BID YIR IN LIEU IN SIR IT

BIOHAHA

Build your own lab and share it

“Don't rush to discard your tetris specs computer equipment,
or impulsively sell it for the price of five servings of soto babat.
That computer used to smile when you first entered the digital world.
Repurpose it, give it once more time to accompany you on another journey”.

~Wira Darmadi

HOT PLATE MAGNETIC STIRRER

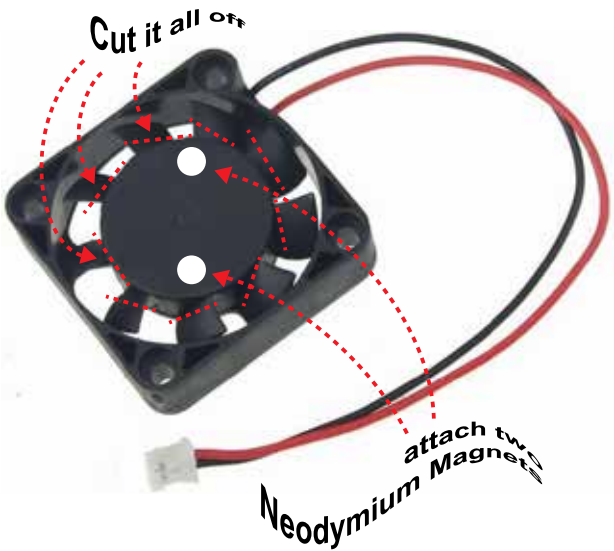
A Hot Plate Magnetic Stirrer is a laboratory device used to heat and stir one solution with another, aiming to create a homogeneous solution with the help of a magnetic stirring bar.

Here we will make a DIY version of it from unused items, or you can also find them at flea markets in your area.

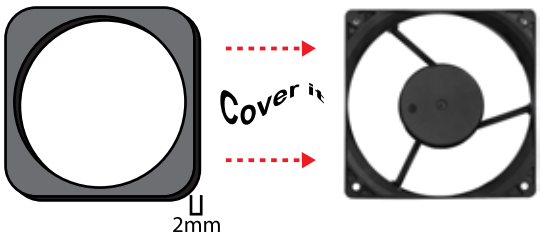
Materials:
- CPU Fan (1 pc)
- Neodymium Magnet (2 pcs)
- Magnetic Stirring Bar or Magnet Stick (1 pc)
- Coffee Heater 220V (1 pc)
- DC Power Plug Connector (Female) (1 pc)
- Adjustable Power Supply 3-12V (1 pc) or PWM Module 12V(1 pc)
- AWG 26 cable or similar
- Adhesive Glue

STEPS:

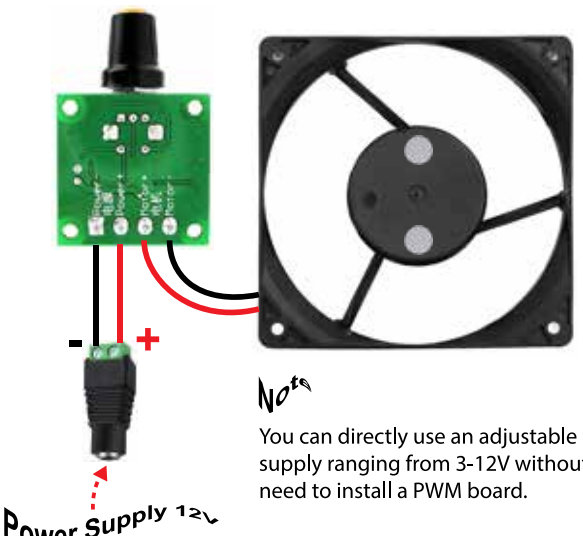
Cut the the propeller of the fan. Then, attach two Neodymium Magnets with opposite poles. The easiest way is to attach them with a stirrer bar or magnet stick first to determine their pole positions, then stick them to the fan shaft as shown in the image.



Leave a gap of about 1 to 2 mm using any flat material to avoid friction between the magnet and the glass tube.



