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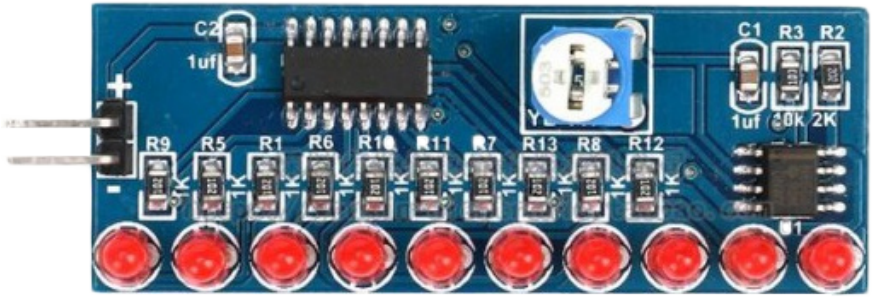
Running Flow LED Light NE555 + CD4017 Module – D.I.Y. Kit



AK-72

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Description:

This D.I.Y. package comes with all the components you need to assemble and solder a running LED module. It has a double-sided board with surface mount and through-hole configuration. It is designed for users with advanced soldering skills. You must solder some components on the top surface and some components on the bottom side of the board. The assembly process should take anywhere between 30 minutes to an hour.

The NE555 chip is designed to output a square wave signal based on the resistor values of its voltage divider and the capacitor values. This essentially generates a clock signal which turns the LEDs ON one after the other in sequence.

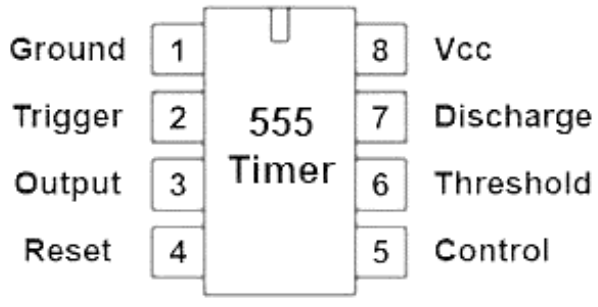
This module works with a supply voltage of 2.5 to 14.5 DC Volts. The NE555 astable timer works in conjunction with 4 resistors (R1, R2, R3 and R4) and they charge the C1 capacitor. This capacitor is discharged through R3 and R4. The oscillation is created at the output pin (pin 3) of the NE555 chip as the C1 capacitor charges and discharges. This oscillated signal is provided to the clock input (pin 14) of the CD4017 chip. This chip is a logic-based counter which provides 10 outputs to be used by the LEDs. The outputs pins are pin 1 to 7 and pin 9 to 11.

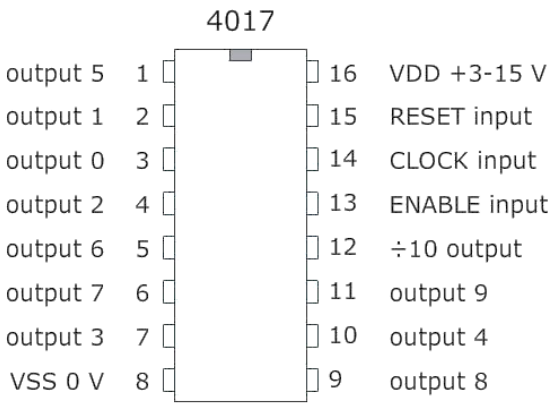
Specification:

Required Input Voltage: 2.5 to 14.5VDC
Circuit Board Size: 54mm x 20mm (2.13 in. x 0.79 in.)

IC Pinout:

The following figures indicate the pinout configuration for both ICs:

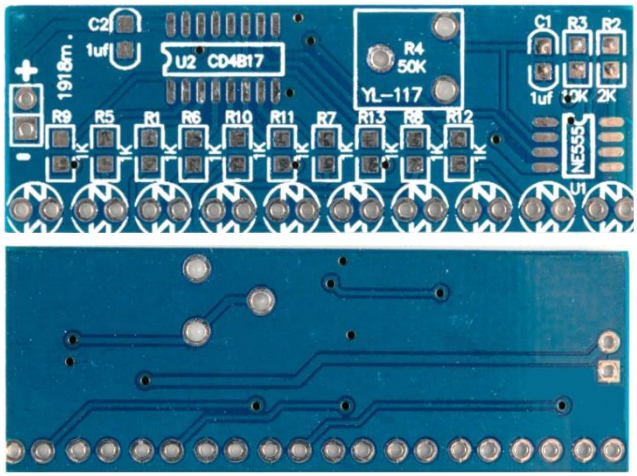




Component List:

This packaged includes 28 pieces which are listed below:

1) **1x PCB –** Printed Circuit Board
(doubled-sided, tin plated, blue soldermask, white silkscreen)



2) **10x** 1kΩ **SMD resistors** – R1, R5, R6, R7, R8, R9, R10, R11, R12, R13

3) **2x** 2kΩ **SMD resistor** – R2 (1x spare)

4) **2x** 10kΩ **SMD resistor** – R3 (1x spare)

5) **1x** 50kΩ **variable resistor (potentiometer)** – R4

6) **2x** 1µF **SMD capacitor** – C1, C2

7) **1x** NE555P **SOIC IC chip** – U1

8) **1x** CD4017BM **SOIC IC chip** – U2

9) **10x** 3mm **red LEDs** (not labeled)

10) **1x** single row 2-pin header (not labeled)

Assembly:

1) In order to assemble the module, you need the following tools:

Must Have

Temperature Adjustable Soldering Iron

60/40 or 63/37, Tin-Lead Solder

Flush Cutters

Needle Nose Plier

Phillips Screwdriver

Lint Free Cloth

***It is recommended to have some isopropyl alcohol and a fine soldering brush handy to clean off the excess flux on the circuit board when done soldering.**

