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Automatic Coffee Maker Machine Based on Internet of Things (IoT)

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***Abstract*—In this era of globalization, technological developments are very rapid penetrated in all fields in particular. in the food and beverage sector. During a pandemic like this, as entrepreneurs, food and drink must adapt. Adaptation in question is hygiene in the process of making drinks and food. One example. it is an automatic drink making machine. that can help in the process. make drinks more practical and hygienic to keep more sterile. when making drinks in terms of blending drink ingredients. the process of stirring and pouring hot water. In an automatic drink making machine, in a supermarket there are still many weaknesses. ie the user is still making physical contact, such as approaching and selecting the menu and waiting for the process to complete. Based on the problems that exist among the general public, an idea was formed to design and manufacture an Internet of Things (IOT) based automatic drinking machine. which can help users in terms of making a drink. Users only need to select the drink menu that they want to make on the Android smartphone application that is connected to the access point, then the machine will carry out the process of making drinks. according to the menu selected in the application. The user only takes drinks to the places that are available. Based on the results of testing and analysis carried out on a machine this helps users to place orders and can enjoy drinks that are processed automatically.**

Keywords—IoT, Coffee maker, Automatic

I. INTRODUCTION (*HEADING 1*)

The very rapid development of technology at this time is the automation system which has now penetrated all fields, one of which is in the field of culinary food, namely the emergence of food-making machines. or drinks automatically. Automatic machine which can mean all processes that run by themselves [1][2].

Most of today's technology already uses machines who has developed in the culinary field is an automatic drink-making machine that runs programmed. This machine can make several drink menus such as hot coffee, warm tea and warm milk. It is easier and simpler to estimate the dose of drink ingredients, the process of mixing and pouring hot water until the process of stirring it [3][4].

We often encounter these drink-making machines in public places, for example in large cafes, mini bars, bistros and in some workplaces. One example of a beverage machine that has been designed by the manufacturer at a price that is relevantly expensive for the upper middle class, which is currently the most widely used today is this espresso machine, which is an automatic beverage device that produces a cup of espresso[5][6].

The Internet is a communication network that provides many benefits that were previously difficult for us to obtain. an internet networks. the use of the internet is not only used for purposes such as making calls, or sending messages, watching videos online. Which can be connected via an internet network, but the internet can also be used for other purposes, one example is. Internet of Things.

The web of Things (IoT) is a giant network that is connected to all data collection about how a device is used and the environment of the device is operated remotely wherever the user is located, the user can easily operate this Internet Of Things (IoT) based tools [7][8].

DC motor is a device that converts electrical energy into motion energy. Motors have become a very vital tool for robotics and the industrial world. The power supply may be alternating to give the effect of different rotation directions. The motor will rotate continuously as long as the power supply is supplied and will stop when the voltage supply is cut off. This type of motor is widely used as or to drive a child's toy wheel.

Motor shield is a board that can activate 4 motors as well as 2 servos at once, its use is very easy for making walking robot applications that use a wheel. But in a market with a relatively cheaper price. The motor shield specifications are as follows: there are 2 pins for 5 Volt Servo, can operate 4 DC motors at once or 2 stepper motors, 2 external power connectors.

Wi-Fi ESP8266 is a set of Wi-Fi modules that are currently very popular among beginners. Besides that, the price is very relevant and affordable, the Wi-Fi module is very versatile because it is already SOC, so when we do a program, we can directly use the ESP8266 without other additional microcontrollers. Another advantage, the ESP 8266 can run like adhoc, as well as access points or clients at once.