Install the PWM module as shown in the diagram below. Then, connect it to the 12 Volt power supply.



Note

You can directly use an adjustable power supply ranging from 3-12V without the need to install a PWM board.

Test it by placing an Erlenmeyer flask or similar container filled with water on top of the fan, then dip the stirrer bar and turn on the fan.

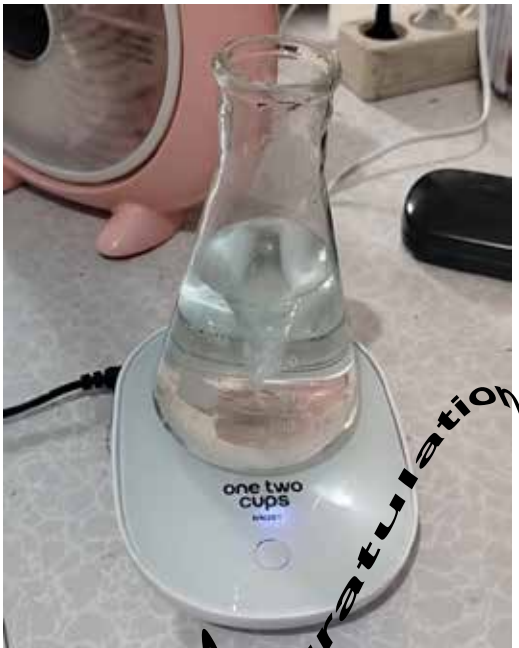
Testing Numero Uno

Test it from the lowest speed to the highest speed. If everything runs smoothly, proceed to the next step.

Testing Dari Bunga

Cut the bottom part of the coffee heater to the size of the fan, then glue the fan inside the coffee heater.

Test it again, check the rotation speed and temperature. Congratulations! Your bio lab equipment is almost ready.



Congratulations

Trash is not the right place,
Understand your electronic waste.

~Mas Wid

SHAKER

Shaker is a liquid mixer or agitator used in chemical and biological laboratories to homogenize a substance or solution. In this stage, there are two types of shakers, Gently Shaker and Big Shaker, you can choose one or try to make both.

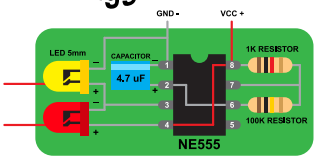
SIMPLE SHAKER

Materials:
- Used CD/DVD ROM (1 pc)
- H-Bridge Module L298N (1 pc)
- Trigger Module e.g. Flip Flop, 555 Pulse, etc. (1 pc)
- DC Power Connector, Female (1 pc)
- Power Supply 5V (1 pc)
- AWG 26 cable or similar