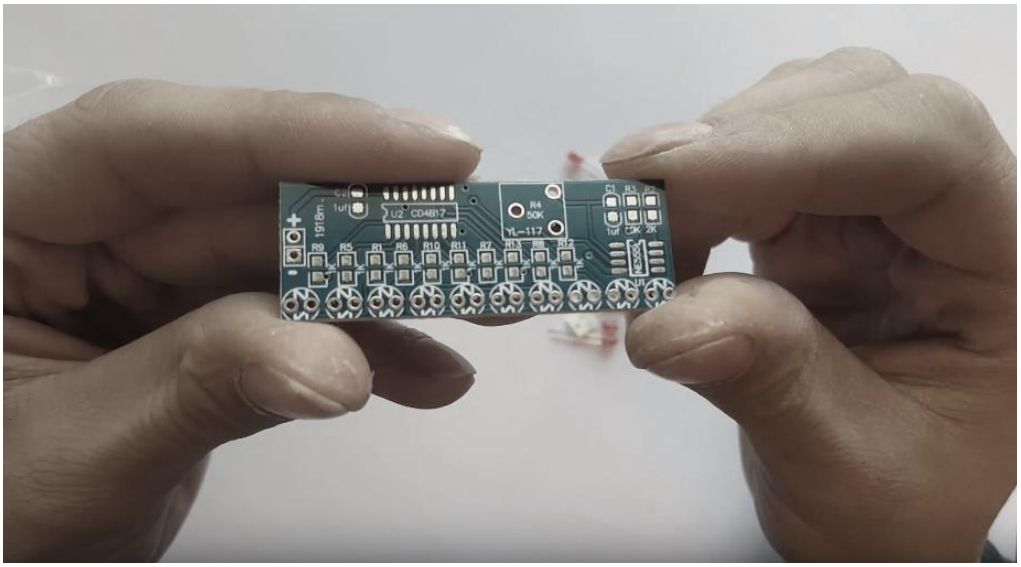
Recommended

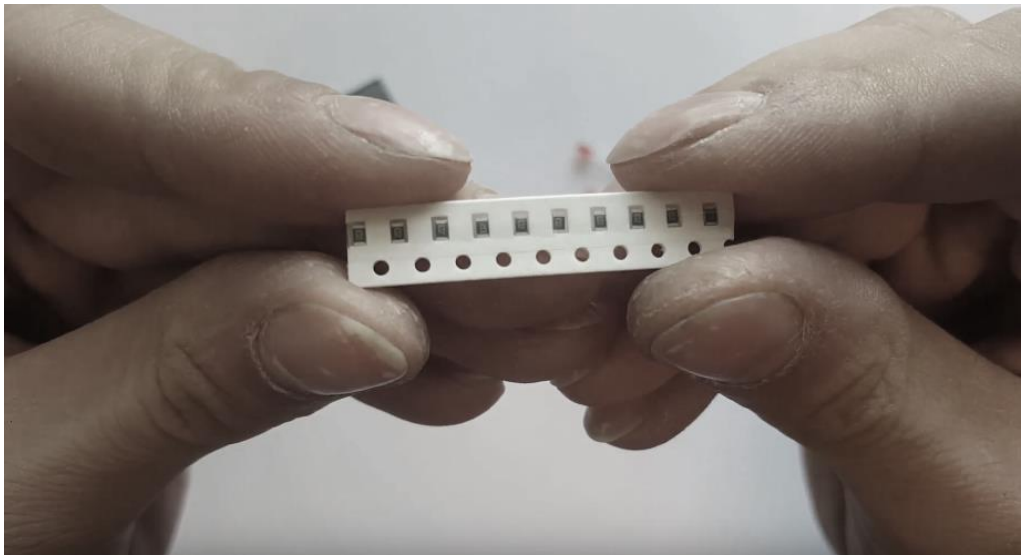
Isopropyl Alcohol

Soldering Brush

***ATTENTION* DO NOT USE RUBBING ALCOHOL, IT WILL DAMAGE THE COMPONENTS.**

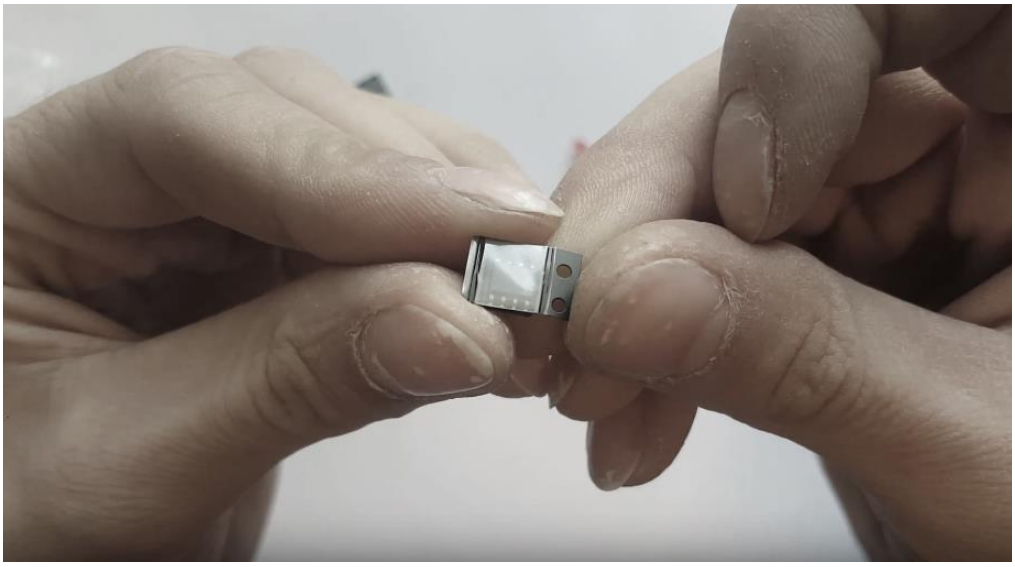
2) Open the package and verify the components. (refer to section **4. Component List** on **page 4** for this step)