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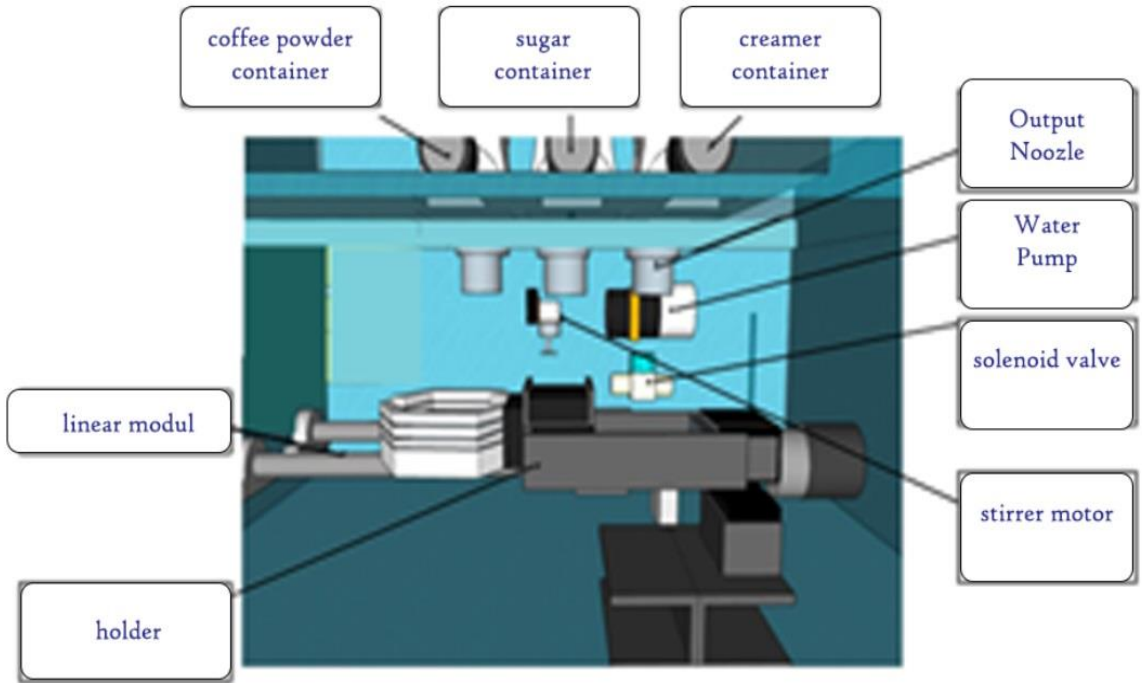

Figure 1. Design IoT Coffee Maker

II. METHODS

The research design includes the design of the physical appearance that will be designed as desired. Consists of a research flow that has been designed from design to mechanical design and electrical circuits that are interconnected in carrying out a process that is in accordance with the design of the tool.

The design of a tool that includes in terms of design on the physical appearance of the tool to be done is in accordance with what is desired. This section is one of the mechanical designs and electrical circuits that are connected to each other to carry out an initial designed process. The tool to be built is an Internet of Things (IoT) based automatic drinking machine. The use of this tool to facilitate a process of making drinks that produce drinks quickly.

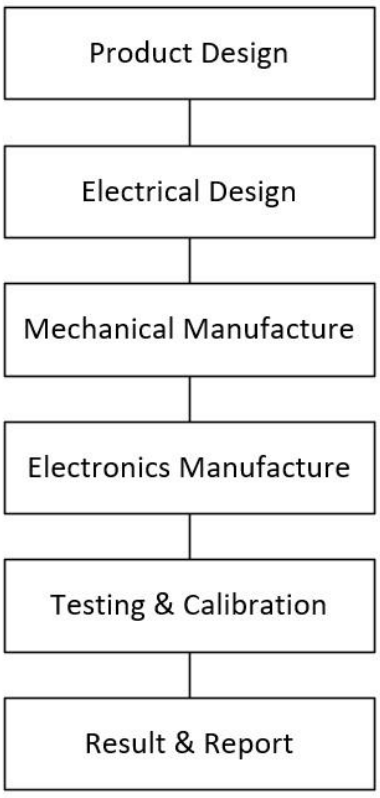

Figure 2. Research flow

III. RESULTS AND DISCUSSION

In analyzing a data is one of the indispensable parts in making reports. Any type of report always uses the analysis of a data result in the presentation in the form of facts or an information contained in a report. The test results of this tool aim to see whether a device designed is an automatic drinking machine that can operate properly and run as desired. In the table below the test results on a DC motor.

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Table 1. Device test table

Iteration	Iterations	Respond			
		Linear Modul	coffee container	sugar container	milk container
Non Sugar Coffee	1	Active	Active	inactive	inactive
	2	Active	Active	inactive	inactive
	3	Active	Active	inactive	inactive
	4	Active	Active	inactive	inactive
	5	Active	Active	inactive	inactive
Sweet Coffee	1	Active	Active	Active	inactive
	2	Active	Active	Active	inactive
	3	Active	Active	Active	inactive
	4	Active	Active	Active	inactive
	5	Active	Active	Active	inactive
Milk	1	Active	inactive	inactive	Active
	2	Active	inactive	inactive	Active
	3	Active	inactive	inactive	Active
	4	Active	inactive	inactive	Active
	5	Active	inactive	inactive	Active
Milk Coffee	1	Active	Active	inactive	Active
	2	Active	Active	inactive	Active
	3	Active	Active	inactive	Active
	4	Active	Active	inactive	Active
	5	Active	Active	inactive	Active