CD/DVD ROM

H-Bridge L298N

Trigger Module



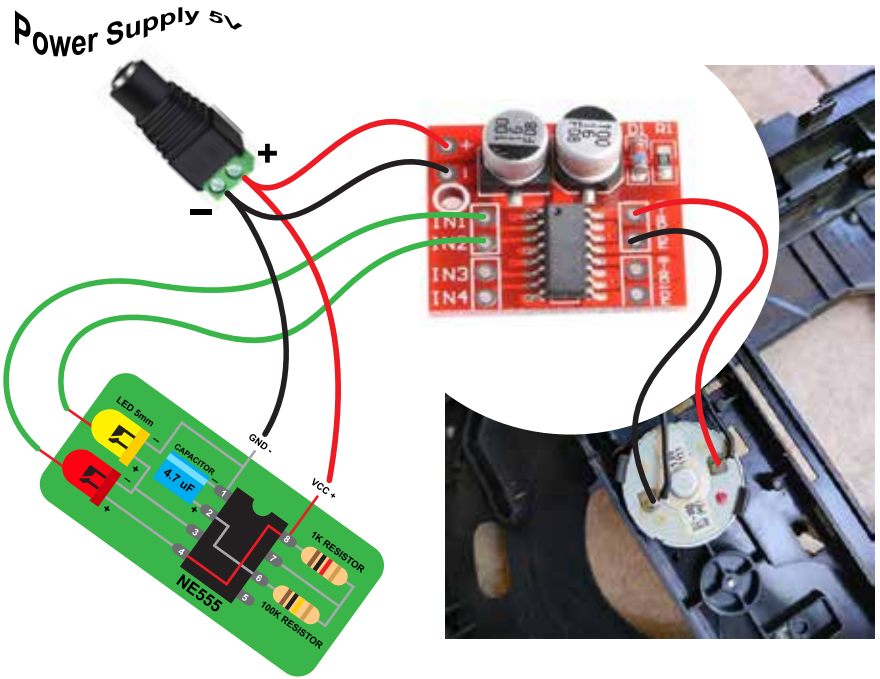
DC Power Connector Female

Power Supply 5V

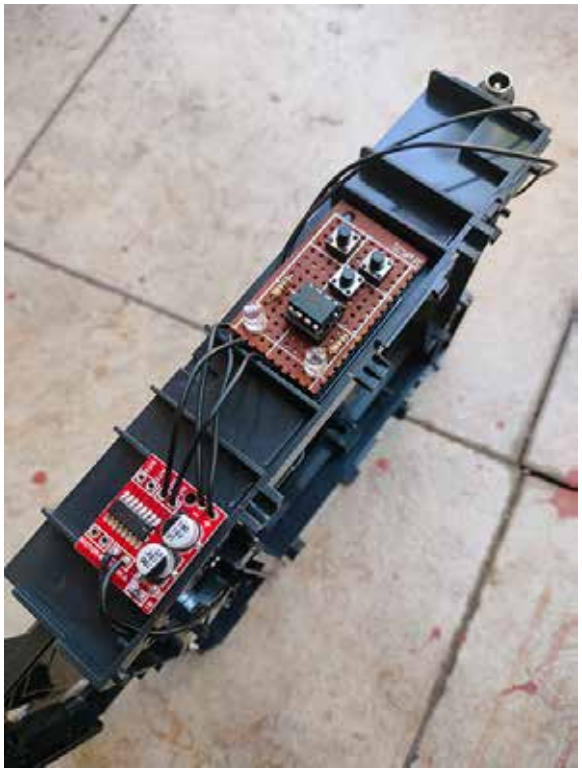
STEPS:

Disassemble the CD/DVD ROM, take the disk slider module along with the DC motor.

Connect the motor's poles to the motor A pin on the H-Bridge, then connect Pin 1 and Pin 2 to each trigger module you have. Or you can also use the circuit below.



Power it with a 5V power supply. Test its movement, stability of the base, and experiment with different trigger modules.



Now, your bio lab equipment has gained another addition.

“You live, you learn, and you upgrade”

~Nanang Mercury - Garut

GENTLY SHAKER

Now we try to make a shaker that has a slightly rotating movement using a stepper motor from a CD/DVD ROM.

Materials:
- Used CD/DVD ROM (2 pcs)
- Microcontroller (e.g., Arduino, ESP, etc.) (1 pc)
- Motor Stepper Driver Board e.g., ULN2003, L293, TB6600, etc. (1 pc)
- DC Power Connector, Female (1 pc)
- Power Supply 9V (1 pc)
- AWG 26 cable or similar
- Bolt Nut set (5 sets)