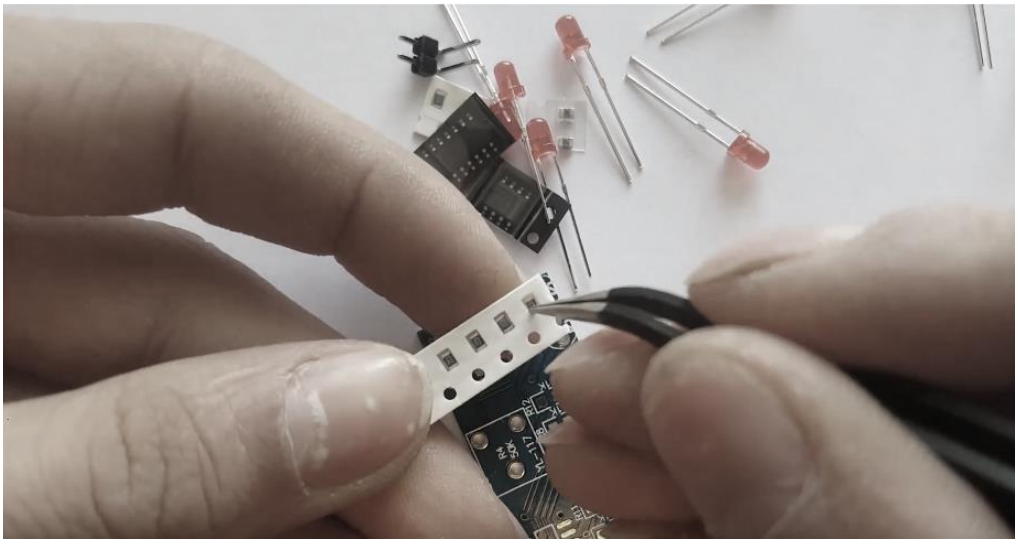


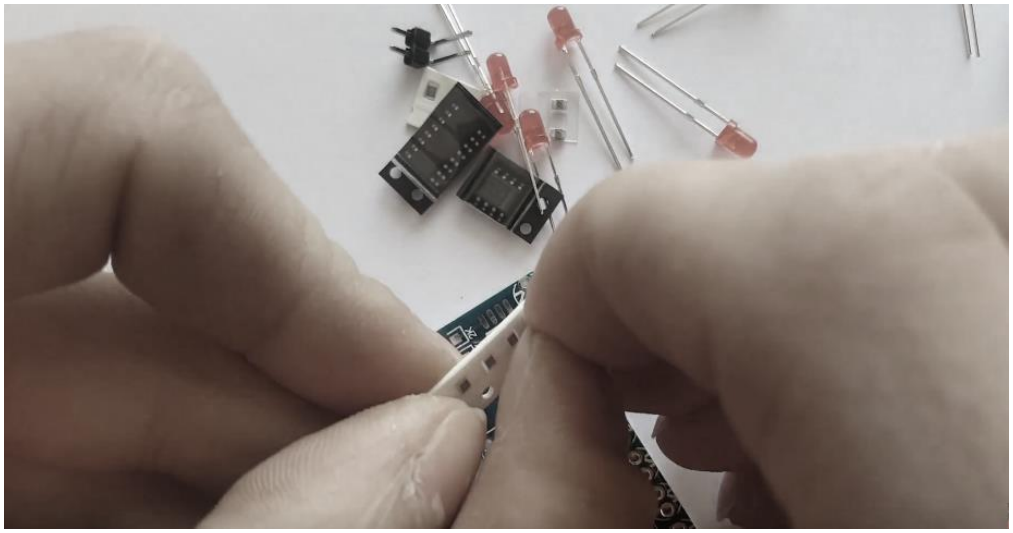


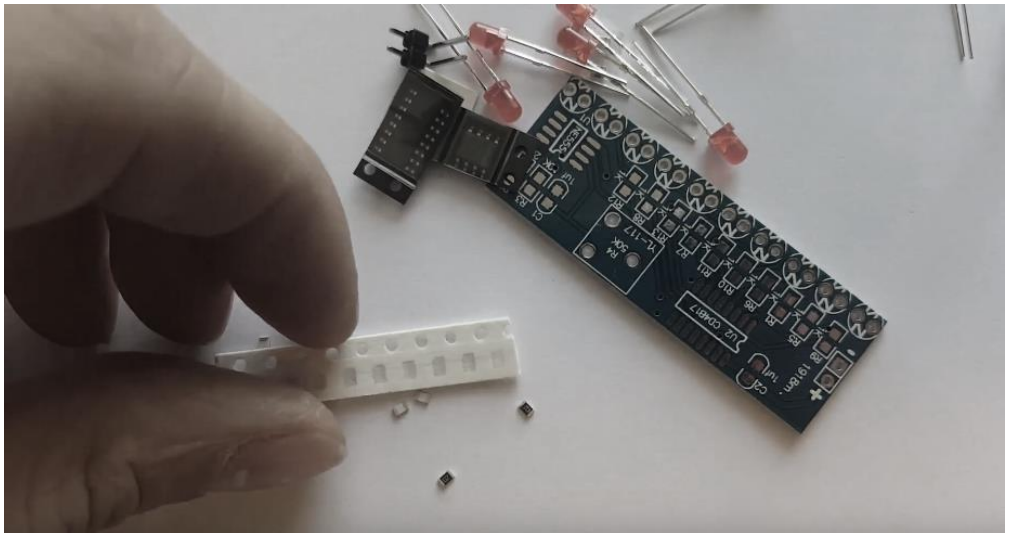
3) Take out the ICs, resistors and capacitors from their package by removing the clear tape and leave them on your workbench for the next step.

***ATTENTION* SURFACE MOUNT COMPONENTS ARE VERY SMALL. DO NOT LOSE THEM. IT IS RECOMMENDED TO USE YOUR PLIERS WHEN YOU ARE HANDLING THEM.**









4) ***OPTIONAL*** It is best practice to check component values using proper equipment (i.e. Using a Digital Multimeter to verify the ohmic value of the resistors) before proceeding to the next step.

5) Prepare your soldering tools.
   a) Make sure the soldering tip size is correctly chosen and it is clean.
   b) The soldering iron temperature depends on the type of solder used.
   c) If you are using a typical 60/40 lead solder, depending on the thickness the temperature should be set anywhere between 370 to 500 °F (187 – 260 °C). If you are using a lead-free solder, increase above temperatures by 40 to 70 °F (5 – 20 °C).

