AUTOMATIC SHOE DRYER

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ABTRACT

Nowadays many people face dry problem, especially those who are often involved in activities in sweaty areas resulting in shoes being wet and damp. Besides, the uncertain weather conditions cause the shoes to be wet As a result, the shoes are uncomfortable to use as well as cause skin diseases in the legs. Therefore, this project is to design and implemented a functional Automatic Shoe Dryer that can help people to speed up the drying process of shoes in short time and can be placed indoor of building, and thus avoid the shoe loss which is convenient for user. The product created is a combination of software and hardware programmed. This system is using Arduino UNO as microcontroller platform with temperature sensor DHT 11 to gauge the humidity inside of the Shoes. Arduino UNO will send command to relay to open AC hot bulb & fan to distribute the heat evenly. The System operates by calculating the shoes drying period with temperature over time

***KEYWORDS**: Drying, DHT 11, Arduino Uno*

1. INTRODUCTION

Drying method under the sun, dry cleaning, hair dryer and putting shoes under the refrigerator is an old method and not suitable for using it. This method that make it difficult for users getting satisfactory drying results. Refers to the problem statement above that the objectives to build this project to find a solution in drying process that are to design and build Automatic Shoe Drying that can easy to use and can brought to everywhere. Besides that, the process of drying shoes in short time.

To achieve the project's objectives, the scope of this project includes to use of three or four AC bulb light and fan for drying process, sensor DHT 11 for detect the humidity in shoes, rack and Arduino Uno for program the system process. The below show the block diagram of this project.

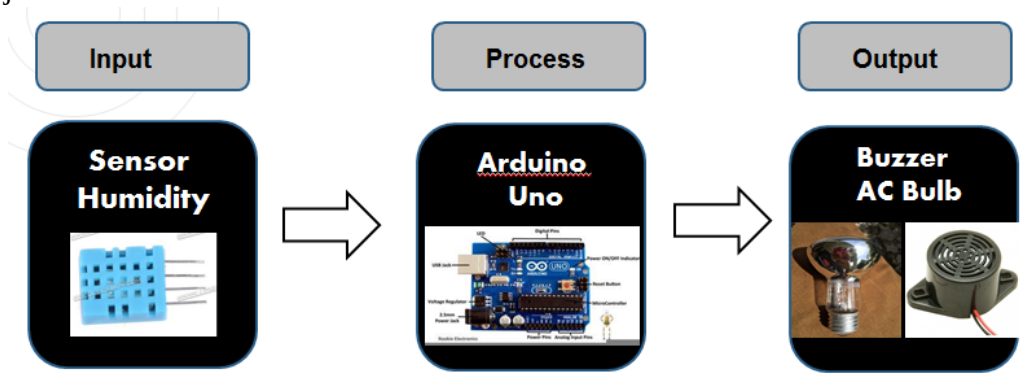

Figure 1.1: The block diagram of Automatic Shoe Dryer

2. LITERATURE REVIEW

Nowadays, time is very important in human life, with the growing technology rapidly then something needs to be done immediately. Similarly, shoe drying process. People can use

anywhere the apparatus when want to dry a shoe with short time and safely. It because of this apparatus can place anywhere that near the electric supply to operate it.

2.1 Current existed shoe Dryer in Market.

2.1.1 Portable Shoe Dryers at Hammacher Schlemamer,

This is the portable shoe dryer preferred by our customers when they travel because they can be stored in your footwear, and when plugged into an outlet at your destination they gently, safely, silently, and thoroughly dry your footwear overnight. The dryer fits inside a shoe to gradually remove moisture, eliminating bacteria build up without damaging the material or shape of the footwear. Easy-to-transport, the dryers are ideal for hunting trips, beach vacations, ski or hiking excursions, or out-of-town marathons.