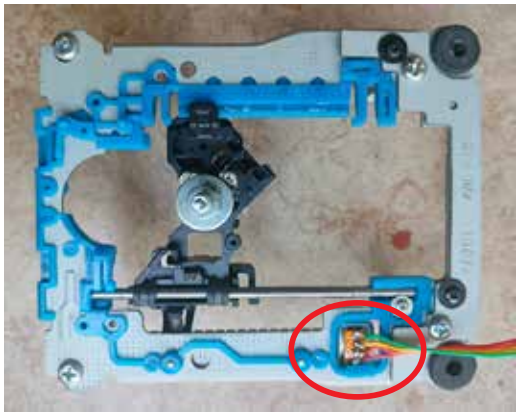
Or

Or

Or

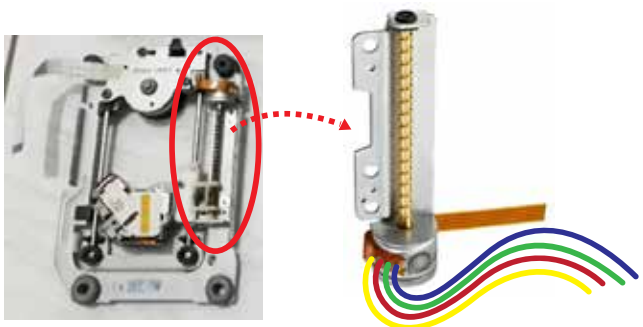
STEPS:

Disassemble the CD/DVD ROMs, take the stepper motor module for the optic.

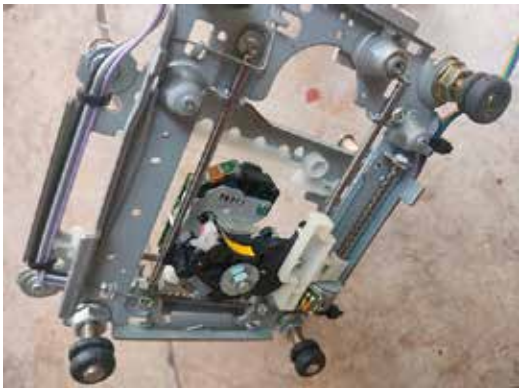


X2

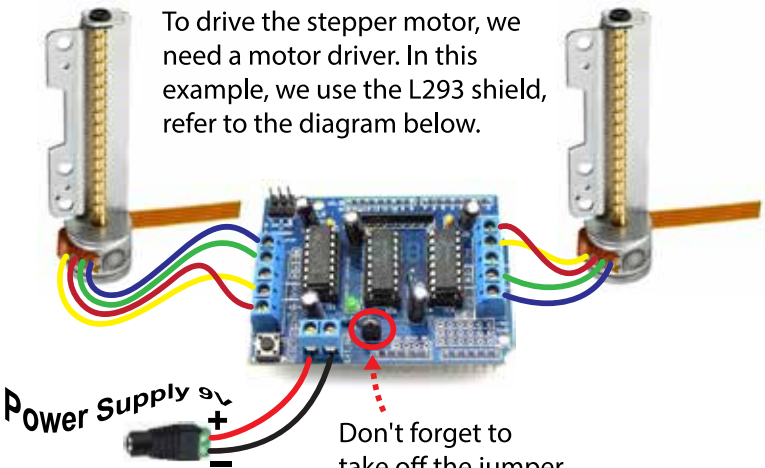
Connect the 4 stepper motor pins with a soldered cable about one handspan long.



Repeat the same with the second CD/DVD ROM. Combine these two modules into one using bolts and nuts.



To drive the stepper motor, we need a motor driver. In this example, we use the L293 shield, refer to the diagram below.