The table above is the result of experiments on DC motors in the program to make drinks for 5 trials, so that the results during the process of making warm coffee drinks, then a motor that runs is motor 1 as a glass cross-sectionalized, then motor 2 as a booster to remove coffee grounds. When making sweet coffee drinks, the active motor is module 1 as a driving force for the cross section of the glass, motor 2 as a driving force for removing coffee powder and motor 3 as a driving force for removing powdered sugar. When making milk drinks, the active motor is motor 1 as a driving force for the cross section of the glass and motor 3 as a driving force for removing powdered sugar. To make coffee milk drinks, the active motor is motor 1 as a driving force for the cross section of the glass, motor 2 as a booster for removing coffee grounds and motor 4 as a driver to remove milk powder.

Table 2. Actuator response data

Iteration	Signal on Relay			Respond			
	In 1	In 2	In 3	stirrer	pump	splenoid valve	buzzar
1	High	Low	Low	Active	inactive	inactive	inactive
	High	Low	Low	Active	inactive	inactive	inactive
	High	Low	Low	Active	inactive	inactive	inactive
	High	Low	Low	Active	inactive	inactive	inactive
	High	Low	Low	Active	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
2	Low	High	Low	inactive	Active	Active	inactive
	Low	High	Low	inactive	Active	Active	inactive
	Low	High	Low	inactive	Active	Active	inactive
	Low	High	Low	inactive	Active	Active	inactive
	Low	High	Low	inactive	Active	Active	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
2	Low	Low	High	inactive	inactive	inactive	Active
	Low	Low	High	inactive	inactive	inactive	Active
	Low	Low	High	inactive	inactive	inactive	Active
	Low	Low	High	inactive	inactive	inactive	Active
	Low	Low	High	inactive	inactive	inactive	Active
	Low	Low	Low	inactive	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive
	Low	Low	Low	inactive	inactive	inactive	inactive

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Table 3. Test result of measurement weight

Drink	Iterations	Ingredients				Error
		coffee (gr)	sugar (gr)	milk (gr)	water (ml)	
Non Sugar Coffe	1	10,3	-	-	-	2,8
	2	12	-	-	-	7
	3	11,5	-	-	-	4
	4	10,5	-	-	-	5,5
	5	12	-	-	-	2
Sweet Coffee	1	10	5	-	-	4,83
	2	11	5,3	-	-	4,46
	3	9,5	4,8	-	-	4,13
	4	9,7	4,9	-	-	1,1
	5	10,5	5,5	-	-	3,5
Milk	1	-	-	30,5	-	5
	2	-	-	31	-	4
	3	-	-	30,8	-	2,8
	4	-	-	30	-	5,5
	5	-	-	31,3	-	2,3
Milk Coffee	1	16	-	3,7	-	2,36
	2	15,7	-	3,8	-	3,83
	3	16,4	-	3,2	-	5,6
	4	16,8	-	3,5	-	2,63
	5	16,2	-	3,3	-	1,16

Figure 3. Coffee maker

In the table above, the results of testing on a 4 ch 5 volt relay were carried out with the aim of seeing the condition of a driving motor for stirring, water pump, solenoid valve and buzzer. The program that is entered is input at Input 1, Input 2 and Input 3. The data from the experiment on a 4 channel 5 volt relay was tried and took data 5 times for each series of electrical components. Input pin 1 is given a high signal on which a stirrer motor must turn on. Input pin 2 when given a high input signal, a water pump and solenoid valve will light up. Input pin 3 when given a high input signal then the buzzer will light up.

On the results of the calculation of the average error, it can be stated a conclusion that the drink produced during the process of making bitter coffee is 3.03% of the ingredients that come out, on sweet coffee drinks 2.70% of the ingredients that come out, on warm milk drinks are 1, 10% of the resulting powder and milk coffee drink is 2.82% of the resulting powder. So the results of making drinking work well because there is only a difference between errors when making drinks, which is below 4% overall

IV. Conclusion

From the results of experiments conducted, it can be concluded a study as follows that the ratio of comparisons in the manufacture of beverages, the

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comparison with the results issued by the machine as a percentage of the difference has an average error of below 4%. From the results the average error when making bitter coffee drinks is 3.03%, for the process of making sweet coffee drinks is 2.70%, for making warm milk drinks is 1.10% and the last one is making coffee milk drinks is 2, 82%.

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