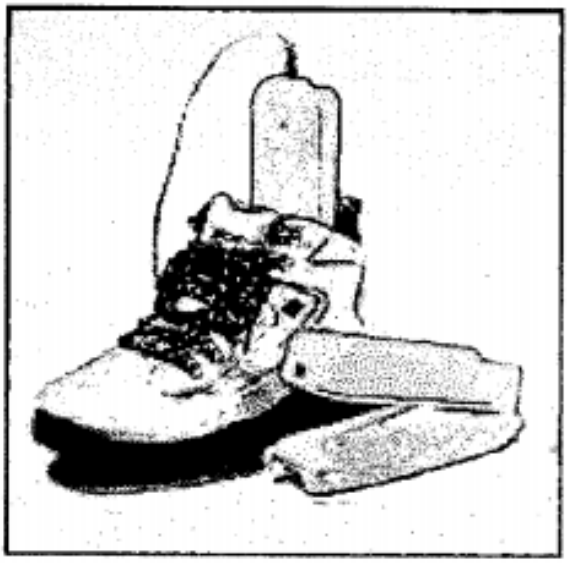

Figure 2.1: Portable shoe dryers at Hammacher Schlemmer

2.1.2 Shoe and Glove Dryer

A small fan pulls air through the shoes and gloves. In the portable unit shown here, you can turn the heat on or off. This boot dryer will also dry one pair of shoes or boots plus a pair of gloves at the same time, according to the product literature. For this particular model of shoe dryer, some thought needs to be put into supporting the unit. Other, more expensive models have their own stands.

Figure 2.2 Shoe and Glove dryer

2.3 DryGuy DryFast - Portable Footwear Dryer (AC, DC or 12V)

The Dry Fast is a compact, lightweight portable footwear and garment dryer that operates on three power sources drying footwear and garments anywhere. Legs extend to fit and retract for easy storage. Utilizes forced ambient (room temperature) air powered by AC, DC (four C batteries not included), or 12 volt (car adapter included) to dry footwear or garment in hours. Specifications:

i. Dry Time - Approximate dry time 4 - 8 hours
ii. Power - 120 volt AC household outlet, DC (four C batteries not included), or 12 volt (car adapter included)
iii. Size - Height 12.75 in x Width 7.75 in
iv. Material - High quality thermoset plastics

Figure 2.3: **DryGuy DryFast - Portable Footwear Dryer (AC, DC or 12V)**

3. METHODOLOGY

3.1 Introduction

In this project, Automatic Shoe Dryer are design for help the people who need the shoes are dry and comfortable to wearing. So the methodology is important before make the product. These methods will be guidance in so that it will be finish at the right time as the planning. This project is divide in two part that consists of software development part and hardware development. The below diagram is the basic idea of this project whereby Arduino Uno is used to programme the system process. The flowchart project of the system you can see at Figure 3.1.