   ***ATTENTION* HIGHER TEMPERATURES WILL DAMAGE THE COMPONENTS ALONG WITH THE CIRCUIT BOARD.**

***ATTENTION* DO NOT TOUCH THE SOLDERING IRON TIP WHEN IT IS HOT.**

d) It is recommended that you clean the board with a brush, isopropyl alcohol and lint-free cloth to get rid of any glue or dirt. This way the solder will create a better joint with the pads.

e) Have your flush cutter handy.

f) Having a roll of paper tape helps you to keep the components in place when soldering. ***ONLY FOR THROUGH-HOLE COMPONENTS***

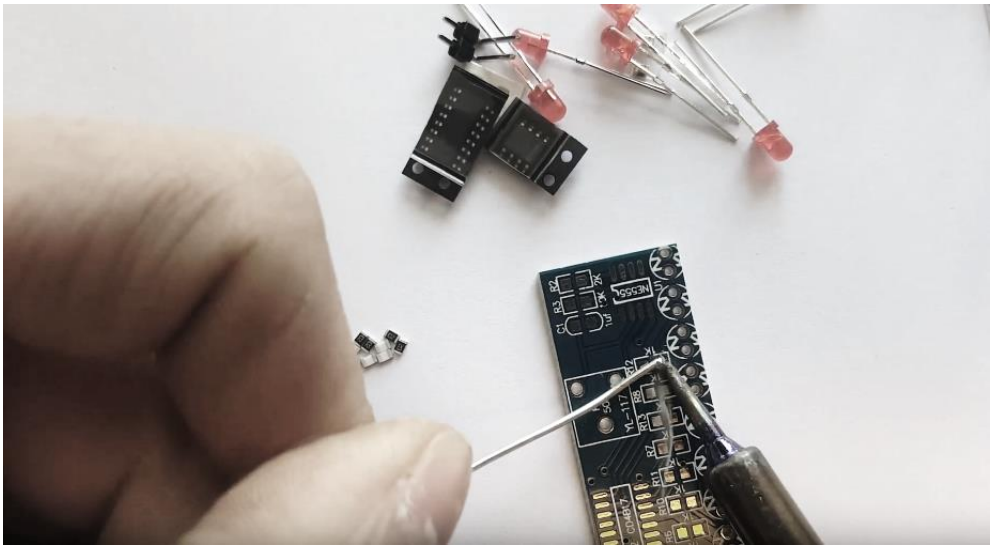
g) Have a rosin flux pen or paste handy. Adding flux to the pads before soldering the component makes the process easier.

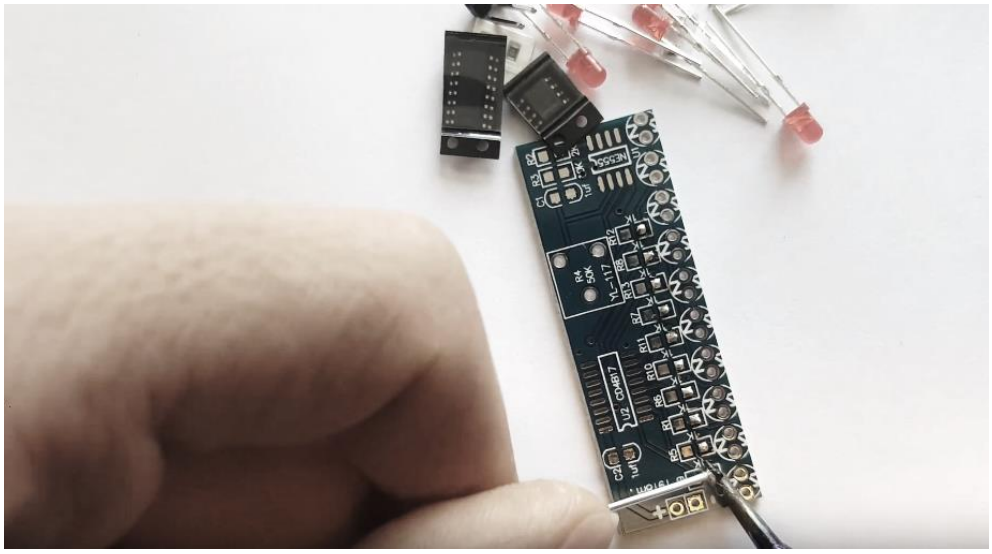
***ATTENTION* SOLDERING SHOULD BE DONE IN A VENTILATED AREA. BREATHING SOLDER FUMES WILL HARM YOU.**

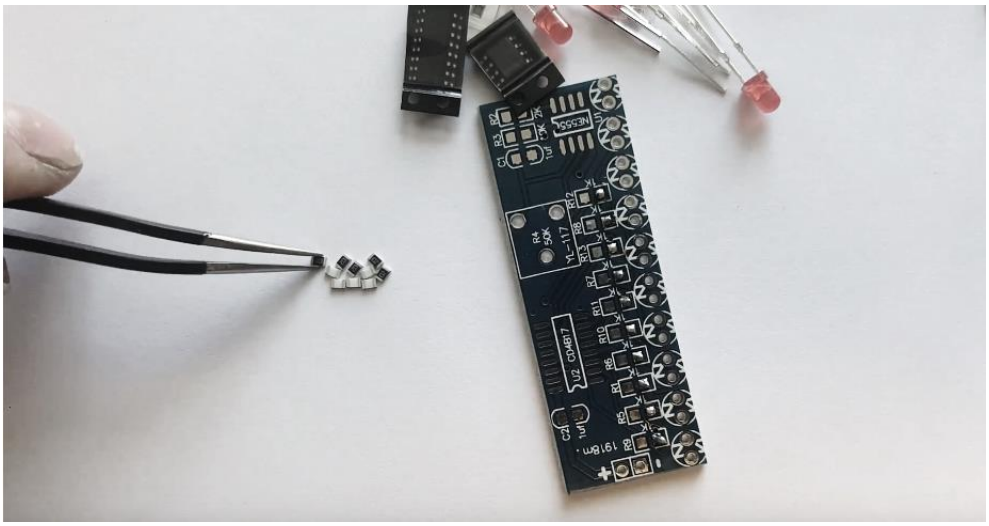
6) Start the assembly by soldering the SMD resistors, capacitors and ICs. Add an appropriate amount of solder to one pad at a time. Place each component in its designated location by using your pliers while heating up the previously added solder so it melts again and covers the component lead. Once the component is stuck to its location, add solder to the other lead/pad to secure the component and create a connection.

