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Design Of Automatic Storage Of Medicines In Packaging With Gui Based Arduino Mega 2560

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***Abstract* – it takes a lot of time and effort to manually search for and store pharmaceuticals, especially in locations that sell a variety of drugs, such as pharmacies, clinics, health centers, pharmacy stores, and so forth. Consequently, it takes a while to locate new medications. To ascertain medicine availability and expiration dates, drug data collecting is further required. This necessitates the development of an automated medicine storage system with an Arduino Mega 2560-based GUI. This approach offers benefits, including making it simpler to record, choose, store, and retrieve medications of various kinds. Users simply need to choose drugs through the application, and the storage device will automatically direct the medications they have chosen. There is an application for recording drugs that also serves as a user interface with a storage device. Additionally, there are sensors for measuring the temperature and humidity within the appliance. An average retrieval and storage time of 2.4 seconds for the closest distance and 6 seconds for the greatest distance was found when testing the automatic medication storage system in this package.**

***Keywords*: Automatic, Storage System, Medicine**

I. INTRODUCTION

Medicine storage is usually in the form of many racks. It needs a wide enough room to place a medicine storage. Medicine storage process manually hardening data collection, searching, storage, and medicine taking. Especially with a lot of differences in medicine is quite complicated and, a waste of time and power, especially in pharmacies, clinics, public health centers, etc. because of too many racks and a lot of medicine kind that are stored. The search process for medicine takes a lot of time affecting patients or buyers who have to wait long enough to get the medicine.

From problem outlined is needing an automatic storage device to ease storing and taking medicine. This storage device plans to automatically search medicine according to the meant kind. So simplifies the user to data collecting, searching, storing, and taking medicine. This device also has a temperature sensor. The plan is that this device will have a minimalist form so it does not require a lot of room and use C# programming language to make search apps and choose medicine.

Research related to drug search automation, namely, research on automation of drug storage drawer search systems in pharmacies using a microcontroller.[1] Syahrul et al's research make it easier for pharmacists to find and take drugs, this device has a 16x2 LCD and 4x4 keypad as the user interface with the device. The pharmacist only needs to enter the password, drawer code, and the amount of medicine to be taken, and the device will process it, namely taking the selected drug and the specified amount. The difference with the author's research is that Irvan Kurniawan's device is similar to CNC, while the author's device is not. Ivan Kurniawan's device uses a password, while the author's device does not. Irvan Kurniawan's device does not have a temperature sensor, while the author's device has a temperature sensor and also the author's device uses Arduino Mega 2560, while Irvan Kurniawan's device uses ATmega 8535. The similarities are that they are equally useful for storing and taking drugs. There are several other references for this device, namely research on the application of electronic component borrowing systems in electronics laboratories based on the Arduino Mega 2560 and Visual Basic 6.0, [2]. This device was made to make component borrowing systems in the electronics laboratory effective, this device is in the form of an electronic component storage cabinet and a laptop as user interface. This device can move electronic component storage drawers, making it easier to search, retrieve and return electronic components[2], as well as other research, namely the component borrowing systems in electronics laboratories using Raspberry Pi [3]. This device can make it easier for the process of borrowing electronic components because the drawer for storing the electronic components you are looking for will open and close automatically. From the two titles of this thesis, it's almost similar to the device that the author will make, the difference is that author's device is specifically for medicine[3].

The author hopes that the results of this study can be useful, especially for storing drugs. Making it easier to store and take drugs and does not require a large space and can also monitor the temperature of drug storage

II. METHOD

The writing systematics used by the authors in this research is engineering research systematics [4]. The research method used by the author in the manufacture of an automatic packaged drug storage device with a GUI based on the Arduino Mega 2560, namely Research and Development, commonly abbreviated as R&D. the R&D research method used by the author refers to the R&D research method by Borg and Gall[4].

Based on the computer application program flowchart in Figure 3. It can be seen that the drug data displayed in the table is drug data that has been stored in xml format, so that the drug data entered by the user will be stored safely. And when the application is connected to Arduino, the application will receive temperature and humidity data from Arduino, which will later be displayed in the application. When the user chooses a drug, the application will send the storage side data and the selected

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drug line to Arduino, and Arduino will execute the data sent by the application to move the device and turn on the LED indicator.

Based on Figure 4. Arduino program flowchart, namely start, after that initialize the program. After that there are two activities that run on Arduino, namely reading the DHT11 temperature and humidity sensors, and the storage section playback program. In the DHT11 sensor program section, Arduino reads the temperature and humidity values, if the temperature is above or below the specified temperature limit, which is outside the temperature of 20℃-25℃ then the buzzer does not beeps. In the storage part player program, Arduino waits for input from the user, if the user gives input then the DC motor rotates and the LED indicator will turn off, if the RFID tag matches the drug storage side selected by the user is detected by the RFID reader then the DC motor will stop and the LED indicator will light up according to line. Finished.

