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Android Based Coffee Dryer *Temperature* Control System Design

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Abstract: Development And application technology post-harvest need Keep going driven in effort push lost results And increase quality product so that capable increase income farmer specifically farmer small . Development sufficient coffee production rapidly the need supported with readiness technology And means suitable post- harvest For condition farmers to order them capable produce coffee beans with quality as required _ by National Standards Indonesia.Tasks end This aim For increase productivity coffee farmers when face bad weather _ friendly.with using DHT-22 sensors and sent using Bluetooth HC-05 to Android smartphone. To use For turn on heater so that coffee drying can walk Keep going continuously when face bad weather _ Good as well as capable increase productivity And quality small coffee farmer.Testing done for 3 days To use ensure tool Work with OK.testing This get results where Bluetooth is capable Work within a 5 meter radius without obstacle and the heater is capable light up more less than 1 hour when No There is sun depends from capacity battery.

Keyword: Controller, Temperature, Coffee Dryer, DHT22, Android.

INTRODUCTION

The development and application of post-harvest technology needs to continue to be encouraged in an effort to reduce yield losses and improve product quality so as to increase the income of farmers, especially small farmers. In addition, post-harvest is one aspect that must be prioritized from the seven steps towards expanding market access for agricultural products (Ostertag 2007).

The other six aspects are farmer organization, marketing trends and options, capital, technology, pre-production and production, as well as business expansion and better relationships. Even though many technologies have been disseminated to small farmers through government programs, in reality many of them are problematic. The technology introduced and socialized to small farmers is not used sustainably (Dyah et al. 2011; Saparita et al. 2012).

The fairly rapid development of coffee production needs to be supported by technological readiness and post-harvest facilities that are suitable for farmers' conditions so that they are able to produce coffee beans of the quality required by the Indonesian National

Standard. The success of postharvest technology development depends on the success of technological innovation and assistance systems (Stathers et al., 2013).

According to Rahardjo (2012), coffee beans that have been picked should be processed further for approximately 12 to 20 hours so that the coffee beans do not undergo *fermentation* and other chemical processes that can reduce the quality of the coffee beans. This is also in accordance with Henderson and Perry (1976), who state that drying is the process of removing water from an agricultural material at a water content level where the quality of the agricultural material does not decrease due to attack by fungi, enzymes and *insect* activity .

Based on problem the so writer designing And make tool For overcome the problem discussed in Task The end , then from That writer lift A title “ Design Get up System controller *temperature* Tool Android Based Coffee Dryer ”.

METHOD

The method in this dryer research is in the form of an experiment. This method includes *hardware* and *software design* .

Block Diagrams

Block diagram design on study This aim For facilitate the design process And analysis tool with refers on the block diagram .

