

# Water Alarm Clock

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Computer Sience 207  
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December 19<sup>rd</sup>, 2017

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## Introduction

The project was to make a wake-up machine, and the purpose of making this machine was because the traditional alarm clock was annoying, so our team used water to awake the user. Its name is water alarm clock. At the same time we will open the whole project on Github (<https://github.com/HanPeizhi/CS207-Project>).

We all know every morning, the biggest challenge we face when we get up is that we need determination, dedication and discipline to get up. An important reason that getting up is very difficult is that the bed is comfortable, and our head is not awake and sensible, because most people's consciousness is still a bit vague when they just wake up.

So why not create an alarm clock to make people feel uncomfortable in bed, while allowing users to wake up immediately, the most important thing is do not have to bear too much pain and trouble.

This article discusses the hardware requirements for water alarm clocks using common sensors and everyday-visible tools. In the beginning we had tried to use a smart car to carry a glass, and then use the car's servo to flip the cup, then we improved the program.

We also discuss the real time modules and temperature and humidity sensors that use the most critical sensors in the design and development of water alarms. We use the real time modules to improve the accuracy of time, and temperature and humidity sensors are used to monitor the environment.

## Background

Our team is not the first to make a machine, and we certainly will not be the last one.

Before we did this project, we tried to search the internet for items and content related to the wake-up machine. Luckily we found Simone's project, and we are very grateful for her project for giving us inspiration, which is very crucial to our first step as we have made a big mistake in how to control the design of the glass . We write these mistakes in this project writeup, because the progress of a project not only to come up with new ideas, but also need to reflect on mistakes to avoid the same mistake again next time.

Ms. Crazy "Creative Technologist" Simone Giertz created an alarm clock that smacks her in the face with a rubber hand to wake her up [1]. For the arm, Simone uses a rubber Halloween props, a bloody, torn arm and hand. To make it less troubling, she used a nail polish remover to remove the blood and remove exposed bones and other ruptured lumps. She uses an Arduino Uno and a relay, which fires when the alarm is turned off to control the device. ServoCity's brushed DC motor activates the arm when an alarm is triggered [2].

This project writeup is fully upgraded Simone's wake-up machine. We made a big change in both parts, alarm and clock. We improve the real alarm clock for electronic alarm clock while adding some small features. We also think the arm looks not so comfortable, but also to improve the effectiveness of the machine, we use the cup instead of the arm, so not only to eliminate the uncomfortable and improve the effect of the.

We found that the source URL provided by Simone on youtube is fake and does not have code and files, So this project is that after we got the inspiration of Simone we all have our own practice, And we made a few mistakes for that, but these are all our valuable experiences.

## Designing Process

This design has three parts. The first part is using Arduino, TRC and LCD to achieve the function of electronic watches. The second part is to add some modules to achieve some small functions such as digital temperature and humidity sensor(DHT11) and buzzer. Photograph of the circuit diagrams can be viewed in Appendix A. The third part is to use servo to release the cup pouring water, and we have to fixed the cup, servo and Arduino and other things on the wall.

The first part and the second part, these parts do not need us to make improvements, but we use a soldering iron to connect the pins of the RTC module.

The third part is to improve the paper cup to prevent paper cups hit the face, and to avoid unnecessary harm. And the improvement we designed was to make a small hole in the edge of the bottom of the paper cup, then let the thread go through the hole and tie it to the tack on the wall.

Here we want to repeat that in initially we tried to design an intelligent obstacle avoidance car to carry water and pour water, but this obviously can not be very good at the bedside. These we will talk about later in milestones.

## **Building Process:**

Our building process is to test each of the separate modules and parts of a separate test of these modules, and after the test is successful, we combine these modules together to achieve a complete function.

We built from the first part is the beginning of the electronic watch function. We first set up the RTC, also tested the code can run successfully RTC[3]. Then we built the LCD, because the LCD is too much trouble so we tried many times, but fortunately the code was finally run successfully and achieved the expected display[4]. Nextly, we combined the two functions of the RTC and the LCD and implement the functionality of a simple electronic watch in code.

