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Folding Clothes Tool Using Arduino Uno Microcontroller and Gear Servo

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***Abstract*— Folding clothes is one of the homework that is often done for housewives, from a survey conducted on 200 housewives in Pekanbaru, the problem is that many housewives choose to fold family clothes by hand, this takes time and the energy to do the job. Based on these problems, the authors designed a microcontroller with a servo motor as a practical medium in folding the clothes applied to the clothes folding tool, where the author uses the Hardware Programming Methodology in order to carry out this research smoothly, the materials needed in this research are Arduino Uno, Gear. Servo, Power Supply, and software components. The result of this research is the creation of an automatic clothes folding device that is useful for simplifying household chores. From the test results, it can be concluded that this tool can fold clothes with a duration of 2 seconds.**

Keywords*— *Folding tools, Hardware Programming Methodology, Arduino Uno, Gear Servo, Ultra Sonic Sensor.

I. INTRODUCTION

The development of science and technology is currently very fast, and has a role in the advancement of human life. Electronic technology is one part of helping to ease human work. Various practical and efficient electronic devices have been created to help humans meet their needs was studied by baktiar[1]. Nowadays, various kinds of equipment that operate manually are increasingly being abandoned and switch to fully automatic equipment, so that automatic equipment dominates human life was studied by miller [2].

Housework is one of the most time-consuming activities was studied by Satya hariyanti [3]. Not only that, this activity is carried out every day, and of course when there is neglected homework it will be something that is lacking was studied by osawa [4]. One of the household chores that is a concern for this problem is folding dried clothes was stuied by fred [5]. When there are a lot of clothes, this will certainly take the time to fold and tidy up the clothes quickly and neatly, so that time for other activities is wasted was studied by doumanoglou [6].

From the above problems, a solution appears to ease wasted activity and time, for that a tool model is made that can help in folding clothes quickly with automatic labor was studied by erlangga [7]. The purpose of this research is to design a model for clothes folding device based on Arduino Uno and Gear Servo was studied by nurkholis [8]. It is hoped that this tool can provide benefits for solving solutions in terms of folding clothes in a relatively fast and neat time without having to fold manually by hand was studied by wahyuni [9]. So far, many people who fold clothes still use manual methods, namely using their bare hands was studied by hafis [10].

Based on the majority of people still folding clothes manually was studied by kido [11], in this study the author will design and make clothes folding device based on the Arduino Uno, the mechanism is fast moving with the help of Gear Servo and other components was studied by doumanoglou [12]. It is hoped that this tool can help shorten the time for folding clotheswas studied by ernawati [13].

II. METHODS

In conducting this research, the authors use the hardware programming method, the stages can be seen in the image in Fig. 1.

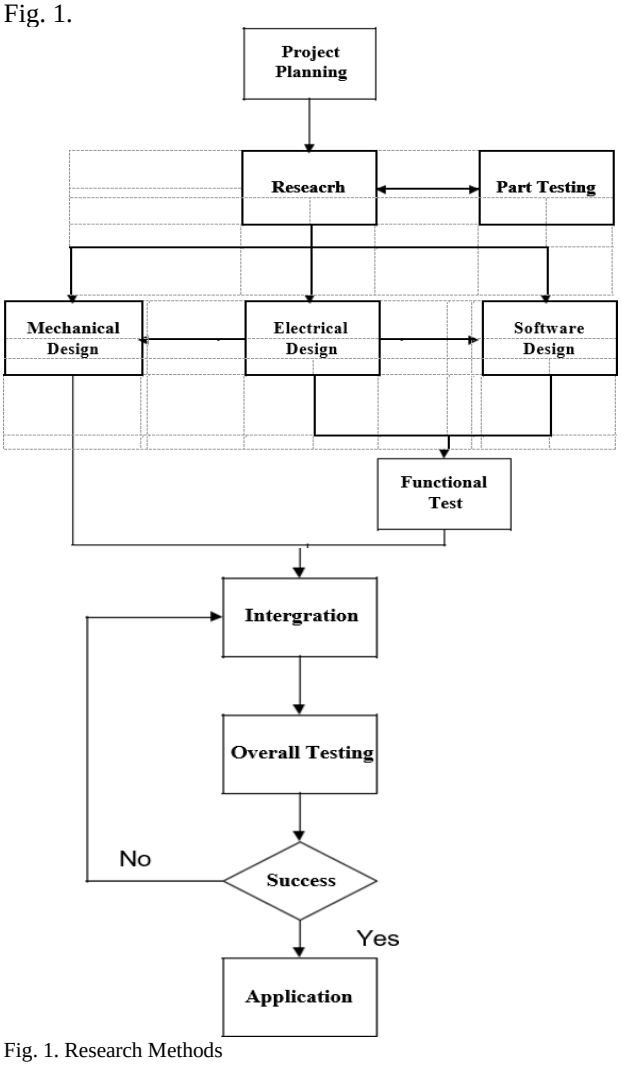

Fig. 1. Research Methods

A. Project Planning

In planning a research project, there are several important things that need to be determined and considered was studied by Irawan [14], including:

1. Initial information on research;
2. Estimated needs for tools and materials;
3. Budget estimates, and,
4. Possible applications of the designed application was studied by luo [15].