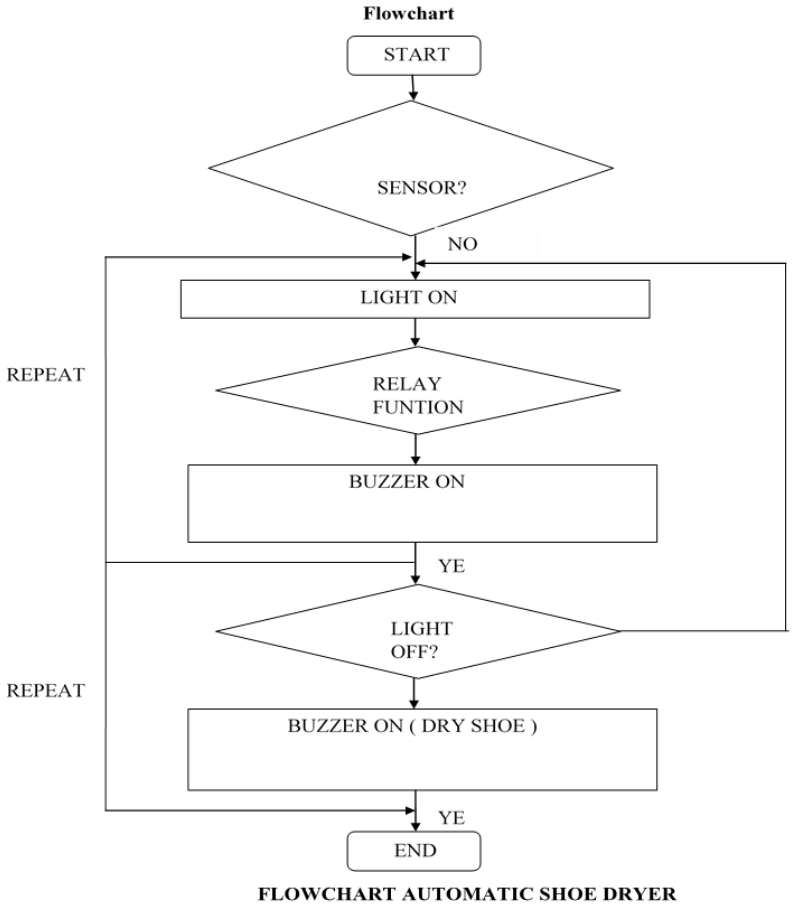

Figure 3.1 Flow chart Automatic Shoe Dryer

3.2 Hardware Implementation

3.2.1 Sensor Circuit Installation

Figure 3.2 Sensor Humidity Circuit

Humidity sensor DH11 are important part of this project that to produce an output. If the sensors are not properly installed, the detector cannot detect the humidity in shoe properly. DH 11 temperature range is from 0 to 50 degree Celsius while humidity range is between 20 -80%. The sensitivity of the sensors can be adjusted to the sensor circuit if the sensors can't properly recognize the input.

3.2.2 Arduino Installation

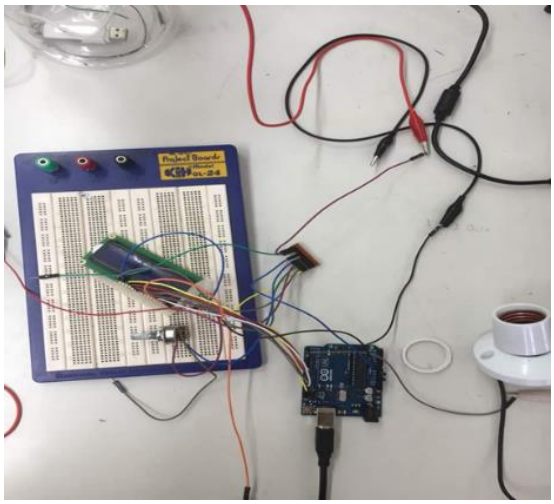

Figure 3.3 Sensor Humidity Circuit

The connecting Arduino circuit is to connect the component such as fan, relay and LCD. Arduino is an open source electronic platform based on easy to use hardware and software.

3.2.3 Relay Installation

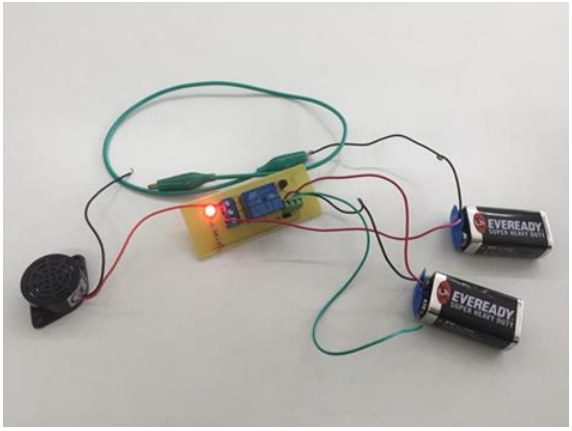

Figure 3.4 Relay Circuit

Relays are used to control or switch devices which uses a higher power than what most microcontroller such as Arduino.