In the second part, we used a nail to pocke a hole in the bottom edge of the paper cup. Then we nailed two tacks on the wall. Finally, I use a thread to pass through the hole in the bottom of the paper cup, then tie the other end of the thread to the tack, so that the cup will not hit the human face. There is one more question that we really tried a lot and also thought of many ways, but fortunately we have succeeded. This problem is how to fixed servo on the wall. We gripped the servo with an iron clip and then nailed the iron shelf to the wall with a spike (Appendix B).

Here we put the servo on the edge of the mouth of the paper cup, so the servo can jam and release the paper cup when the servo turns (Appendix C).

The third part we have enriched the function of electronic watch. I added two modules, one is the buzzer[5], one is the DHT11[6], so the buzzer in order to achieve the electronic watch

alarm function, and DHT11 is to display the current environment temperature and humidity. We provided the picture in the Appendix D.

## User manual of sorts

This water alarm clock is not particularly difficult to use. The first step is to Arduino connected to the power, only to provide 5V voltage can be. Here to explain, you can use the phone's charging plug, you can also use the charging treasure power, of course, will be inserted in the computer's USB interface is also possible.

The second step is to download the code to the Arduino, and then set your own time to get up, or use to worry about, this is also very easy, just find the appropriate code to modify two numbers (Appendix E).

The third step is that Arduino UNO comes with a transparent plastic base case, and a few holes in this base case. We can fix the Arduino on the wall with just a few studs(Appendix F). As for the breadboard is even more simple, because the back of the breadboard with a sticker, we simply glued the breadboard can stick the breadboard on the wall. If you do not like sticky glue on the wall, we also use tacks to support the breadboard on the wall(Appendix G).

The last step, we use the thread through the edge of the bottom of the paper cup, and then tied to the wall tacks. With a clip grip servo, and then we use two spikes fixed servo. We can also choose the buzzer working hours, such as the 7 buzzer to work and only work for a minute. A cup of water will be released in a minute.

Here we also think about using a button to cancel the pouring, but we think this will lose the effect of the water alarm clock, because often the alarm clock does not wake us up, but we wake up and turn off the alarm and then go to sleep.

Thus in order to avoid this, we are very sad and determined not to add a cancel button. Of course, do not worry too much about your pillow and sheets can not get dry. Because after our test it took only five hours at normal room temperature to get the pillow and sheets dry.

## Milestones

Milestones: #	Date #	To achieve the goal	Notes and supplements
1	11.04	All parts gathered	Weld the wire with motor
2	11.11	Learn and test each module	Coding each module
3	11.18	<b>Finish the smart car</b>	<b>Testing and run car on the road</b>
4	11.25	<b>Add holder support and water</b>	<b>Solve combination structure</b>
5	12.02	<b>NEW design. Use RTC, LCD</b>	<b>TEST code and finish the e-watch</b>
6	12.10	If has time, do more extensions	More idea and more...
7	12.17	Finish the project	

We think we have completed this milestone and have made improvements on the original milestone. We think the final result is very satisfying, although our project is a bit crude.

The biggest mistake with our milestone is the mistake of positioning in milestones 3 and 4. We originally planned to have a man lying on the table, and then a small car to the water.

When the car drove to the edge of the table, the water was poured down, while the bottom was lying.

Fortunately, we immediately find ways to improve the design, but also more clearly the purpose of our project. Eventually our project is on the right track no longer deviate from the goal, but also makes the function of our project more rich. In general, we learned a lot of lessons from this mistake and let us learn a lot of experience.

Milestone 5 is our new improvement. More troublesome is that we have to buy some spare parts, and then wait for a more anxious time, because we are buying parts from the net so courier takes some time.

Of course, our project is not perfect, and I am constantly improving and adding some new ideas and ideas. At our milestone 6, we added two new modules called Buzzer and DHT11, So the function of our electronic watch has become abundant.

We also think our project can be improved better, such as the appearance of a better look, while making it easier to use. These need us more time to think. Of course, this is also someone else's opportunity, Because if others inspire the new ideas when they see our projects, they will be able to make better projects based on our projects.

## **Group Contributions**

This writeup uses 'us,' but the team is only me, because I do not really want to use too many 'I' and do not want to see my name everywhere.