Fig. 1. Arduino program flowchart

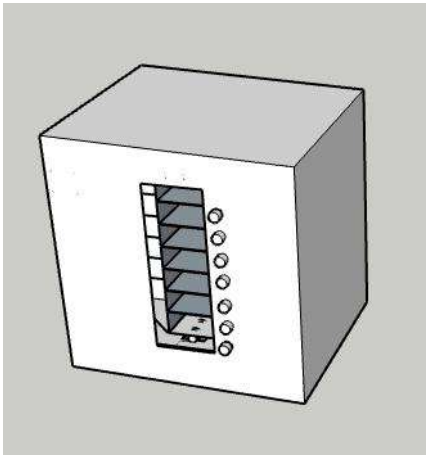

Fig. 2. Design of automatic storage device in package

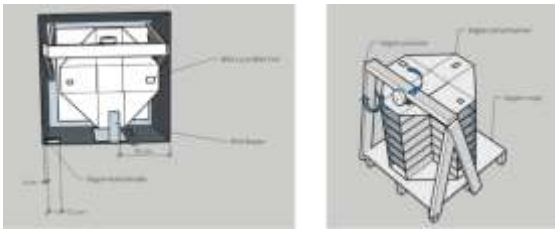

Fig. 3. (A) Inner part of device design & (B) Main storage part design

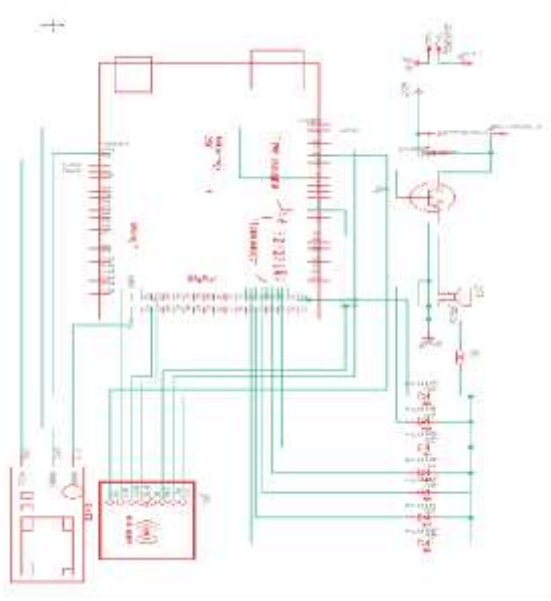

Fig. 4. Full circuit design

Fig. 5. User interface application design

III. RESULT AND DISCUSSION

Fig. 6. (A) Front face device & (B) Main storage part

Testing the DHT11 sensor serves to find out whether the DHT11 sensor can detect the temperature correctly or not. A comparison was made between the DHT11 sensor and the HTC-2 digital hygrometer and temperature to determine the accuracy of the DHT11 sensor.

TABLE I. CONTENT TESTING ON APPLICATION

Date	Testing	Input				Result	
		Side	Row	Name	Qty	Suit	Not Suit
6 June 2022	1	A	3	Med 1	3	V	-
	2	B	4	Med 2	4	V	-
	3	D	1	Med 3	5	V	-

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11 June 2022	4	B	3	Med 4	20	V	-
	5	C	1	Med 5	10	V	-
	6	A	6	Med 6	20	V	-

Fig. 7. Look on application of table content testing

Testing the contents of the drug table in the application is carried out to test whether the application can store drug data in the drug table.

TABLE II. AUTOMATIC MEDICINE STORAGE SYSTEM TESTING

Date	Test	Med to be chosen			Med chosen
		Side	Row	Name	Y/N
19 June 2022	1	B	3	CDR	Y
	2	C	5	Actifed	Y
	3	D	6	Biolysin	Y
	4	A	7	Enkasari	Y
	5	C	2	Lianhua Gingwen Jiaonang	Y
	6	D	6	Biolysin	Y
	7	B	3	CDR	Y
	8	C	5	Actifed	Y
	9	A	7	Enkasari	Y

Testing of the automatic drug storage system is carried out to test whether the drug storage device that has been made has been successful or not.

Date	Temperature	Buzzer Indicator	Figure
19 June 2022	> 20℃-25℃	Beep	
	20℃-25℃	No Beep	
	< 20℃-25℃	Beep	

Testing the buzzer indicator for the temperature of the automatic drug storage system is carried out to test whether the buzzer sounds when the temperature of the drug storage device being made is higher or lower than the specified temperature.

IV. CONCLUSION

The conclusion obtained from this study is that the designed tool functions successfully according to design, namely being able to record drugs, being able to choose the sides and rows of the storage section to store drugs automatically, and being able to detect temperature and humidity in the box and give an indication if the temperature of the box outside from the specified limit of 20oC-25oC. although there are some drawbacks, namely sometimes the storage section is slightly tilted from the gap for taking and storing drugs.

Suggestions are obtained from the results of the author's evaluation of the results of this study. Suggestions that the author can give for the development of an automatic storage system for packaged drugs with a GUI based on the Arduino Mega 2560, that is, use the Arduino Mega 2560 or other Arduinos that use a 16u2 USB-to-serial chip, so you don't need to install the Arduino driver, add a side to the storage from 4 sides to 8 sides, namely utilizing empty gaps between sides, using PID to maintain storage section rotation speed and increasing rotation torque, user interface applications / user interfaces can be developed to be wireless and mobile, using weight sensors on drug storage devices to monitor drug storage capacity, and added the ability to control and maintain the temperature inside the drug storage device.

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