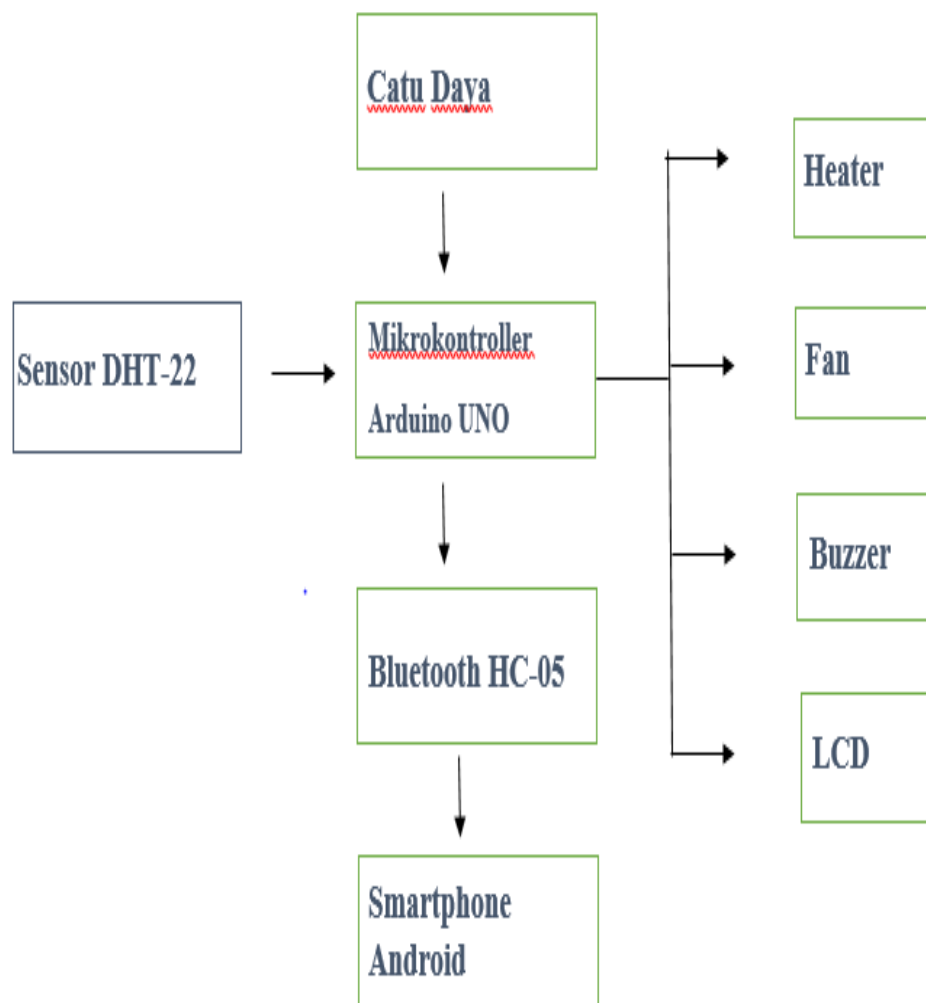


Figure 1. Block Diagram

Following each explanation block from design block diagram tool above , including :

1. DHT sensors 22
It works As detector temperature And humidity room in tool .
2. Cat Power
Functioning as source voltage on tool
3. *Microcontroller* Arduino Uno
It works as center data processing / center control , all instructions that have been programmed executed by *microcontroller* as brain from Suite tools .
4. Bluetooth HC-05
It works as an intermediate interface tool and android smartphones
5. Android *smartphones*
It works as *input* controller And *output* on tool
6. Heater
It works as heating on tool
7. fans
functioning as controller *temperature* on tool
8. Buzzer
It works as device that delivers notification form voice
9. LCD (*Liquid Crystal Display*)
It works as *output* appearance *temperature* on tool .

Design hardware

Planning *hardware* is very thing _ important in making task end this . Because with exists *hardware* then system can tested in a manner real is tool This can Work with Good or no . Planning *hardware* tool made resemble room coffee drying or Can say dryer DOM *prototype* coffee. goal is a tool can Work resemble in accordance with circumstances actually . Tool This designed like room where is the coffee dryer ? on from tool This own acrylic which one *is transparent* ? capable drying coffee on moment There is sun or Can called use system *Hybrid* .and next to the box is place Where put it down module.and component other like picture below :