Han did everything and independently completed the entire project. The project's positioning and milestones are both dictated by Han. Quoted lookups and code changes are done independently by Han.

The part of the code is not easy, because you first learn the code for each module online and then practice the code yourself.

Han did not have anyone to discuss when it came to selling mistakes and failing to function, so he could only suffer on his own and in this process that often caught Han in anxiety. Milestone changes, and add new ideas, are Han decided. From this point of view this may be the only benefit for a group of only one person.

This writeup is written by Han, including photos, code and schematics in the appendix, and the repository on Github is also done by Han.

## Reference

[1] Simone Giertz. The Wake-up Machine VLOG. Retrieved November 11, 2017

<https://www.youtube.com/watch?v=mXLzfAHl4-k>

[2] Gareth Branwyn. Slap Yourself Awake with This Ridiculous “Wake-Up Machine” Alarm

Clock, Retrieved November 11, 2017

<https://makezine.com/2015/11/14/slap-yourself-awake-with-this-ridiculous-wake-up-machine-alarm-clock/>

[3] Yert, File:RTC.zip, Retrieved November 11, 2017 from

<https://www.elecrow.com/wiki/index.php?title=File:RTC.zip>

[4] Arduino, "Hello World!", Retrieved November 11, 2017 from

<https://www.arduino.cc/en/Tutorial>HelloWorld?from=Tutorial.LiquidCrystal>

[5] University of Regina, Lab 2: Blinking Light, Retrieved November 11, 2017 from

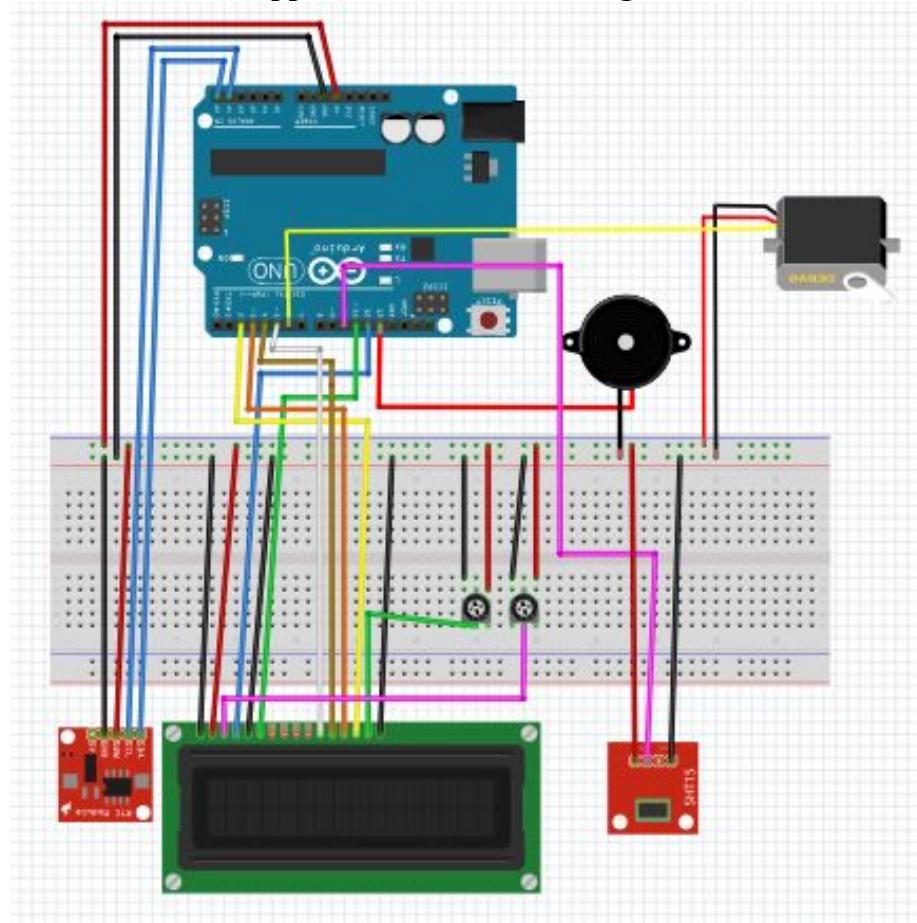
<http://www.cs.uregina.ca/Links/class-info/207/Lab2/>