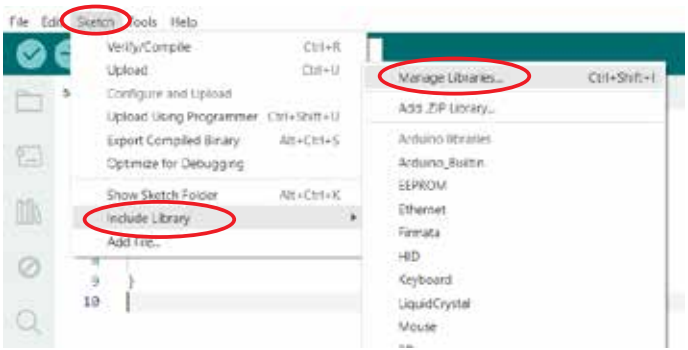


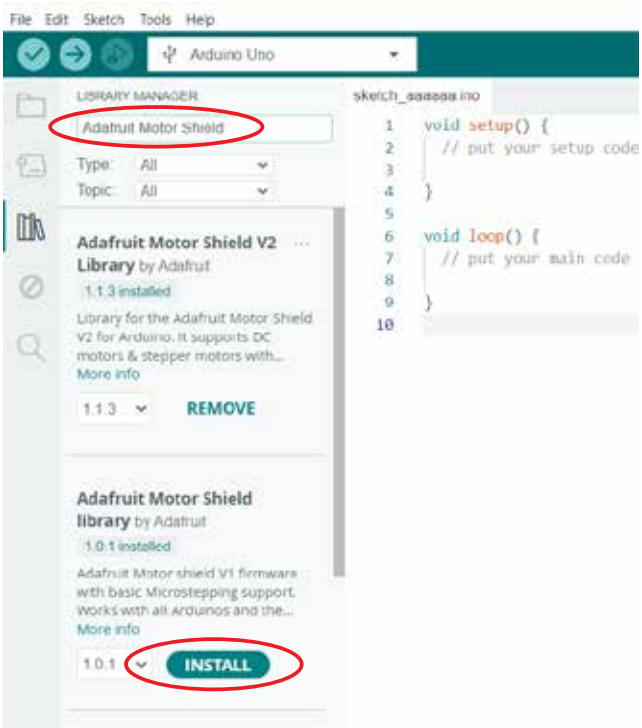
Don't forget to take off the jumper

For the microcontroller, we use Arduino Uno, follow the step-by-step guide below:

Download and Install Arduino IDE from the following link: https://www.arduino.cc/en/software

Install the Adafruit Motor Shield library with the following steps:
Open Arduino IDE, then select Sketch > Include Library > Manage Library > type Adafruit Motor Shield library in the search box > Install.

