

## PORTABLE CLOTHES WASHING MACHINE MODEL DESIGN ARDUINO BASED

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### ABSTRACT

*The development of electronic technology provides great benefits for the world of electronics and everyday life. Single-chip computers, also called microcontrollers or microcomputers, also provide technology so that many human aids can be created. One of the tools to complete human tasks is washing clothes. Washing clothes is a routine task that humans do almost every day. Automatic clothes washing machines have indeed been created and many people are already using them, but in some cases, for example, people who travel or stay outside the home will find it difficult to carry or own a conventional clothes washing machine because it is large and takes up space to store. The aim of making this tool is to make it easier and simpler for people to use a clothes washing machine and to carry it everywhere. By using the Arduino system, the washing machine which originally used a module was replaced with an Arduino which is definitely simpler to use. Portability Easy to carry and use anywhere, including in dorms, small apartments, or while traveling. Efficiency Saves air and energy compared to general washing machines. Easy to use and operate. Suitable for small clothes: Ideal for washing small and delicate clothes, such as underwear, socks, and towels.*

**Keywords:** *microcontroler, relay 4 channel and lcd 16x2*

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### INTRODUCTION

The development of electronics technology provides great benefits for the world of electronics and everyday life. Research has found many single-chip components or minimum systems to be very practical and useful. Apart from that, many small motor drives such as DC motors, servo motors, and stepper motors were also created to support the rapid development of the world of mechanics. A microcontroller is a single-chip computer built specifically for embedded control applications. These devices are economical and easy to use in digital control applications, often having the necessary built-in circuitry. (Sari, Saputra & Safrianti, 2024).

One of the important tools in everyday life is a clothes washing machine. Although automatic washing machines are commonly used, people who travel frequently or live temporarily may face difficulties due to their large size. For example, students who live in boarding houses may not be able to bring their washing machines due to limited space and high costs at boarding houses that provide washing facilities. Based on this background, the author developed a practical and compact portable clothes washer using an AVR controller-based system. AVR, a particular type of microcontroller, does not require an external oscillator because it has an internal oscillator and is equipped with a Power-On Reset feature that makes it easier to use. (Andi, Yanie & Siregar, 2023).

This design is designed to be as simple and efficient as possible for easy mobility and storage.

### METHOD

The prototype method is an approach to software development in which a prototype (initial model) of the system you want to develop is tested and evaluated before development of the main system begins. This method is often used in the context of software development to better understand user needs and minimize risks before full implementation takes place.

### RESULT AND DISCUSSION

This chapter discusses the planning and development of tools. After the development stage is

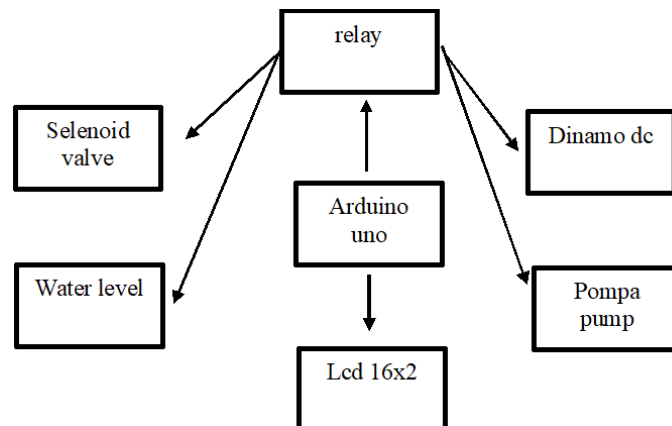
completed, testing of the developed tools is carried out.

## Result

### • Design

#### Block Diagram Design

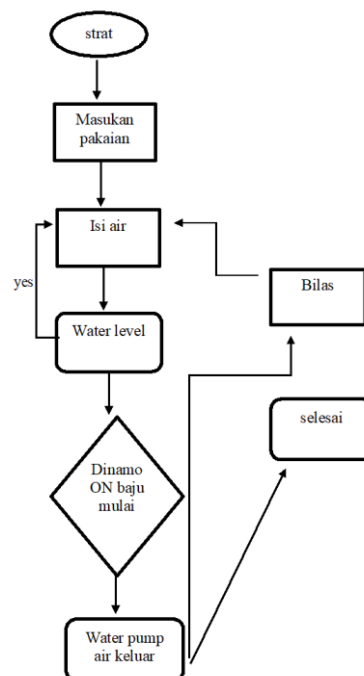
A block diagram is a diagram that explains how a system works as a whole. This block diagram shows how each block is connected and related to each other.