[6] Arduino, A DHT11 Class for Arduino, Retrieved November 11, 2017 from

<https://playground.arduino.cc/Main/DHT11Lib>

## Appendix

### Appendix A: the circuit diagram



LCD		Arduino
RS	->	12
E	->	11
D4	->	5
D5	->	4
D6	->	3
D7	->	2

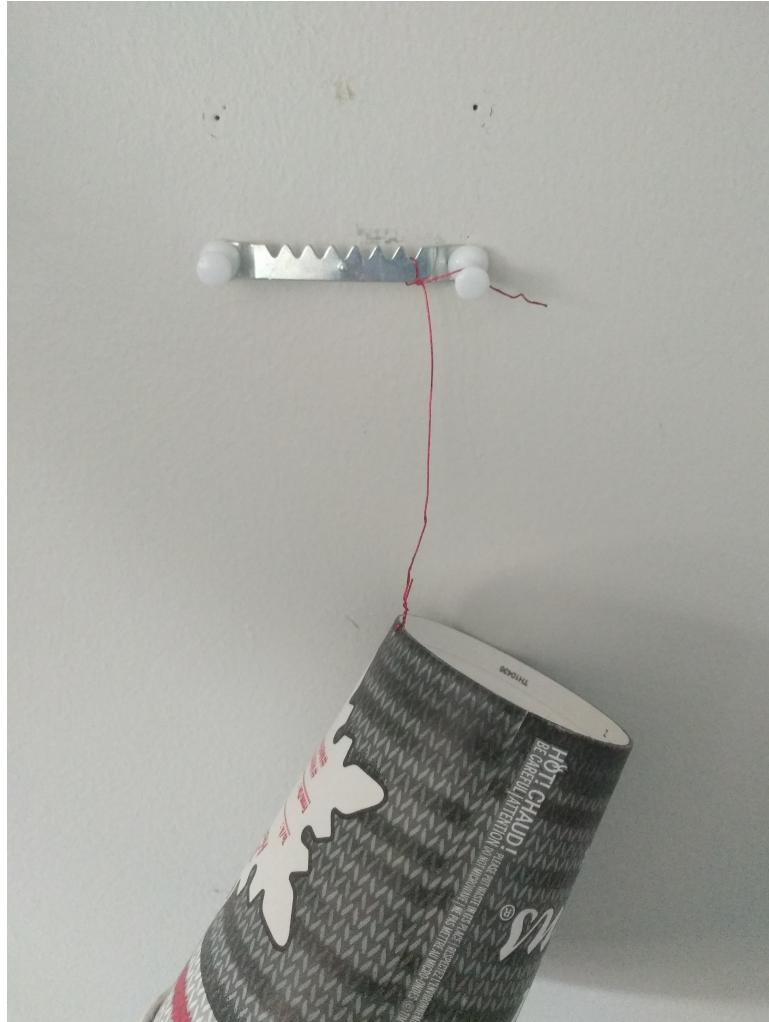
VCC	->	5V
R/W	->	GND
GND	->	GND

### Appendix B: the fixed servo



We gripped the servo with an iron clip and then  
nailed the iron shelf to the wall with a spike.

### Appendix C: the fixed cup



A thread through the bottom edge of the paper cup

Tie the thread to the tack

**Appendix D:**

The original angle is 90 degrees,

When the angle to 0 degrees will release the cup.