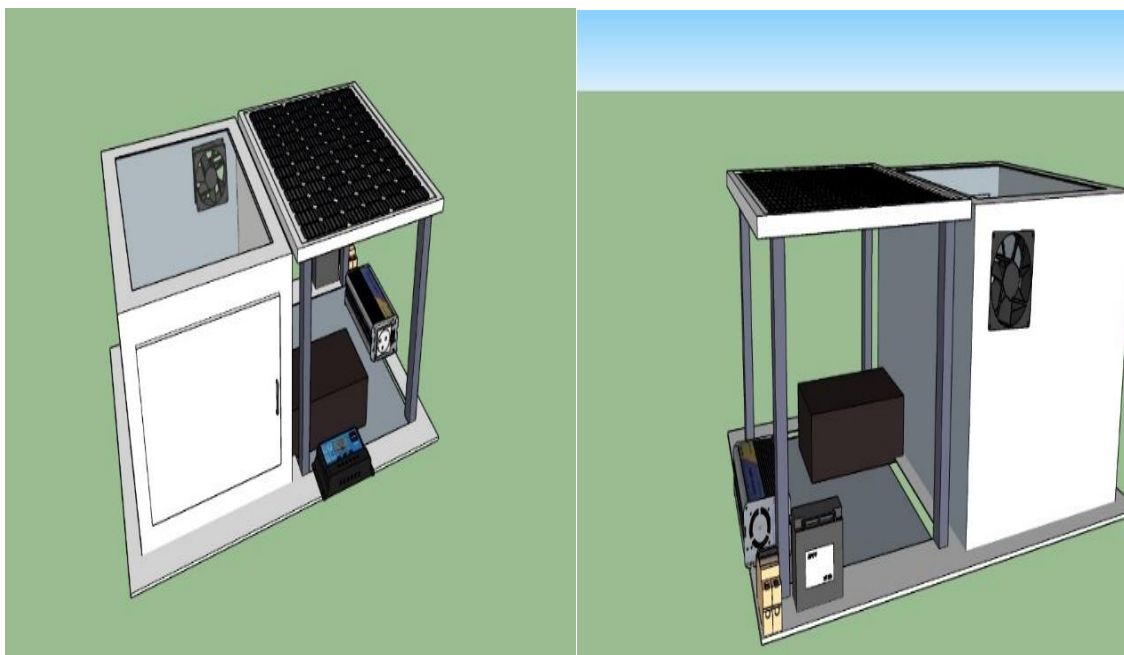


Figure 2. Form Design Whole Tool

Flow Chart (*Flow Chart*)

Flowcharts are means reference when designing a. In the flowchart there are election order for the program you want designed. Following is the flow diagram on study this.

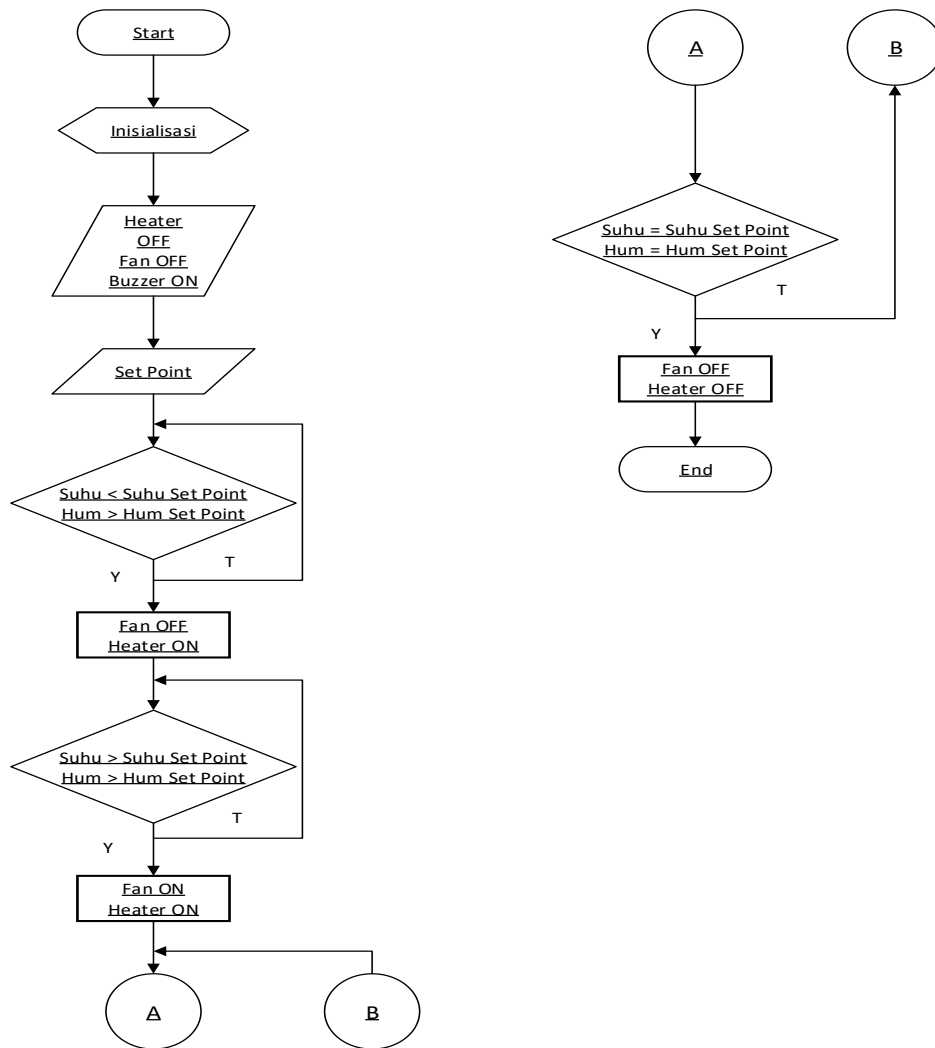


Figure 3. System Flowchart

RESULTS AND DISCUSSION

In this section, testing of the tool as a whole is carried out to see if the designed tool is working properly.