B. Research

After the planning has been mature, it is followed by preliminary research on the application (hardware) to be made, starting from the selection and testing of components (tools and materials), the possibility of initial and final designs, namely the Arduino Uno-based Portable Clothes Folding Tool Model was studied by stria [16].

C. Parts Testing

In component testing, a tool testing is carried out on the function of the component based on the needs of the application to be made was studied by muhardi [17].

D. Mechanical Design

In hardware design, mechanical design is an important thing to consider, because it will affect the performance / results of the tools that have been made was studied by bukardi [18]. In general, the application requirements for mechanical designs include:

1. Shape and size of PCB (Printed Circuit Board)
2. Dimensions and mass of the entire system.
3. Resilience and flexibility to the environment.
4. Placement of the electronic modules.
5. Testing the mechanical system that has been designed was studied by pambudi [19].

E. Electrical Design

In the design of the electrical system, there are several things that must be considered, including:

1. Power supply source
2. The controller that will be used
3. Driver design for application support.
4. Design the control system to be applied.
5. Schematic model tool.
6. Flowchart design was studied by apriliyanto [20]

F. Software Design

Hardware generally requires software design for the tool control system which includes the system design to be used. The design of the software used in making this tool uses the Arduino IDE and Fritzing software was studied by zeng [21].

G. Functional Test

The functional test is carried out by integrating the electrical system and software that has been designed. This test is carried out to improve the performance of the software for controlling electrical designs and eliminate errors (bugs) from the software was studied by Irawan [22].

H. Integration

The electrical module is integrated with the software in the controller, integrated into the designed mechanical structure. Then a functional test of the entire system is carried out was studied by maitin [23].

I. Overall Testing

At this stage the function of the entire system is tested was studied by watanable [24].

J. Application

Application to improve the performance of applications that have been designed was studied by wahyuni [25]. Optimization is emphasized on the mechanical design for maximum and optimal use was studied by zhao [26].

III. IMPLEMENTATION

The Figure 2 is the framework used by the author to carry out this research using wooden boards.

Fig. 2. Wood Frame

The wooden frame in Figure 3 is the main frame that will later house the Arduino Uno, Servo A, Servo B, Servo C, UltraSonic Sensors, Power Supply, and other components. All the components mentioned above are attached to a wooden board so that its functionality is more usable was studied by silitonga [27].

Fig. 3. Component Placement

Regarding this, the placement of components on the frame, there are components such as Arduino Uno, Servo A, Servo B, Servo C, UltraSonic Sensor, Power Supply, and other components. All of the components mentioned above are attached behind this wooden axis, starting from the Power Supply which provides electricity to the Arduino Uno and then connected to several components such as ultrasonic sensors, servo A, B, C, so that the function can run smoothly by using this order was studied by Estevez [28]. The process of connecting tools and applications. Figure 4 is the process of coding the application and tools that will be created.

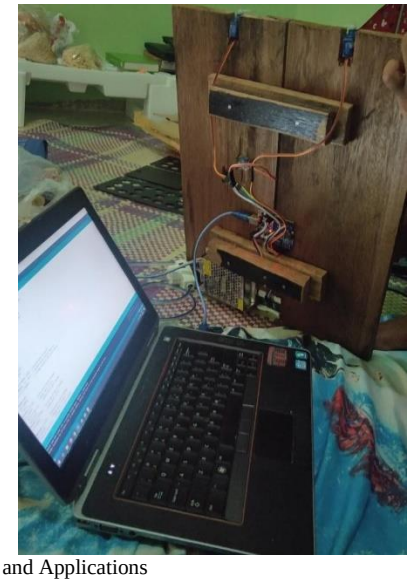

Fig. 4. Tools and Applications

Arduino IDE is an abbreviation of Integrated Development Environment which is a software for writing programs, compiling and uploading programs to the Arduino board. For basic applications using the Arduino IDE, the tools and materials used are: Computer, Arduino Uno board, USB cable was studied by zeng [29]. Arduino Ide implementation in Figure 5 is the coding used by the author to program the tools to be made:

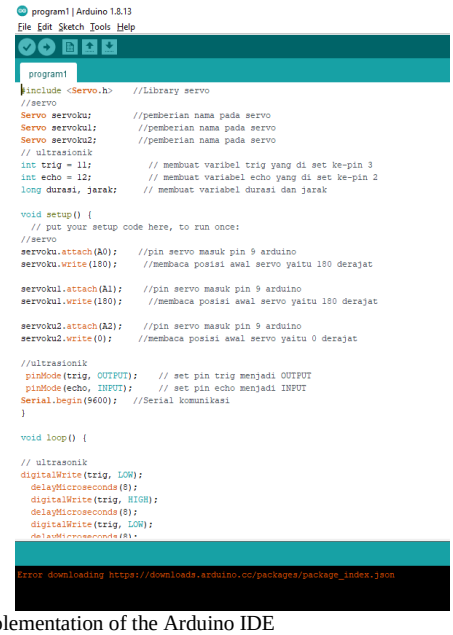

Fig. 5. Implementation of the Arduino IDE

After the IDE installation is complete, the Arduino will be ready to program. Programming is done using the Arduino IDE.To be able to program correctly, the Arduino IDE must be connected to the Arduino board which has been installed on a certain port, if it is connected then click Tools> Board> Arduino, then click Tools> Serial Port (depending on the port USB on the computer that we connect), After the settings are complete, the Arduino IDE is ready to use was studied by salleh [30].

Testing the coding used in Figure 6 is an explanation of the coding that will be used on the component devices that will be used:

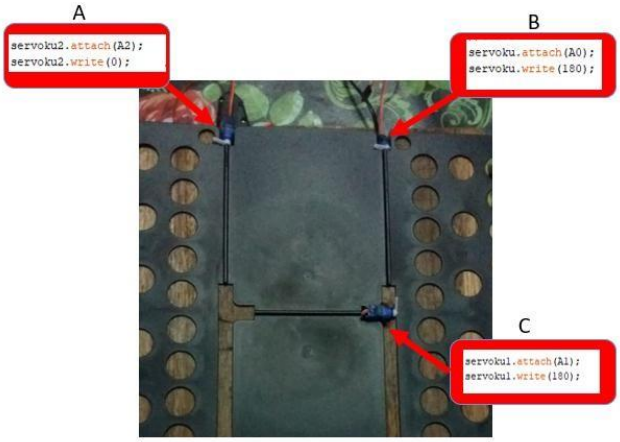

Fig. 6. Servo Coding

Include is the opening of this coding so that the program can be read, then coding A servoku2.write (0) to rotate the rotation position to the left from the upward servo position, in coding B servoku.write (180) to rotate right from the upward servo position , and in coding C servoku1.write (180) to rotate to the right from a sideways servo position was studied by yew [31].

```
void loop() {

// ultrasonik
  digitalWrite(trig, LOW);
  delayMicroseconds(8);
  digitalWrite(trig, HIGH);
  delayMicroseconds(8);
  digitalWrite(trig, LOW);
  delayMicroseconds(8);

  durasi = pulseIn(echo, HIGH);
  jarak = (durasi / 2) / 29.1;
  Serial.println(jarak);
```

Fig. 7. Ultrasonic Coding

The coding above is an order of the speed of the ultrasonic duration, reading, and distance. duration = pulseIn (echo, HIGH); useful for receiving ultrasonic sound, distance = (duration / 2) / 29.1; useful for converting duration to distance (cm), Serial.println (distance); useful for displaying distance on a serial monitor.

```
if(jarak<=10){
  delay(2000);
  //servo
servoku.write(0);
delay(1000);
//servoku.write(0);
//delay(1000);
servoku.write(180);
delay(500);

servoku2.write(180);
delay(1000);
//servokul.write(0);
//delay(1000);
servoku2.write(0);
delay(500);

servokul.write(0);
delay(1000);
//servoku2.write(0);
//delay(1000);
servokul.write(180);
delay(500);
}
```

Fig. 8. Servo and Ultrasonic Coding

In the logic if (distance <= 10) {useful for detecting distance (cm) from the ultrasonic eye, delay (2000); useful for the time it takes to read after an object arrives at the ultrasonic eye.

Servo A coding servoku2.write (180) is the servo position 0 degrees delay (1000) ;, servoku.write (0) the servo position will change to 180 degrees delay (500); , In the application servo B rotates from left to right.

Servo B coding servoku.write (0); is the servo position 180 degrees delay (1000) ;, servoku.write (180) the servo position will change to 0 degrees delay (500); , In the application servo B rotates from right to left.

Servo C coding servoku.write (0); is the servo position 180 degrees delay (1000) ;, servoku.write (180) the servo position will change to 0 degrees delay (500); , In the application servo B rotates from right to left.

Testing the whole circuit is a test of all systems from a series of tests for each of the previous series which are made into a single system and carried out procedurally for further system analysis process. The following is a picture of the overall system test in accordance with existing conditions.

IV. CONCLUSION

After the author has finished testing, the results of the conclusions include the assembly of a clothes folding device in the form of a microcontroller with a servo drive that can be done with a minimum of 3 servo to 6 servos depending on the size requirements of the clothes. There are only 3 servo units and can only lift a small load of clothes, for clothes that are overloaded, it is recommended to add a total of 6 servo, installed on each opposite side of the existing servo placement. This tool can facilitate homework, namely in the work of folding clothes to be more efficient in time and energy.

Figure. 9. Test Results

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