**Figure 1.** Block Diagram

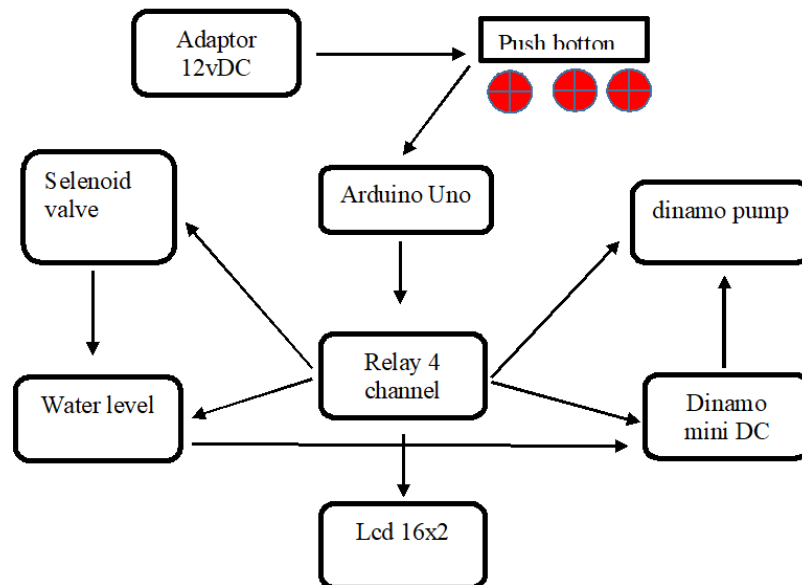
#### Flowchat Diagram

A flowchart is a graphical tool used to illustrate the steps or processes in a system. Flowcharts make it easy to visualize the entire process, thus aiding in understanding the workflow from start to finish.



**Figure 2.** Flowchart (Diagram Flow)

### Prototype Method



**Figure 3.** Prototype Method

### Hardware Assembly

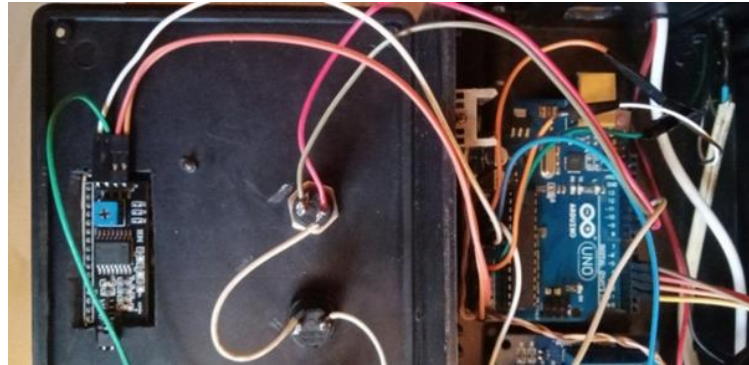
1. Arduino Uno  
Arduino Uno is a platform for developing various electronics projects involving hardware control and monitoring.
2. Relay 4 channel  
The 4 channel relay in this research functions to turn on and turn off components
3. Lcd 16x2  
Functions Lcd 16x2 The 16x2 LCD functions to display commands and results from the arduino uno.



**Figure 4.** Arduino Uno



**Figure 5.** Relay 4 Channel



**Figure 6.** Lcd 16x2 I2c

- **Mechanical Components of Portable Automatic Washing Machines**

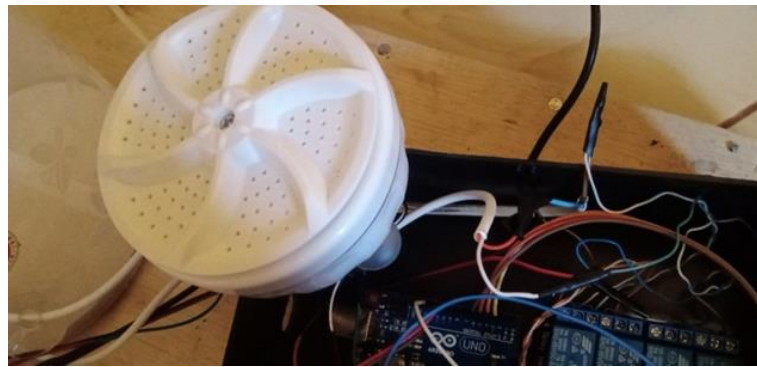
1. Solenoid valve The solenoid valve is a tool to open or close the flow of water entering the washing tube
2. Sensor water level The water level sensor functions to detect the water level. This sensor can be an ultrasonic sensor, a float sensor (float switch), or a conductive sensor.
3. Ultrasonic wash turbine arrangement of electronic components to control and operate a DC motor. This series can be used in various applications, such as robotics, automation, and household appliances.
4. A water pump an important tool for controlling and operating a water pump. This circuit can help optimize water use, and make the water pump easier to use.