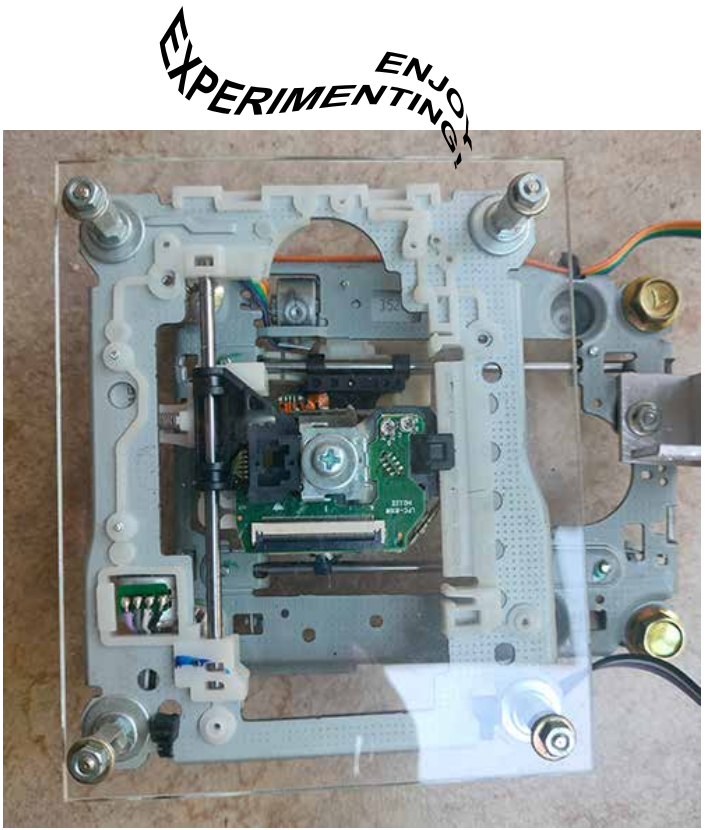


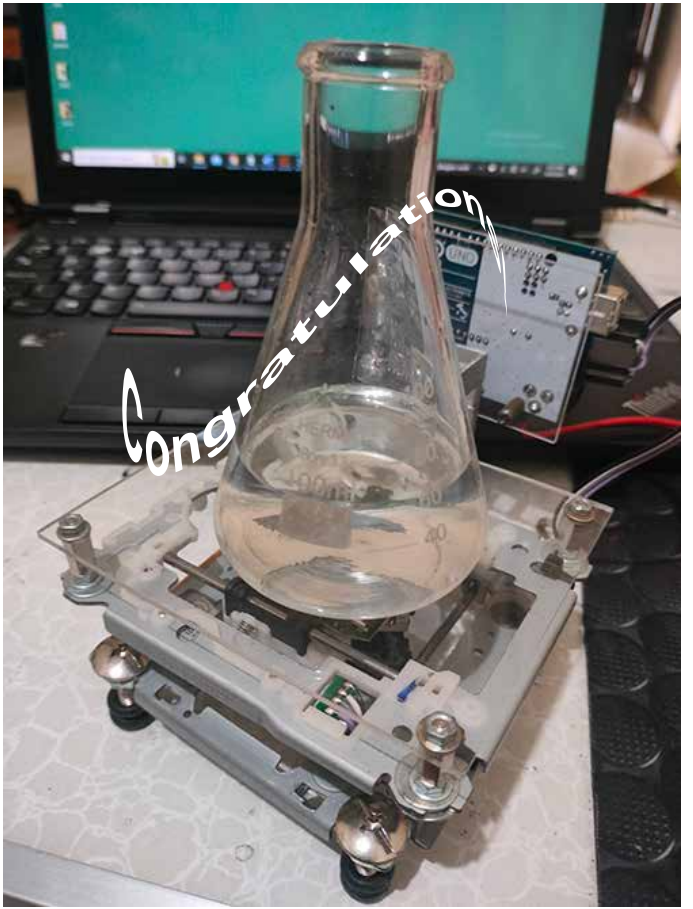


Or if you're using the latest Arduino IDE, you can click the book icon on the left column, then type in the search box.

Restart Arduino and select File > Examples > Adafruit Motor Shield library > Stepper Test, then upload to try. For those new to Arduino, you can follow the steps here:
https://support.arduino.cc/hc/en-us/articles/4733418441116-Upload-a-sketch-in-Arduino-IDE

Modify the sketch to control two stepper motors.
Here's the code link for two steppers. [LINK]





“Just stick with it.
What seems so hard now will one day be your warm up”

~Asep Jerman

BIG SHAKER

now we make a large shaker, using the rail from the printer and without using a microcontroller

Materials:
- Used Bubble Jet Printer (1 pc)
- Relay 14 Pin 12V (1 pc)
- Relay Socket (1 pc)
- Limit Switch (2 pcs)
- Power Supply 12V (1 pc)
- DC Power Connector, Female (1 pc)
- AWG 26 cable or similar