Figure 4. Form Realization Tool Whole

Testing Bluetooth -HC 05

HC-05 Bluetooth testing is performed For know performance from bluetooth HC-05 in send data from arduino uno to android smartphone, testing done with method give distance per 5 meters from tool made . _ Following is the results table HC 05 Bluetooth testing

Table 1. Bluetooth Range Against Android Smartphone

NO	DISTANCE	CONNECTION/NOT CONNECTION	INDICATOR STATUS
1	0	CONNECTED	Flashing LED
2	50 cm	CONNECTED	Flashing LED
3	100cm	CONNECTED	Flashing LEDs
4	150cm	CONNECTED	Flashing LEDs
5	200cm	CONNECTED	Flashing LEDs
6	250cm	CONNECTED	Flashing LEDs
7	300cm	CONNECTED	Flashing LEDs
8	350cm	CONNECTED	Flashing LEDs
9	400cm	CONNECTED	Flashing LEDs
10	450cm	CONNECTED	Flashing LEDs
11	500cm	CONNECTED	Flashing LEDs

DHT-22 Sensor Testing

Temperature sensor testing And humidity done For know performance from the DHT-22 sensor inside detect hot And humidity room dryer . Ensure the value generated by the DHT-22 sensor is sent by Arduino uno to an Android smartphone. DHT 22 sensor testing was carried out for 3 days To use ensure performance tool Work with perfect . However, the data is below is day data to 2

Table 2. Dht 22 Sensor Testing

NO	O'CLOCK	DHT TEMPERATURE 22		TEMPERATURE MEASUREMENT	
		DHT HUMIDITY 22		MOISTURE MEASUREMENT	
1	08.00 WIB	28°C	76%	27°C	74%
2	09.00 WIB	32°C	73%	32°C	71%
3	10.00 WIB	35°C	70%	33°C	69%
4	11.00 WIB	34°C	65%	33°C	53%
5	12.00 WIB	37°C	56%	37°C	50%
6	13.00 WIB	43°C	50%	42°C	52%
7	14.00 WIB	44°C	53%	44°C	43%
8	15.00 WIB	41°C	49%	41°C	40%
9	16.00 WIB	40°C	49%	40°C	47%
10	17.00 WIB	33°C	61%	32°C	68%
11	18.00 WIB	35°C	73%	35°C	70%
12	19.00 WIB	30°C	78%	30°C	75%
13	20.00 WIB	31°C	70%	31°C	73%

INFORMATION:

INITIAL WEIGHT OF COFFEE: 700 gr

WEIGHT AFTER DRYING: 600 gr

TEST DAY: SECOND

Testing Heaters And Systems Air

Testing the heating and air system functions so that when the sun's heat has not reached the point it has reached, the heater will turn on, and also testing the air system functions to control the humidity in the coffee bean drying room so that the dried coffee does not get moldy. The following is a table of the results of testing the heating and air system on dryer

Table 3. Testing Heating And System Air

HEATER AND FAN TESTING			DATE AND TIME:		
NO	O'CLOCK	DRYING ROOM TEMPERATURE	HEATER	FAN	INFORMATION
1	08.00 WIB	29'C	ON	OFF	
2	09.00 WIB	32'C	ON	OFF	
3	10.00 WIB	35'C	ON	OFF	
4	11.00 WIB	34'C	ON	OFF	
5	12.00 WIB	35'C	ON	OFF	
6	13.00 WIB	40'C	OFF	ON	
7	14.00 WIB	41'C	OFF	ON	
8	15.00 WIB	41'C	OFF	ON	
9	16.00 WIB	40'C	OFF	ON	
10	17.00 WIB	32'C	ON	OFF	
11	18.00 WIB	35'C	ON	OFF	
12	19.00 WIB	30'C	ON	OFF	
13	20.00 WIB	31'C	ON	OFF	
TESTING DAY: SECOND					

CONCLUSION

Based on the results of testing and analysis of hardware and software in the design and development of an Android-based coffee dryer temperature control system, the conclusions are as follows:

1. Results testing System Tool Temperature Controller Android Based Coffee Dryer shows in a manner whole tool Already Work with Good in accordance with design And principle it works , System Tool Temperature Controller Android Based Coffee Dryer can Work in a manner automatic in accordance with those who have set.
2. Planning And hardware manufacturing has been in accordance with design as well as can Work with Good in accordance with the command given , as it has been programmed And sent through created android application using MIT Inventor.
3. Bluetooth and android distance can be connected 5 meters away without obstacles . It means on more distance _ of 5 meters and There is obstacle possible happening fail connected .
4. The whole system functions and can work well in detecting, controlling and sending the results to the Android application

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