**Figure 7.** Solenoid Valve



**Figure 8.** Sensor Water Level



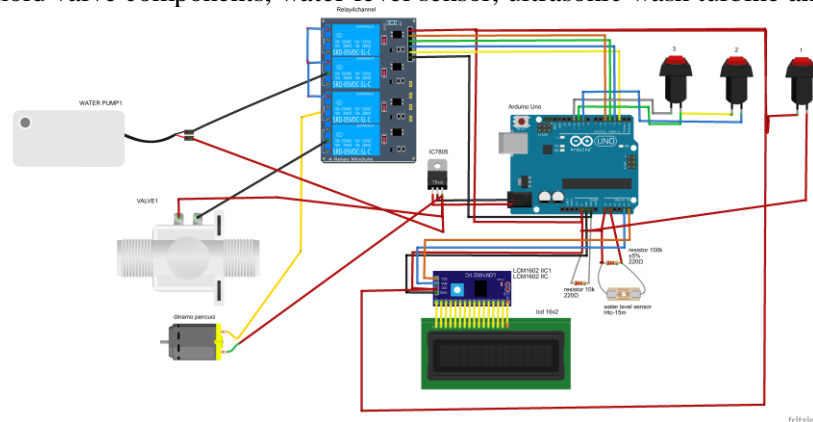
**Figure 9.** Ultrasonic Turbin Wash



**Figure 10.** Water Pump

### Tool Planning

tool design or schematic, this design was formed by combining Arduino Uno, relay and 16x2 LCD with the help of solenoid valve components, water level sensor, ultrasonic wash turbine and water pump.



**Figure 11.** Schematic Networks

The whole series

From several series of modules above, will then be assembled into one to form an integrated system. Among these circuits, each has its function, such as a 4-channel relay circuit that functions to turn on and turn off (switch) components in the clothes washer, a 16x2 I2C LCD used to display program results from the Arduino Uno, a solenoid valve as a water switch, a water level sensor as a water pressure sensor that enters the washing tube, and finally a water pump that pumps the water out after washing the clothes is finished.



**Figure 12.** Whole Series

**Discussion**

**Table 1.** Tool Test Results

Testing	Function	Output/ Next State	Testing Result
<i>Test of Control ON/ OFF Relay</i>	Disconnecting and connecting the electrical voltage to the solenoid valve dynamo and water pump.	The device will work if the CH- button is for OFF and CH for ON.	succeed
Testing of lcd 16x2 I2C	Displays the results of the commanded program	The 16x2 LCD will function if there is a command from the Arduino Uno to display a program that is running.	succeed
Testing of solenoid valve	Valve/switch for water filling	If the relay is ON then the solenoid valve opens/starts filling with water	succeed
Testing of water level sensor	Water pressure detector	If the water filling has reached the specified limit/pressure, the water level is ON	succeed
Testing of dinamo ultrasonic turbin wash	Spinning/grinding washed clothes	If the water level is ON/has detected water, the ultrasonic turbine wash dynamo will automatically turn ON.	succeed
Testing of water pump	Throw away the water that has been used to wash clothes	This tool functions when the ultrasonic turbine wash dynamo	succeed

		has finished grinding/washing the clothes as determined by the program.	
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## CONCLUSIONS

### Conclusion of Tool Testing

From the trial results of this Arduino Uno microcontroller-based clothes-washing device, these are:

- Portability: Easy to carry and use anywhere, including in dorms, small apartments, or while traveling.
- Efficiency: Saves air and energy compared to general washing machines.
- Ease of use: Easy to use and operate.
- Suitable for small clothes: Ideal for washing small and delicate clothes, such as underwear, socks, and towels.

From the tools tested above, all tools run well and smoothly according to the program instructions.

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