Bubble Jet Printer

Relay 14 Pin 12V

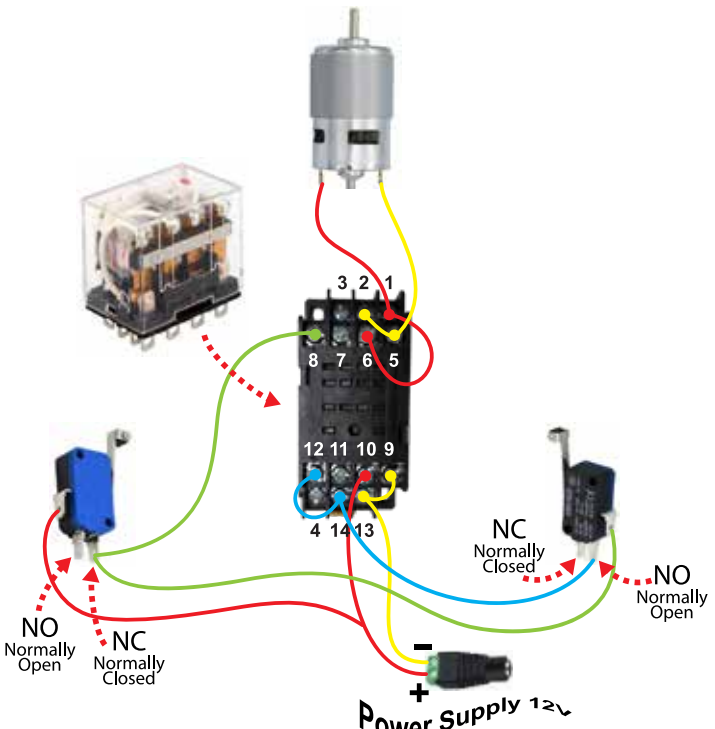
Relay Socket 14 Pin

Power Supply 12V

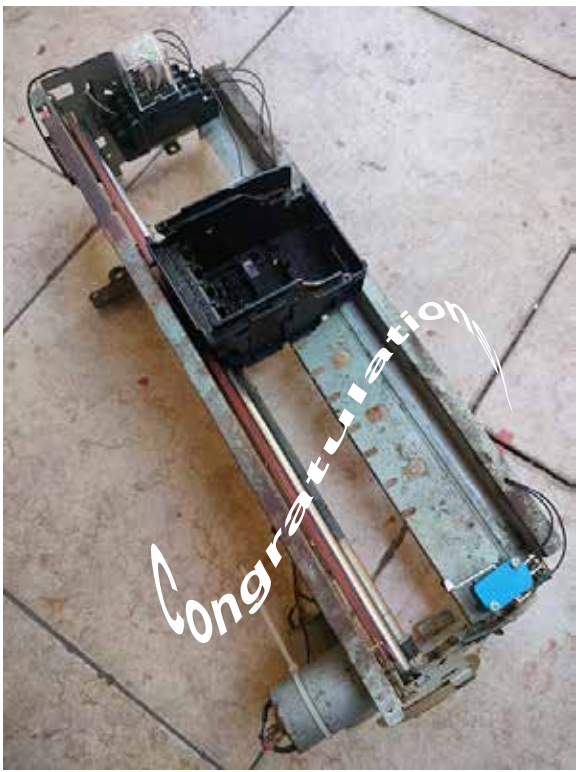
Limit Switch

STEPS:

Disassemble the broken printer and take the relay circuit and its DC motor part. This time, to control the motor's forward and backward movements, we will try without using a microcontroller. Just use one 14-pin relay 12V and two limit switches. Follow the wiring diagram below.



Place the limit switch facing the printer tray installed on the rail, adjust it so that the limit switch lever can collide with the tray if the tray moves towards it.



"It’s like waiting for your favorite cookies to bake,
you gotta be patient, but the reward is worth it"

~Uci Demak

CONDENSER WATER COOLING SYSTEM

A condenser is a cooling tube used in a distillation system to convert steam into water. This condenser consists of a heat absorber equipped with cooling water. So, this time we will use a heatsink fan from a computer processor with other materials to make a condenser water cooler.

Materials:
- Used CPU Heatsink Fan (1 pc)
- Peltier e.g. TEC1-12706, 12708, 12709, etc. (1 pc)
- Boiling Pot (1 pc)
- Thermostat e.g. W1209, W3230, etc. (optional)
- Power Supply 12V 6A (1 pc)
- DC Power Connector, Female (1 pc)

