Internet of Things.

Fig.2. Palm sugar mixer

3. Current Result

Measuring AC Motors using a Tachometer aims to determine the speed of the AC Motor when rotating the palm sugar stirrer. The AC Motor itself is an electric motor that works using AC voltage, namely with an alternating current source by looking at the length of time given when taking the measurement. The results of speed measurements on AC motors can be seen in the image below.

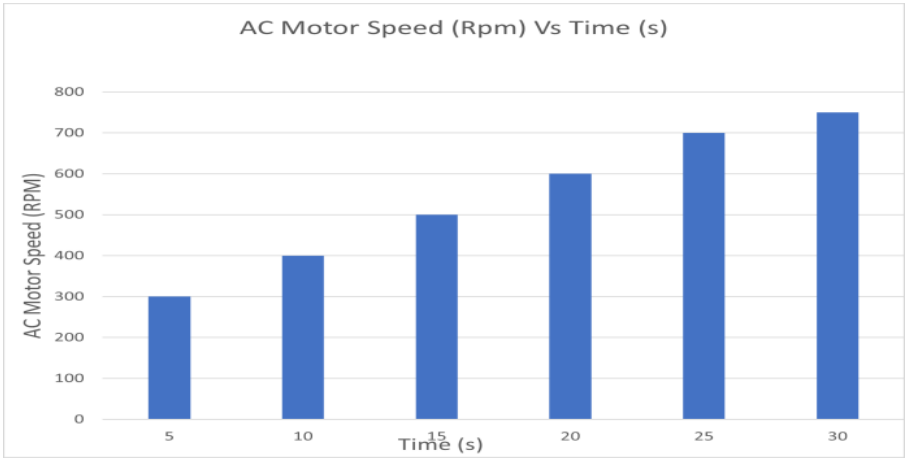

Fig.3. Speed AC motor Vs Time

Based on the image in the graph above, it can be seen that the length of measurement time will affect the results on the speed of the AC motor in Rpm units. The longer the measurement time given, the greater the resulting speed value. In the graph above there

is a measurement time from 0-30 seconds and the AC motor speed value is obtained at 0-750. Here it is proven that every 5 seconds of running time the speed value will increase and at 30 seconds the measurement speed value reaches 750.

Next, the gearbox measurement is carried out using a tachometer. The aim is to determine the speed of the gearbox. This gearbox functions to reduce and adjust the speed of the power produced by the rotating AC motor which is measured using a palm sugar stirrer with the time given when taking the measurement. The results of speed measurements on the gearbox can be seen in the image below.

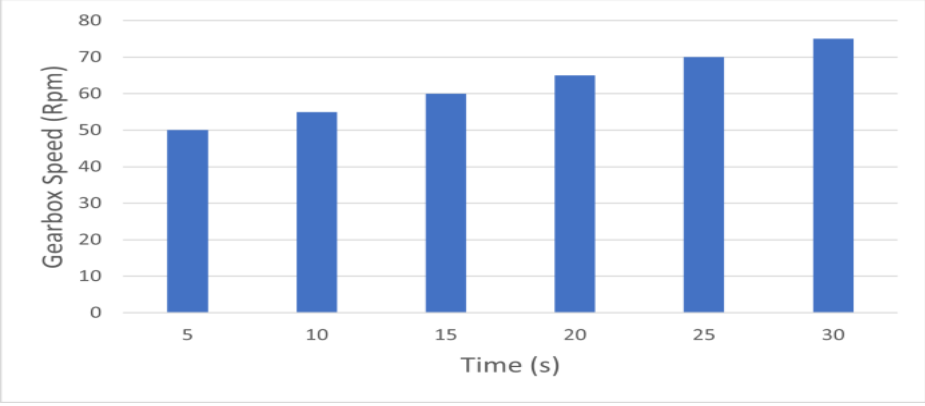

Fig.4. Gearboc speed Vs time

Based on the graphic image above, it can be seen that measurements on a gearbox are the same as measurements on an AC motor, where the longer the time taken during the measurement, the greater the value of the working engine speed in Rpm units. In the graph above there is a measurement time from 0-30 seconds. while the speed value obtained is 0-75 (Rpm). Each time the engine speed continues to increase and after 30 seconds the gearbox engine speed reaches 75.

The next test is carried out to find out how far the connection distance is and the connection time between the ESP32 NodeMcu and the Access Point. Access Point is here as a link between networks such as WiFi and Bluetooth. The following graphic display can be seen in the image below.