## Appendix E:

```

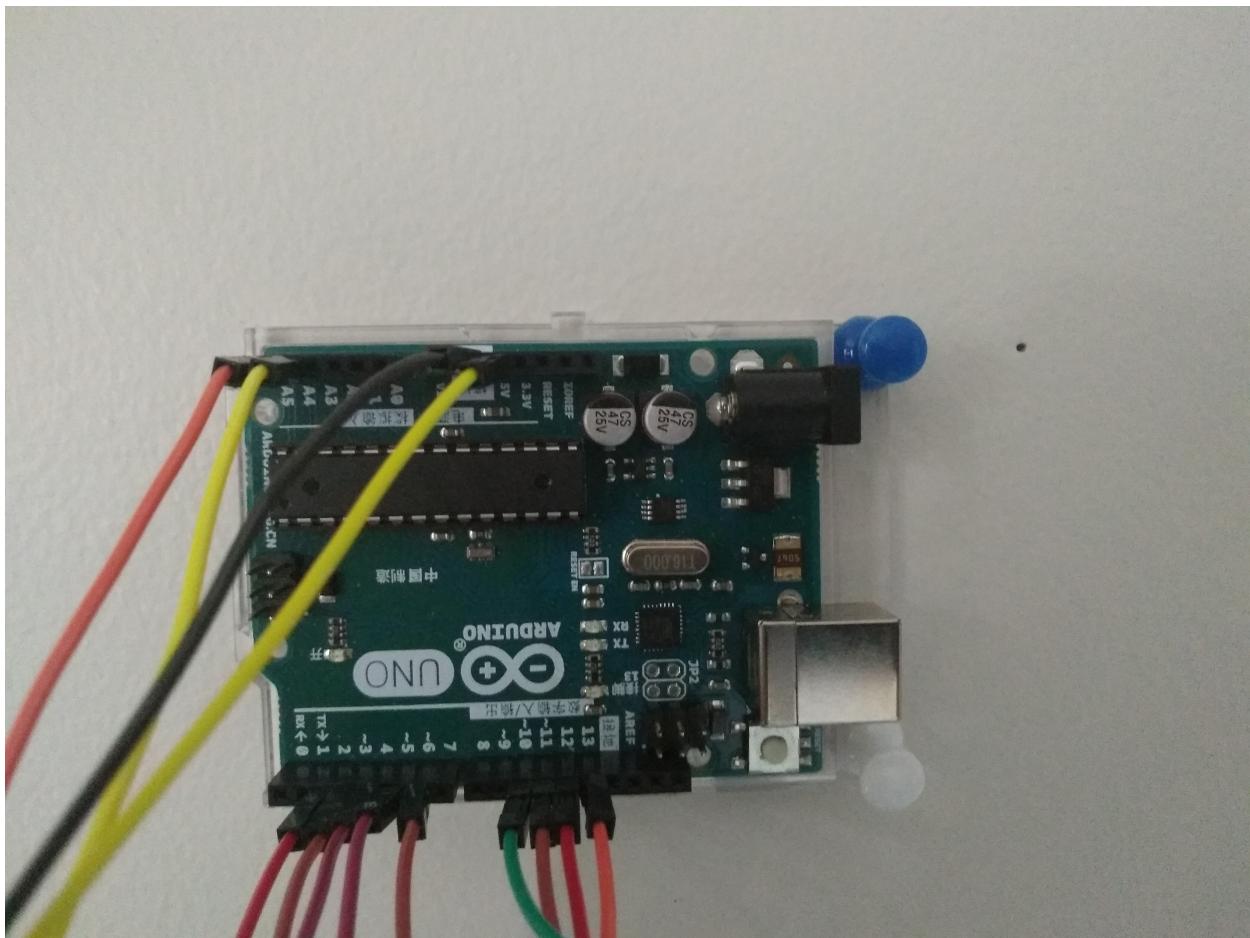
139     if(now.hour() == 6 && openWater){ // set hour here it is 6am
140         if(now.minute() == 0){           // set one minute for working
141             tone(beep, melody);
142         }
143     else{
144         noTone(beep);
145     }
146
147     if ((now.minute() == 1 )){      // after one minute release the cup
148         Serial.println("Open water NOW!");
149         for(pos = 90; pos>=1; pos-=1){    // goes from 90 degrees to 0 degrees
150             myservo.write(pos);          // tell servo to go to position in variable 'pos'
151             delay(15);                  // waits 15ms for the servo to reach the position
152         }
153         myservo.write(90);
154         openWater = false;
155     }
156 }
157 else if (now.hour() == 6){
158     openWater = true;
159 }
```

Line 139 is to set the hour. This is a 24-hour system.