Heatsink Fan

Boiling Pot

Thermostat W1209

Peltier TEC1-12706

INFO INFO

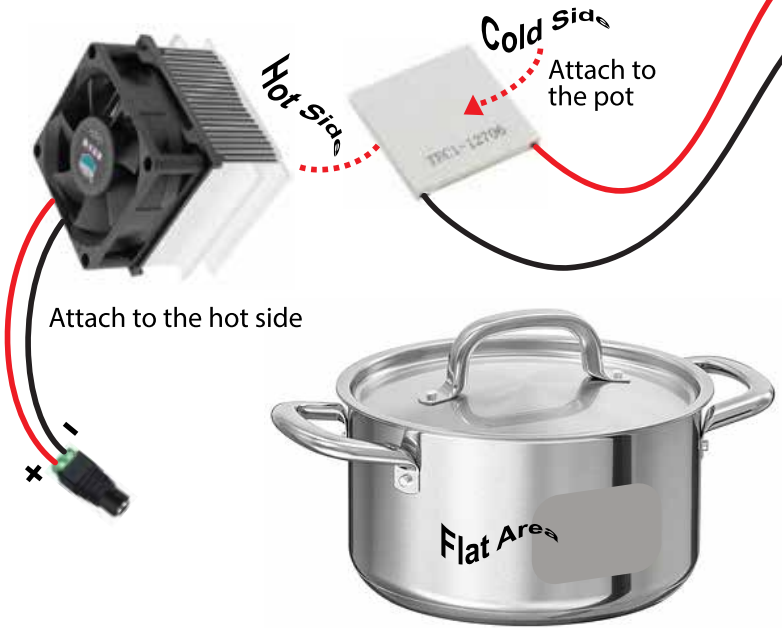
- TEC1-12703 30x30 12V 3A
- TEC1-12704 40x40 12V 4A
- TEC1-12705 40x40 12V 5A
- TEC1-12706 40x40 12V 6A
- TEC1-12708 40x40 12V 8A
- TEC1-12709 40x40 12V 9A
- TEC1-12710 40x40 12V 10A
- TEC1-12715 40x40 15.5V 15A
- SP1848-27145 40x40 4.8V 0.7A

DC Power Connector Female

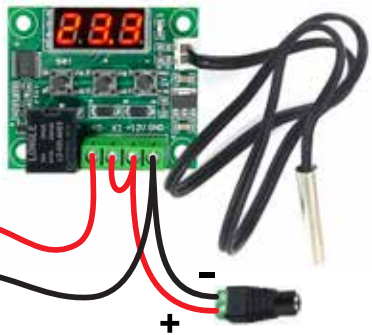
Power Supply 12V 6A

STEPS

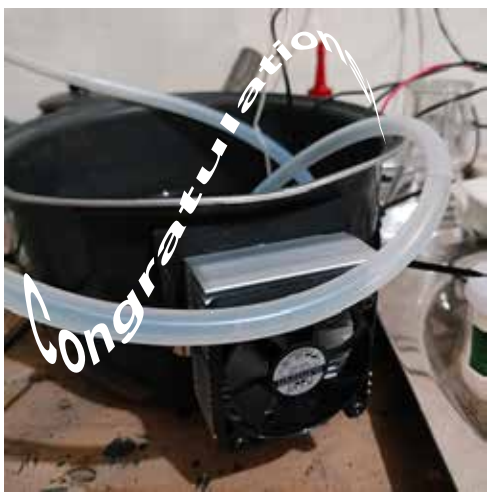
Make one side of the pot flat over the surface area of the Peltier. You can use a hammer or other tools. The Peltier has two different sides, hot and cold; the cold side is the one with the printed number. Attach a Heatsink Fan to the hot side of Peltier, don't forget to apply thermal paste first to the side of the heatsink facing the hot side of the Peltier. Attach them to the part of the pot that has been made flat.



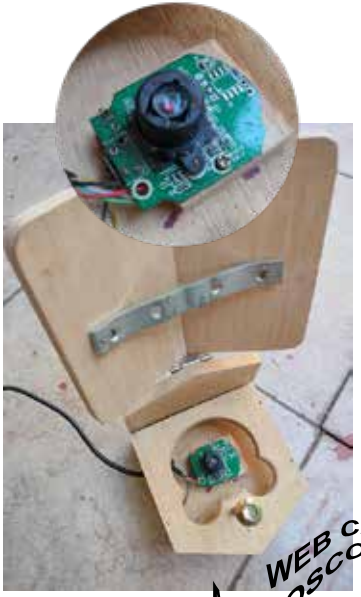
After finishing, continue by connecting it to the power supply. If you want to use a thermostat to maintain its stability, you can follow the diagram below.



Yaey! You don't need to use ice cubes for cooling anymore.



We have the sun, star and moon, Trust me they won't go.
Sans bentar, we'll be back soon, Angak ho.



TEREMAKASE

BIOHAHA

Ⓧ Biohaha 2025
Biological Weapon and
Poisonous Plant Specialist

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