



# Automatic Perfume-Ingredients Mixer for Making One Type of Perfume using a Microcontroller

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## ABSTRACT

### Keywords

Perfume  
Microcontroller  
Motor stepper  
LCD  
Keypad

Perfume is a tool that we often use in our daily life. The fragrance of the perfume we use is also diverse to prevent user boredom. In addition, the smell of perfume is also a match for the consumer itself. The rapid development of technology lately indirectly affects the changes in the wider community. The many sophisticated inventions evidence the development of this technology. Along with the development of this technology, a piece of equipment can be created to facilitate and provide production speed. In other words, it can increase the quality and quantity of producing goods for the users of these tools. These technological advances can be used to make perfume ingredients mixing tools to manufacture one type of perfume using a microcontroller. The test results of this tool after manual settings are obtained automatically by measuring cup 1 containing 19cc, cup 2 containing 10cc, cup 3 containing 19cc, cup 4 containing 18cc, and cup 5 containing 29cc. With an average error rate from testing the entire system of 4,8%, the system is declared to be able to work well.

## 1. Introduction

The rapid development of technology lately indirectly affects the changes in the wider community. The many sophisticated inventions evidence the development of this technology [1][2]. Combining these technological developments can create equipment that facilitates and provides production speed. In other words, it can increase the quality and quantity of production goods for users of these tools. These technological advances can be used to make perfume ingredients mixing tools to manufacture one type of perfume using the AT 89S52 microcontroller.

This idea appears when observing the refilling perfume refill in the Malang city area. When refilling perfume in one of the stores, there are long queues of prospective buyers queuing up to get the service. After observing, this queue is caused by filling the perfume itself. The process is very long and inefficient because the filling of the perfume is done by mixing the chemical liquid little by little. For example, they mix liquid S first, then liquid B, C, etc. And all of these liquids have a specific composition for each type of perfume to be ordered. This is also influenced by the number of experts available, very few available experts, and only those who know the perfume's composition requested by the customer. Therefore the idea arose to improve their performance and profits with the tool to be made.

The system that will be designed is a perfume ingredient mixing device for producing one type of perfume, using the AT 89S52 microcontroller, which is equipped with a mechanical lid pusher motor.

A substance to be mixed consists of 4 kinds. And the amount that is put into the perfume bottle will be determined by the push of the mechanical cap driven by the stepper motor. Because there are various perfume ingredients, the valve pressure variations will also be different for each type of



perfume to be made. In addition, the perfume will usually consist of various volumes, ranging from 100 ml, 50 ml, and 30 ml. A keypad and LCD will be provided to enter data into the microcontroller to determine the type of perfume to be made and the desired volume. This tool will not work if there are not enough ingredients to make the mixture.

From the description above, several problems can be studied further, namely: How to design a device that can systematically mix perfume ingredients into bottles. This research aims to design and manufacture perfume ingredients mixing devices to manufacture one type of perfume that can facilitate and provide production speed. In other words, it can increase the quality and quantity of manufactured goods using the AT 89S52 microcontroller.

## 2. The Proposed Method/Algorithm

### 2.1. Microcontroller AT89S52

The microcontroller is a complete microprocessor system in a chip with input and output and control with programs that can be written and erased especially. This study uses a microcontroller type AT89S52 [3][4][5].

### 2.2. Motor stepper

The motor stepper is a DC motor whose gradual movement (*stepper step*) accuracy depends on its specifications. Each motor stepper can rotate for each step in angle units (0.75, 0.9, 1.8). The smaller the angle per step, the more precise the motor stepper movements [6][7][8].

## 3. Method

A systematic and structured arrangement of the tools is required to create a working system for an electronic device. Here are several stages of the process:

### 3.1. System Block Diagram

Describe the entire system of this tool can be seen in Figure 1 below:

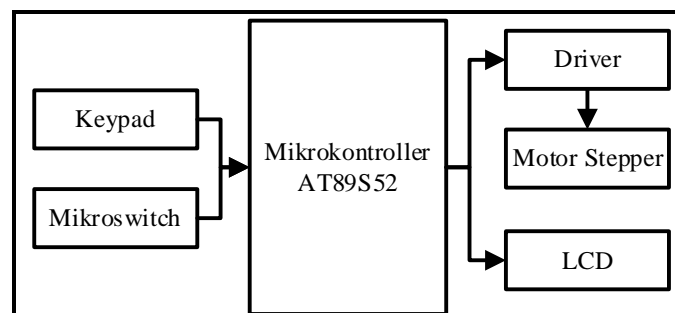


Fig. 1. Circuit Block Diagram

From the picture above, each block diagram can be explained, namely:

1. Keypad  
To choose the type of perfume to man, the desired volume, and refill or empty the perfume tube.
2. Micro Switch  
Functions as a switch to detect filling or emptying if the perfume ingredient in the syringe has exceeded the minimum/maximum limit.
3. AT89S52  
It is a CPU (*Central Processing Unit*) of the microcontroller system that functions to control and regulate all processes in the implementation of perfume making [9].
4. Driver  
To drive a motor stepper (As an initial amplifier)[10].
5. Motor stepper  
Used as a syringe pusher and puller.
6. LCD  
Function as a viewer of the input entered via keypad and a display.