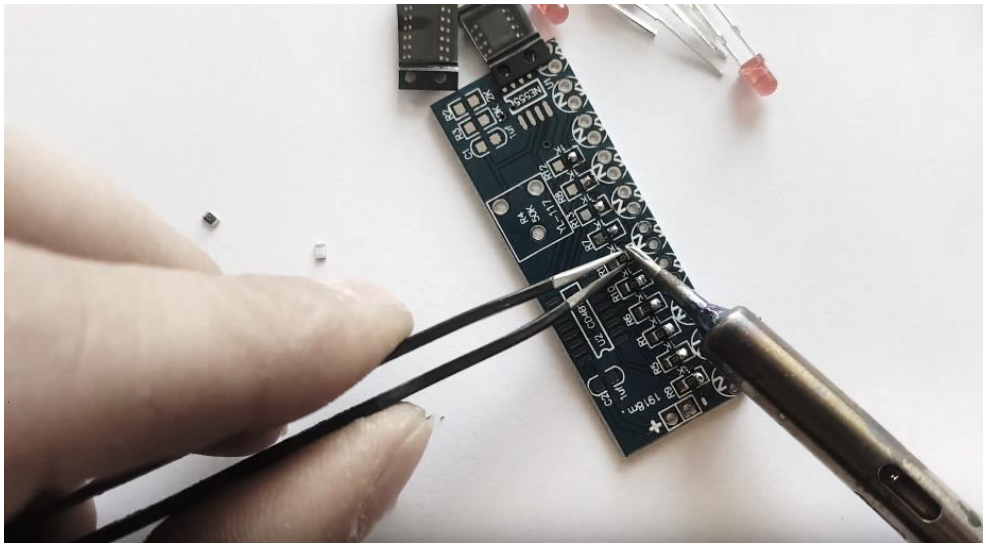
Repeat this process until all your resistors, capacitors and ICs are soldered on the circuit board.

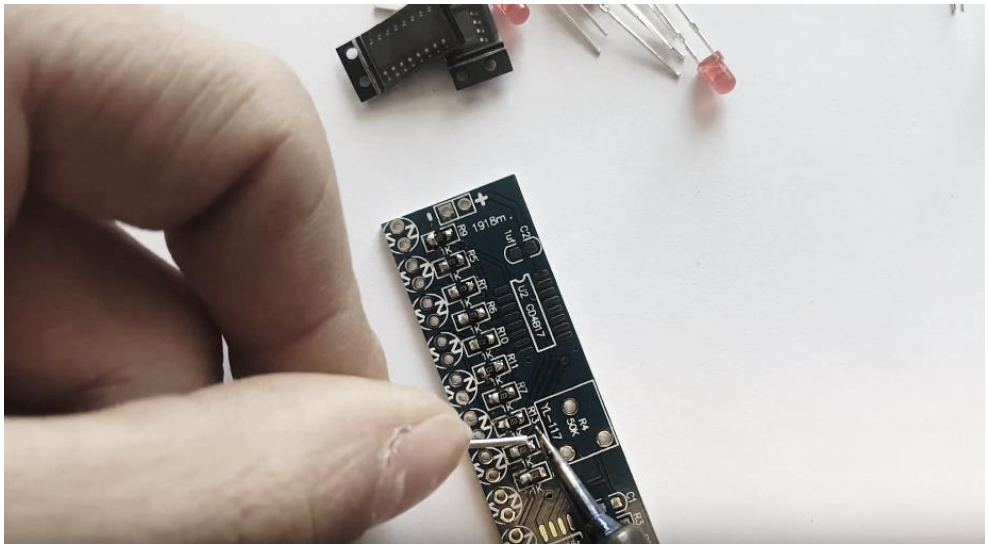
Refer to the illustrations below:

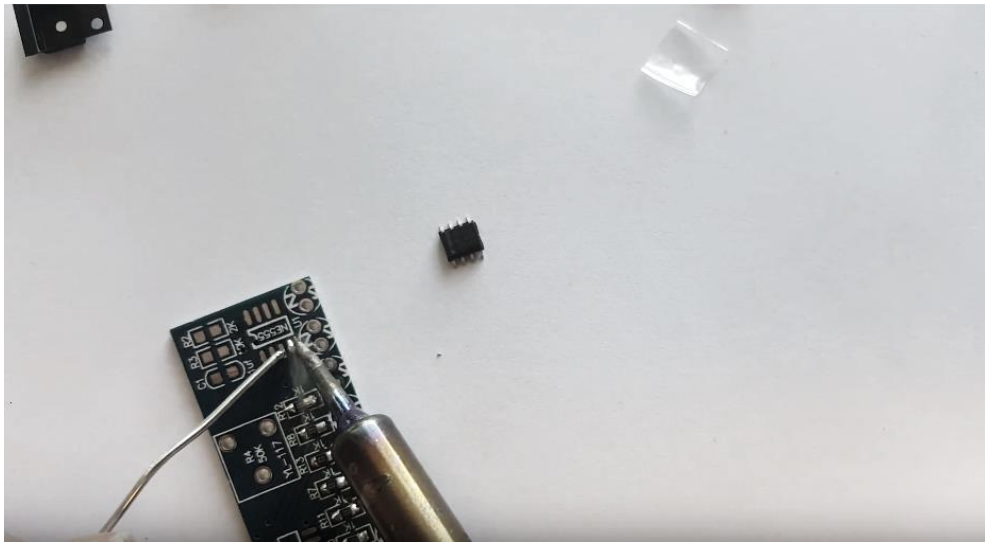


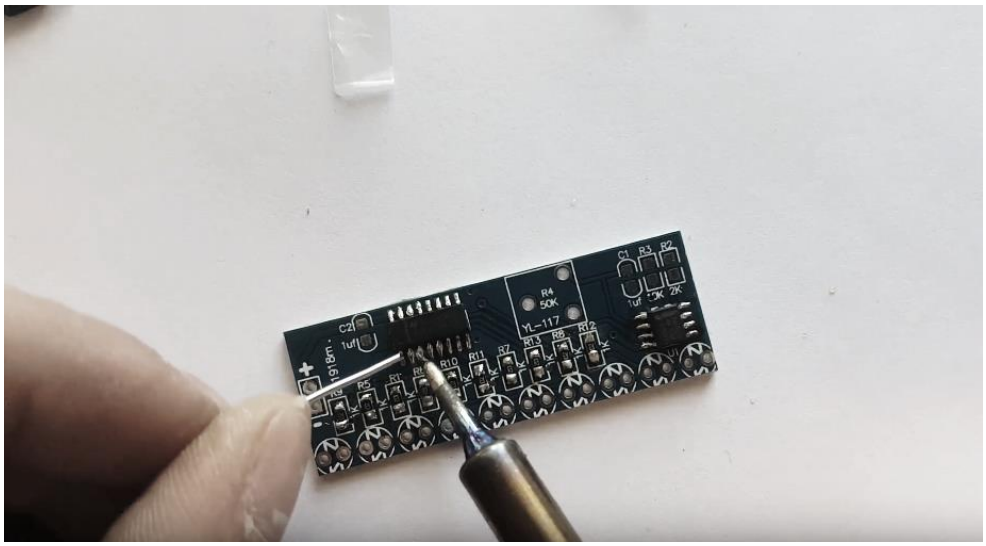


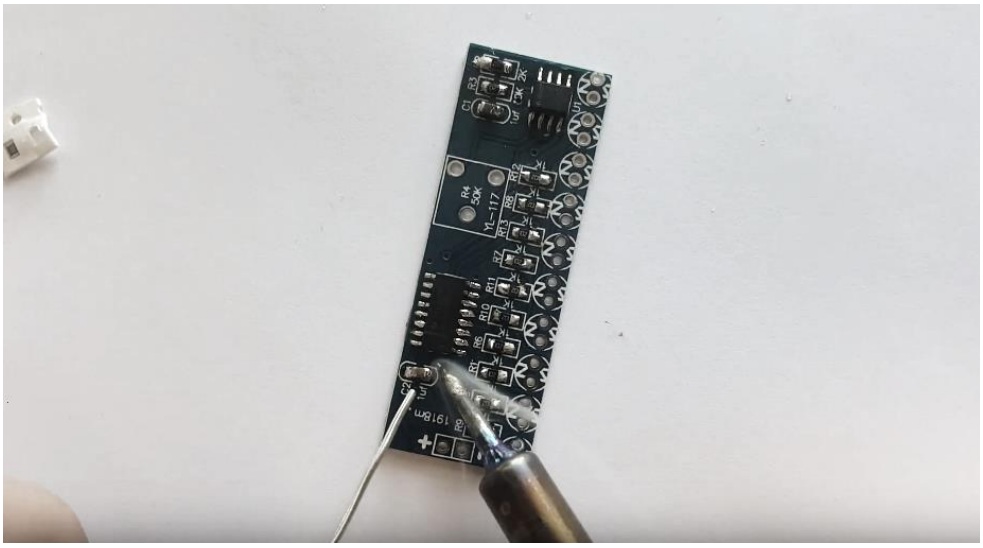





1918m
C2
1uf
R4
50K
YL-117

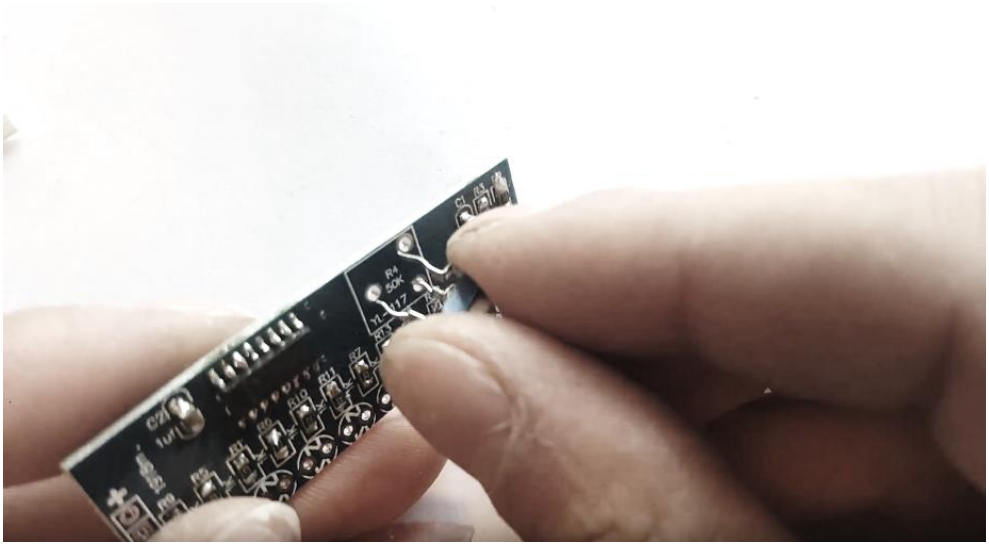

R4
50K
YL-117

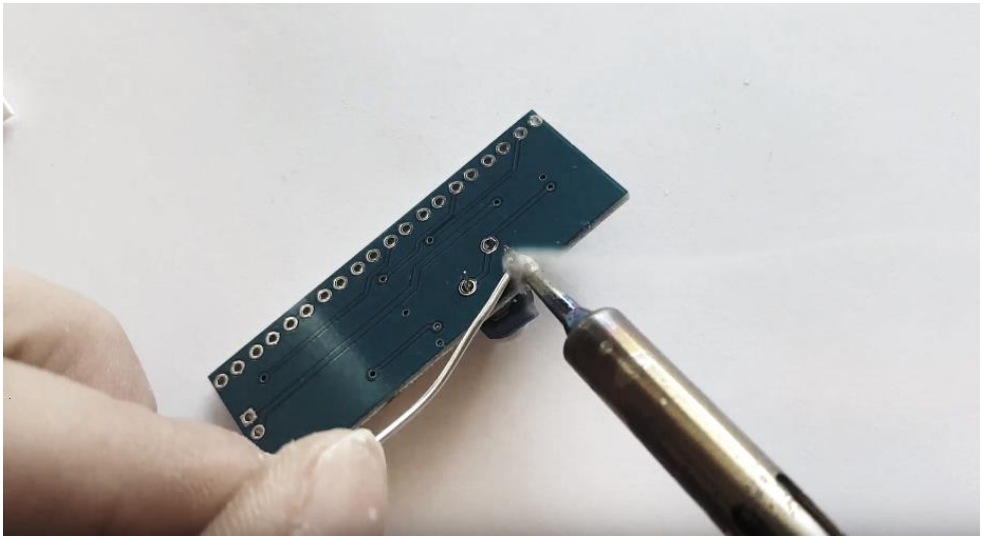

C1
R3
R2
1uf
2K
R4
50K
YL-117
C2
1uf
1918m



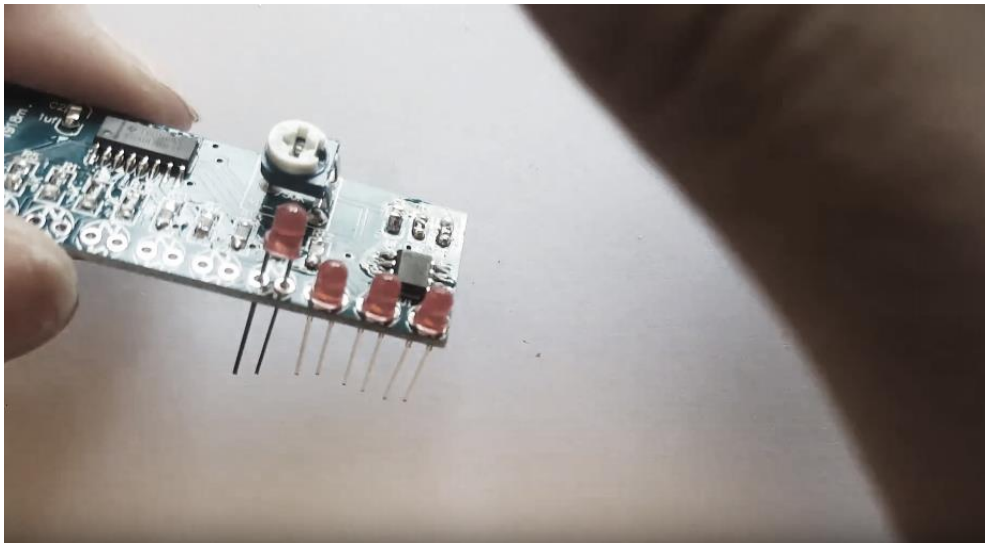
Once all the surface mount components are soldered on the board, proceed to the next step.

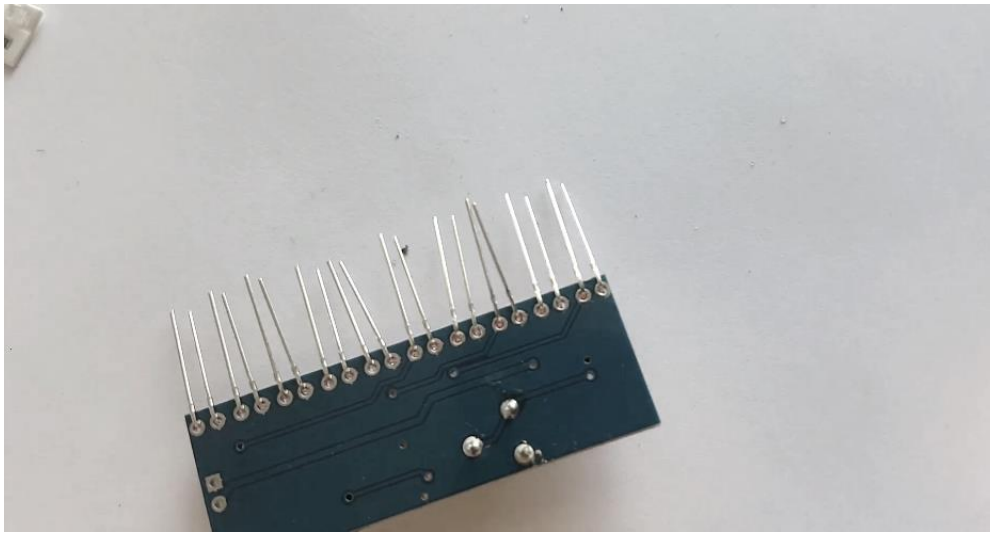