3.2.3 Installation of AC Hot Bulb

Figure 3.5 Ac Hot Bulb

Light bulbs are an artificial light source. It is an electric light made from translucent glass or translucent as a jar and there is a filament wire inside it which will emit light when the electric current is passed through it. Filament is usually made of tungsten. Hot filament is protected from oxidation by glass or quartz which is filled with inert gas or emptied. In this project we use this bulb as an element of heating and as a source of heat.

3.3 Software Implementation

3.3.1 Arduino Software

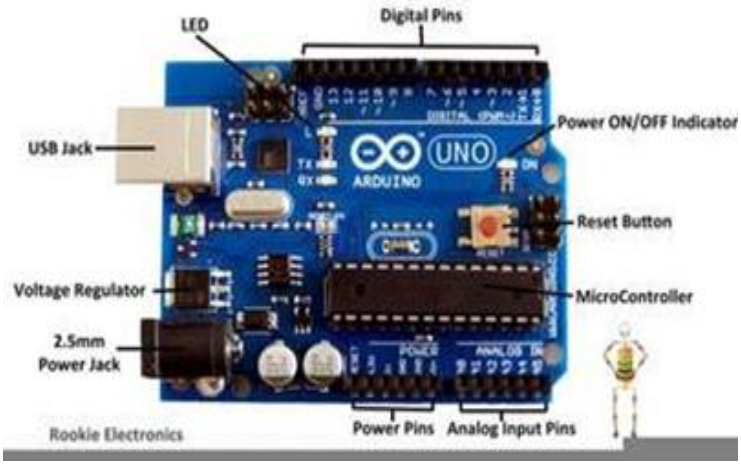

Figure 3.5 Arduino Uno

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Table 3.1: Arduino Uno Properties

Properties	Value
Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
Flash Memory	2 KB of which 0.5 KB used by bootloader
Clock Speed	16 MHz

4. ANALYSIS AND RESULTS

4.1 Introduction

At this stage, the programmer should know the specific purpose of constructing the program to be produced example what the problem to be resolved is. Among the factors to consider are the required output types, the hardware, the programming language to be used, and the constraints available.

4.2 Hardware

Figure 4.2 Project Design and Installation of Automatic Shoe Dryer

Table 4.1: Comparison before project started

Equipment	Humidity **(ºC)**	Result	Dry (%)
AC Bulb	34	Wet in and out of shoes	50%
AC Bulb + Fan	40	Wet in of shoe	75%
AC Bulb + Fan + Aluminium	47	Dry	100%

Before the project is started we try to test 3 method experiment to dry the shoes using this apparatus. Below show the table of comparison before project install. From the result, we know by using AC Bulb, fan and aluminum the shoes are dry 100 percent based on the experiment. After that, we try to experiment any different types of shoes and the results was conclude in table below.

Table 4.2: Result of dry shoes

	Ac bulb	Time (minute)	Temperature in Box (%)	Humidity
Velvet shoes	2	7.5	44	50
Velvet shoes	3	5.5	40	50
Canvas shoes	2	10.15	55	59
Canvas shoes	3	8.15	49	59
Children shoes	2	7.4	41	48
Children Shoes	3	5.11	37	46

From the result above, we try to any types of shoes and different size of shoes. The conclusion of shoe type and shoe size affects the shoe dryer process. In addition, the level of shoe wetness also affects the dry shoe.

5 CONCLUSION

In conclusion from this project, the result of dry shoes has been presented in table 4.2. The process of to implement the project has been clear explained in Methodology. From the results of this project, we can conclude that the size of shoes (children shoe) is one of factor the process to dry is quick. It depends on how many ac bulb that we are use. Besides that, the types of shoe also one the important thing in drying process. From the result we know, the type of velvet shoes are easier n quick to dry.

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