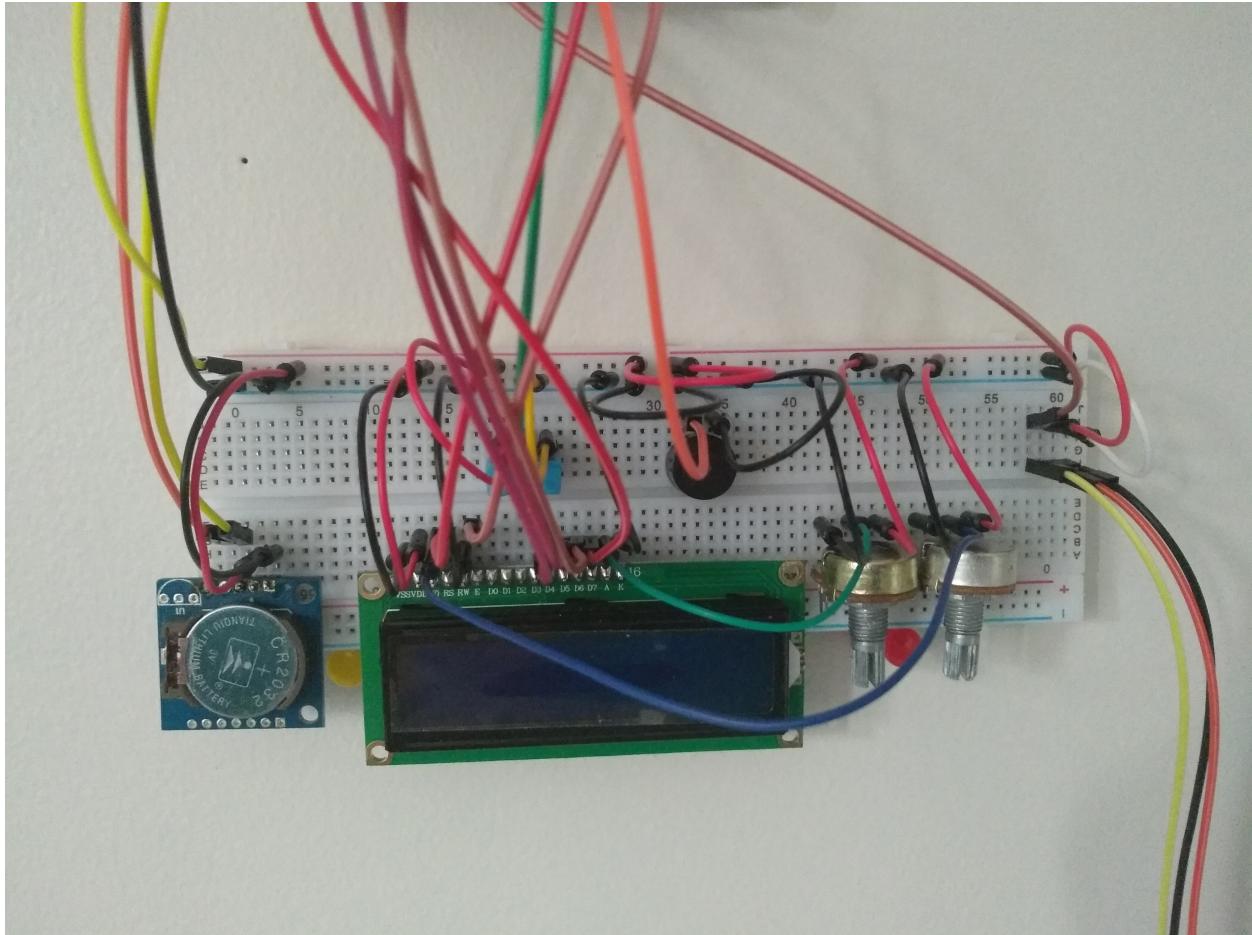
Line 140 is the length of time to set the alarm. Here work time is 6:00 to 6:01.

Line 147 set the 6:01 release the cup. It is minute unite.

## Appendix F:



## Appendix G:



Here are two potentiometers,  
one is to adjust the brightness of the foreground,  
one is to adjust the brightness of the background.