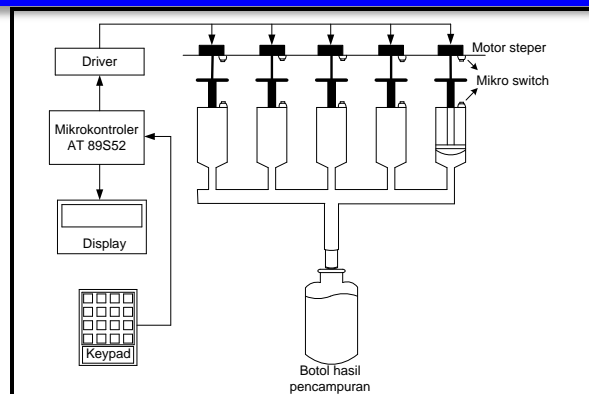


Fig. 2. Perfume blending process system

For more details, we can see in Figure 2 The shape of the perfume mixer design.

### 3.2. How the System Works

The working principle of “a perfume-ingredients mixing device for the manufacture of one type of perfume using the AT89S52 microcontroller is as follows:

When the tool is first turned on, the microcontroller will detect the initial state of the tube in an open position. What is meant here is that the motor stepper still carries out no steps or steps.

This tool is mounted on 5, 60 ml syringes connected to 5 motor steppers. The motor stepper is connected to the motor driver and then to the AT89S52 microcontroller. Each motor stepper will make as many rotations as requested by the microcontroller. Each mixture consists of different compositions. Determine the amount of the cross is regulated by the number of spins of the motor stepper. The motor will push the valve as much as desired. The number of rounds will be recorded in the memory of the microcontroller.

The motor can rotate in reverse to pull the injection tube valve. The purpose of this recall is for the process of refilling materials. The maximum pull will stop when the thread on the tube touches the Microswitch sensor [11].

The mixing process will not run if the remaining steps are insufficient to carry out the mixing process. The microcontroller will ask to refill the material. It is necessary to reload the syringe for every 1 ml shift of material required 288 steps of the motor stepper [12].

## 4. Results and Discussion

### 4.1. Tube Filling Process Test

#### 4.1.1. Objective

This test is conducted to determine whether the system can fill the tube according to what is needed.

#### 4.1.2. Test Result

After going through the process of setting the contents of the tube, the process occurs is that motor stepper in tubes 1, tube 2, and tube 5 moves the suction rod up so that the tube contains water. The suction process continues until the suction rod touches the microswitch.

### 4.2. Testing the Process of Disposing of Tube Contents

#### 4.2.1. Objective

This test is carried out to determine whether the process of removing the contents of the tube can be carried out by the system according to what is needed.

#### 4.2.2. Test result

After going through the process of setting out the contents of the tube, the process that occurs is that the motor stepper on tube 1, tube 2. And tube 5 moves the suction rod down so that the tube that has been filled with water from the tube contents process is emptied.



### 4.3. Manual Setting Process Testing

#### 4.3.1. Objective

The purpose of this test is to determine whether the manual setting process for the contents of the tube can be carried out correctly.

#### 4.3.2. Test Result

After testing the manual setting sub-menu process above, measuring cup 1 contains 19cc, cup 2 contains 10cc, cup 3 contains 19cc, cup 4 contains 18cc, and cup 5 contains 29cc.

### 4.4. Template Process Testing

Testing the template process is done by running the process through the available menus. The purpose, equipment, and method of testing are almost identical to the manual setting testing process. After this testing stage, a test table was obtained on the template for perfume A, perfume B, perfume C, and perfume D as follows:

**Table 1.** Template Menu Test Result

	Parfume A		Parfume B		Parfume C		Parfume D	
	Set	Act	Set	Act	Set	Act	Set	Act
Tube 1	10	9	15	14	10	9	10	8
Tube 2	30	28	50	48	30	28	30	29
Tube 3	50	49	25	25	25	24	50	48
Tube 4	25	24	15	15	10	9	35	34
Tube 5	15	14	15	15	15	13	15	14

From the data of the test results of the Template menu for perfumes A and B, the error percentage is sought as follows:

The calculation of % Error for perfume A:

$$\%Error_{T1} = \frac{Act - Set}{Set} \times 100\%$$

$$\%Error_{T1} = \frac{9 - 10}{10} \times 100\% = 10\%$$

$$\%Error_{T2} = 6\%$$

$$\%Error_{T3} = 2\%$$

$$\%Error_{T4} = 4\%$$

$$\%Error_{T5} = 6\%$$

The calculation of % Error for perfume B:

$$\%Error_{T1} = 6\%$$

$$\%Error_{T2} = 2\%$$

$$\%Error_{T3} = 0\%$$

$$\%Error_{T4} = 6\%$$

$$\%Error_{T5} = 6\%$$

Thus the average percentage error of the system is as follows:

$$\bar{R} = \frac{\sum_n |Error|}{n}$$

$$\bar{R} = \frac{10 + 6 + 2 + 4 + 6 + 6 + 2 + 0 + 6 + 6}{10} = \frac{48}{10} = 4,8\%$$

With an average error rate from testing the entire system of 4.8%, the system is declared to work.



## 5. Conclusion

After the design and manufacturing process as well as tool testing, it can be concluded:

1. The maximum error tolerance of the work if this system is 4,8 %. This can be seen from experimental data;
2. Based on the overall test results, it can be said that the system works well as designed.

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