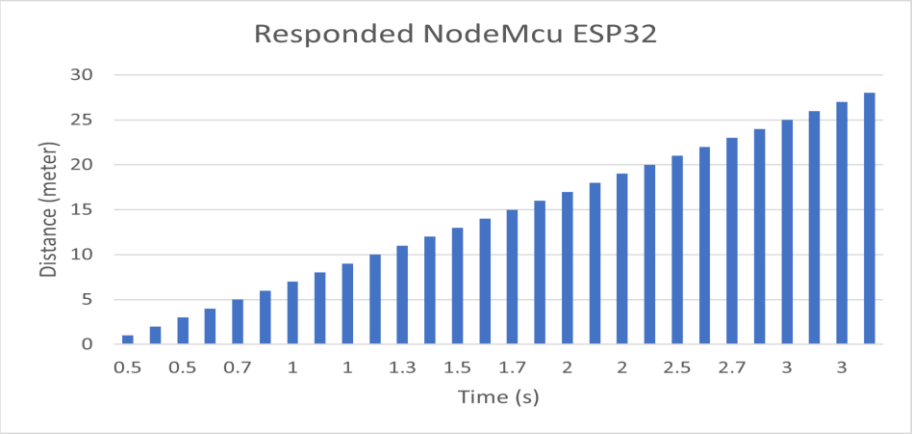

Fig.5. Graph distance Nodemcu ESP32 Vs Time

Based on the graphic image above, it shows that the further the distance between the NodeMcu ESP32 and the Access Point, the longer the connection will be received. The fastest connection time is at a distance of 1 meter to 3 meters with a connection time of 0.5 seconds, the longest connection time is at a distance of 25 meters to 28 meters with a connection time of 3 seconds. At a distance of 30 meters above the NodeMcu ESP32 can no longer connect to the Access Point.

For software testing, this tool will be used, namely MIT App Inventor and Android. During testing, testing methods can be used with several samples to determine the differences in each sample. Based on the software design in Chapter III, an application was produced to control the palm sugar mixer. This chapter will also discuss software testing of programs that have been created with the Arduino IDE (Integrated Development Environment) to program the NodeMcu ESP32 and the MIT App Inventor application.

Fig. 6. MIT app gula aren display

This connection test is carried out to find out how long it takes for the system to connect to the internet.

Table1. Internet connection testing

No.	Times (s)	Connetion
1.	00.01.96	On
2.	00.01.88	On
3.	00.02.23	On
4.	00.02.78	On

Based on internet connection tests that have been carried out, the average time required for the system to connect to the internet is 00.02.21 seconds with the connection statement being connected. Testing on the use of the MIT application was carried out to see the time graph drawn on the Adafruit Io server, where time data was sent from the MIT application during the palm sugar mixing process. The following displays the time graph on the Adafruit Io server which can be seen in the image below.

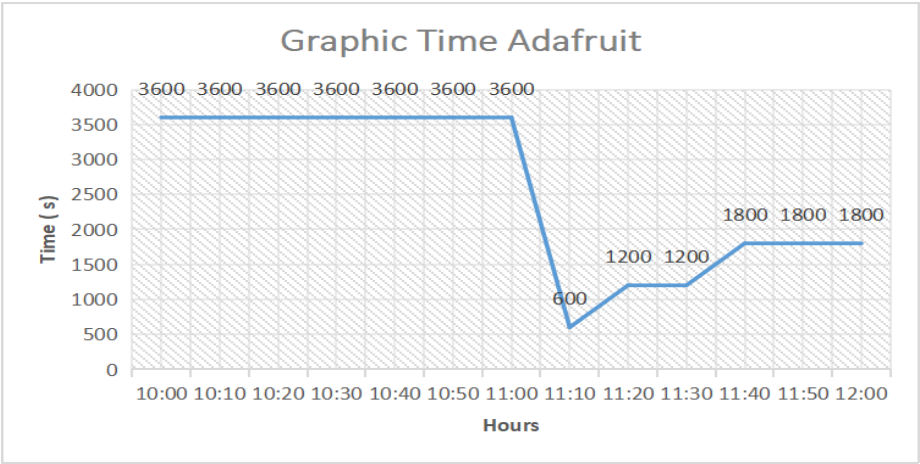

Fig. 7. Results time graph on adafruit IO server

Based on the graphic image above, it shows that the time sent for 3600 seconds or 1 hour for the palm sugar mixing process corresponds to the time the system started for the palm sugar mixing process from 10.00 - 11.00, then the system stops and resumes by sending the time for 600 seconds or 10 minutes from the MIT application which starts from 11.00 - 11.10, then the system stops again by sending the time for 1200 seconds or 20 minutes from the MIT application which starts from 11.10 - 11.30, then the system stops again by sending the time for 1800 seconds or 30 minutes from the MIT application starting from 11.30 - 12.00.

4. Conclusion

The internet of things-based Palm Sugar Mixer tests include engine speed (Rpm) testing carried out on AC motors and gearboxes, distance testing, servo testing, and fire testing. To measure speed on AC motors, use a Tachometer and get results in 5 seconds with a speed of 300 rpm, 10 seconds 400 rpm, 15 seconds 500 rpm, 20 seconds 600 rpm, 25 seconds 700 rpm and 30 seconds equal to 750 rpm on AC motors. Meanwhile, when measuring the gearbox, the results obtained were 5 seconds 50 rpm, 10 seconds 55 rpm, 15 seconds 60 rpm, 20 seconds 65 rpm, 25 seconds 70 rpm, and 30 seconds 75 rpm on the gearbox. Distance between the NodeMcu ESP32 and the Access Point, the longer the connection will be received. The fastest connection time is at a distance of 1 meter to 3 meters with a connection time of 0.5 seconds, the longest connection time is at a distance of 25 meters to 28 meters with a connection time of 3 seconds. At a distance of 30 meters above the NodeMcu ESP32 can no longer connect to the Access Point.

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