instructables WiFi Sync Clock Instructions

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WiFi Sync Clock

 by shiura

Three hand analog clock with automatic time adjustment using NTP via WiFi. Intelligence of the micro controller now removes the gears from the clock.

- This clock has no gears to rotate hands although it has only one stepper motor.
- Hooks behind the hands interfere with other hands, and reciprocal rotation of the second hand controls the position of the other hands.
- Mechanical ends top deines the origin of the all hands. It has no origin sensors.
- Unique and fun motion seen every minute.

note : Two hand version without strange motion (WiFi Sync Clock 2) is published.
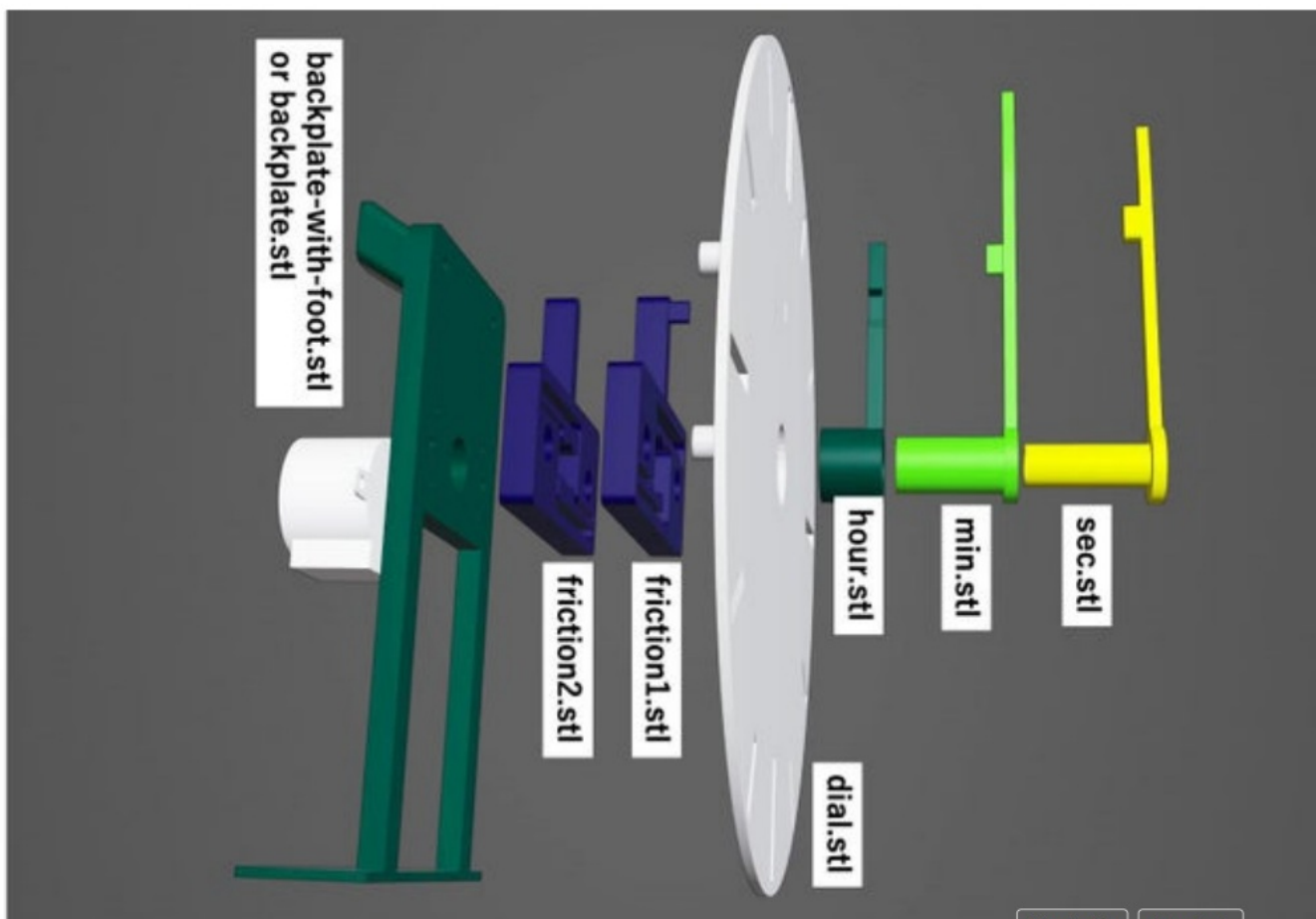
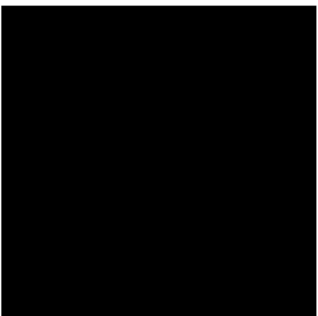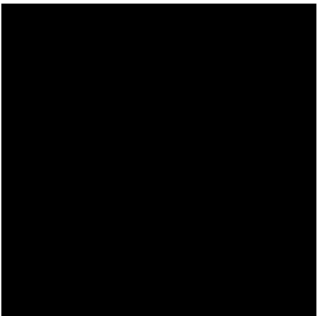## Supplies