7) Place the variable resistor (R4) in its designated location and solder the leads on the bottom side of the board.

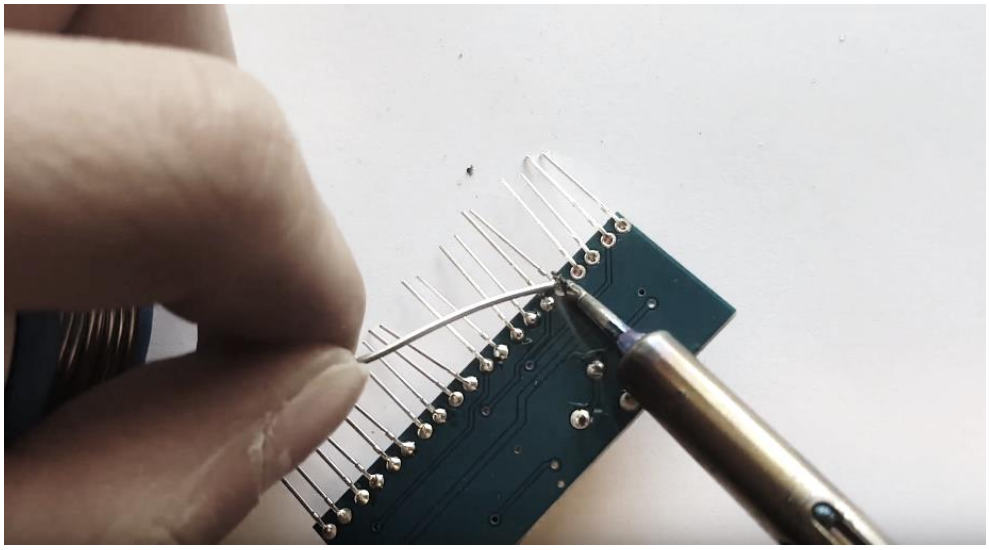


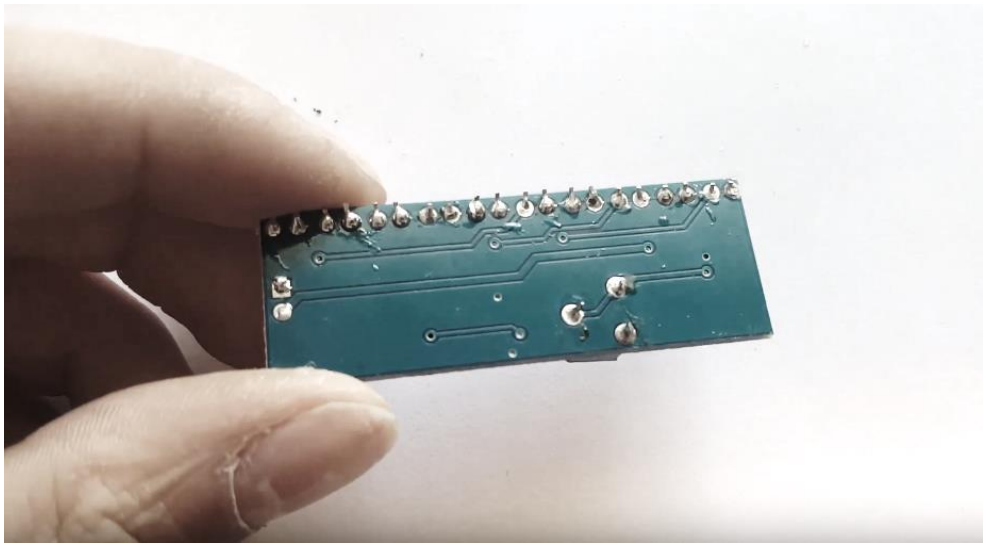


8) Insert the LEDs and solder the leads on the bottom side of the circuit board. You can secure the LEDs by taping them down on the top side of the board or by slightly bending their leads. You can solder them all at once or one by one.

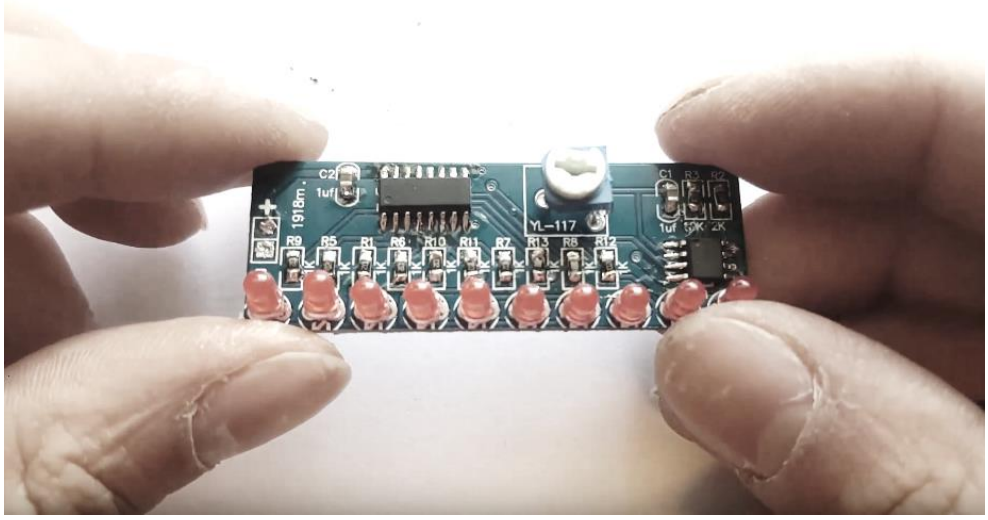




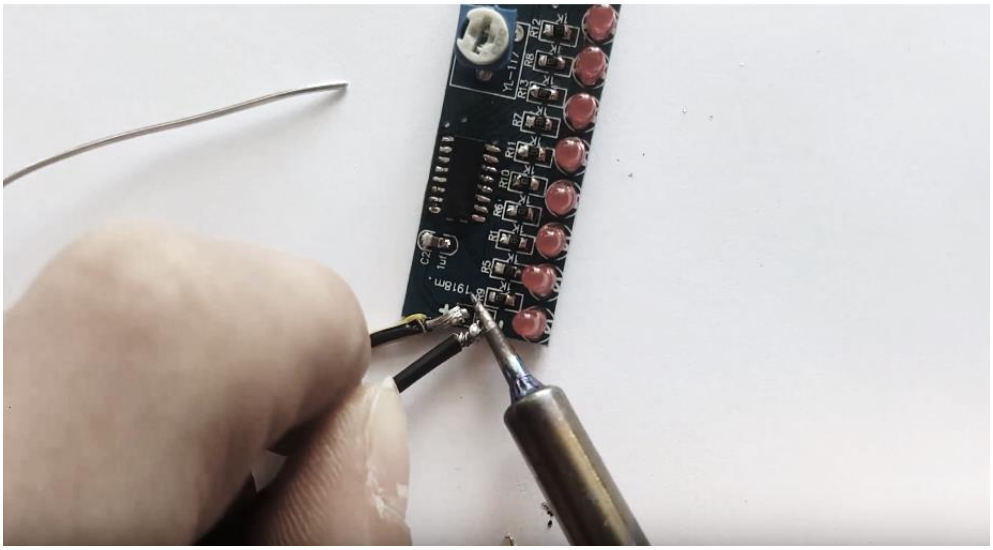




9) Your circuit board should look like this if you have proceeded up to step 8.



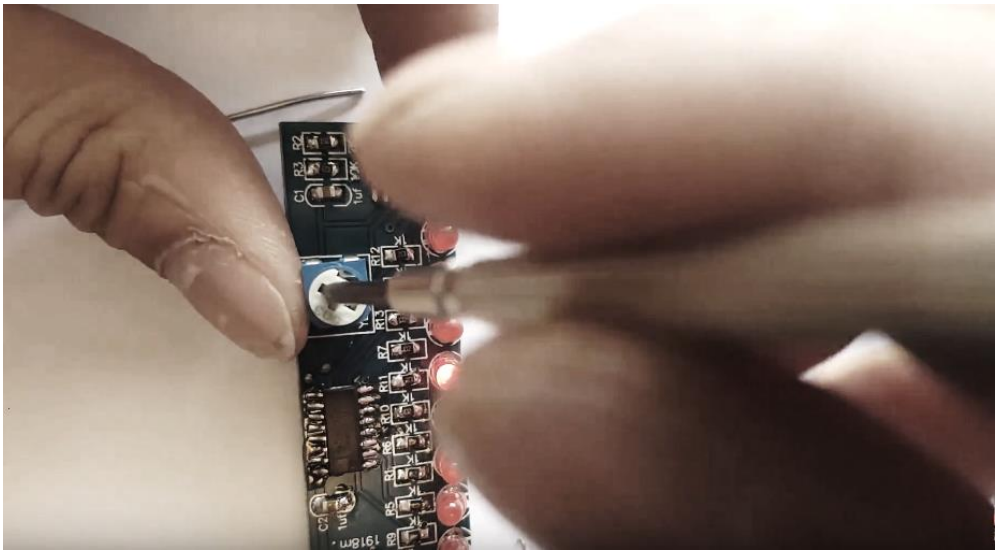
10) This kit provides a single row 2-pin header that can be used to power up the module. You can solder them if you have access to jumper wires or a pair of alligator clips. Otherwise, solder two pieces of wire to the positive (+) and the negative (-) leads on the board.



11) Using your brush, isopropyl alcohol and lint-free cloth, clean the board thoroughly and make sure no flux residue is left.

12) Prepare your power supply, alligator clips and jumper wires. Follow the recommended specs to adjust the power supply before connecting the leads. (refer to section **2. Specification** on **page 2)**

13) When your running flow LED module is turned ON, grab a small flat head screw driver and adjust the variable resistor (R4) to set the speed of the running LEDs.



14) You have completed the assembly of your module.

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