You need (other than 3D printed parts)

- ESP32 based micro controller with WiFi. I used "MH-ET LIVE MiniKit" type ESP32-WROOM-32 board (around 5USD).
- 28BYJ-48 geared stepper motor and its driver circuit (around 3USD)
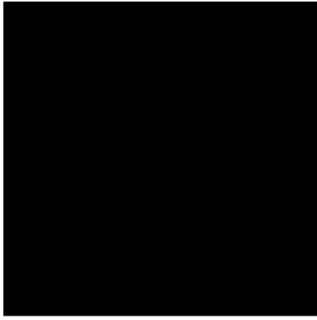- M2 and M3 tapping screws

https://youtu.be/rGEI4u4JSQg

Step 1: Print Parts

- Print all parts with supplied posture.
- No support needed.
- Select either "backplate.stl" (for wall clock) or "backplate-with-foot.stl" (for desk clock)

backplate-with-foot.stl or backplate.stl

friction2.stl

friction1.stl

hour.stl

min.stl

sec.stl

dial.stl

	https://www.instructables.com/ORIG/FLN/E9OC/L6W7495E/FLNE9OCL6W7495E.stl View in 3D Download
	https://www.instructables.com/ORIG/F5R/D5HX/L6W7495F/F5RD5HXL6W7495F.stl View in 3D Download

https://www.instructables.com/ORIG/FTY/GEKU/L6W7495L/FTYGEKUL6W7495L.stl View in 3D Download

Step 2: Finish Parts

- Remove debris and blobs from the parts well. Especially, **all axes of hands should be smooth to avoid unintentional motion of hands.**
- Check the friction given by the friction unit (friction1.stl and friction2.stl). If the hour or minute hands move unintentionally, increase the friction by inserting foam rubber as shown above.
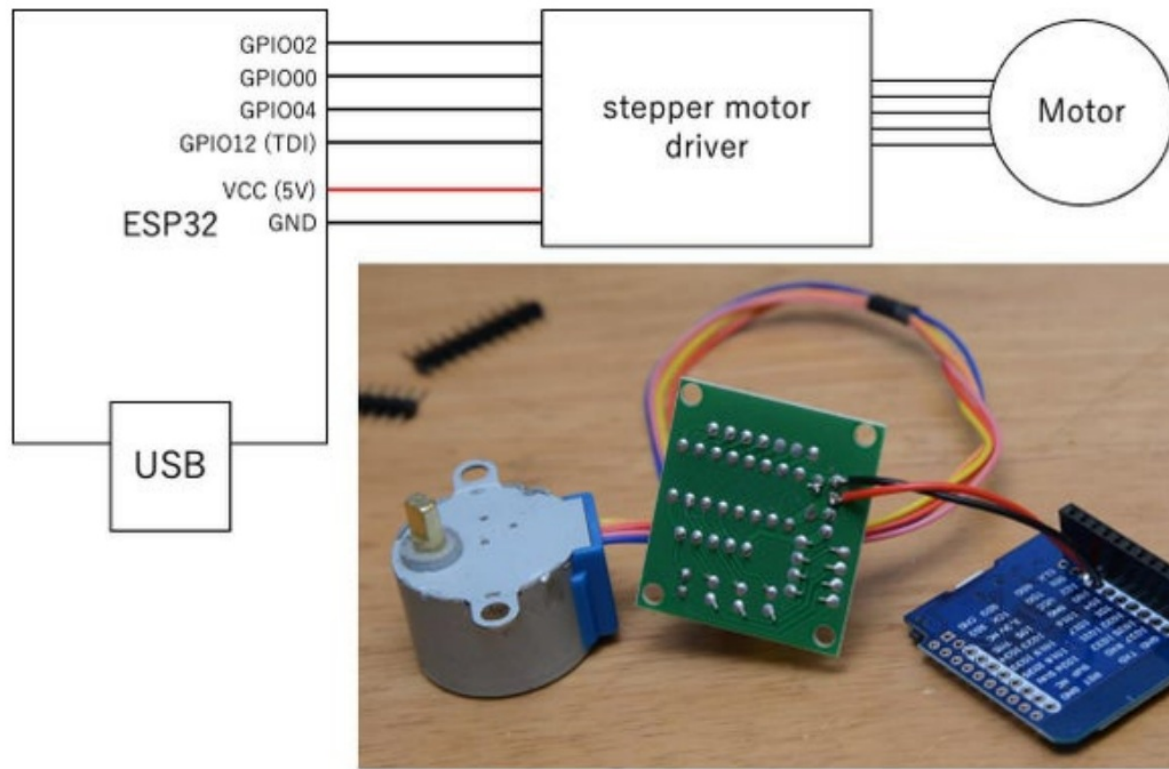

Clean the surfaces of axes inside and out.

If hour or min hands move unintentionally, increase the friction by inserting foam rubber.

Step 3: Assemble the Circuit

- Connect the ESP32 and driver boards as shown above.

Step 4: Final Assembly
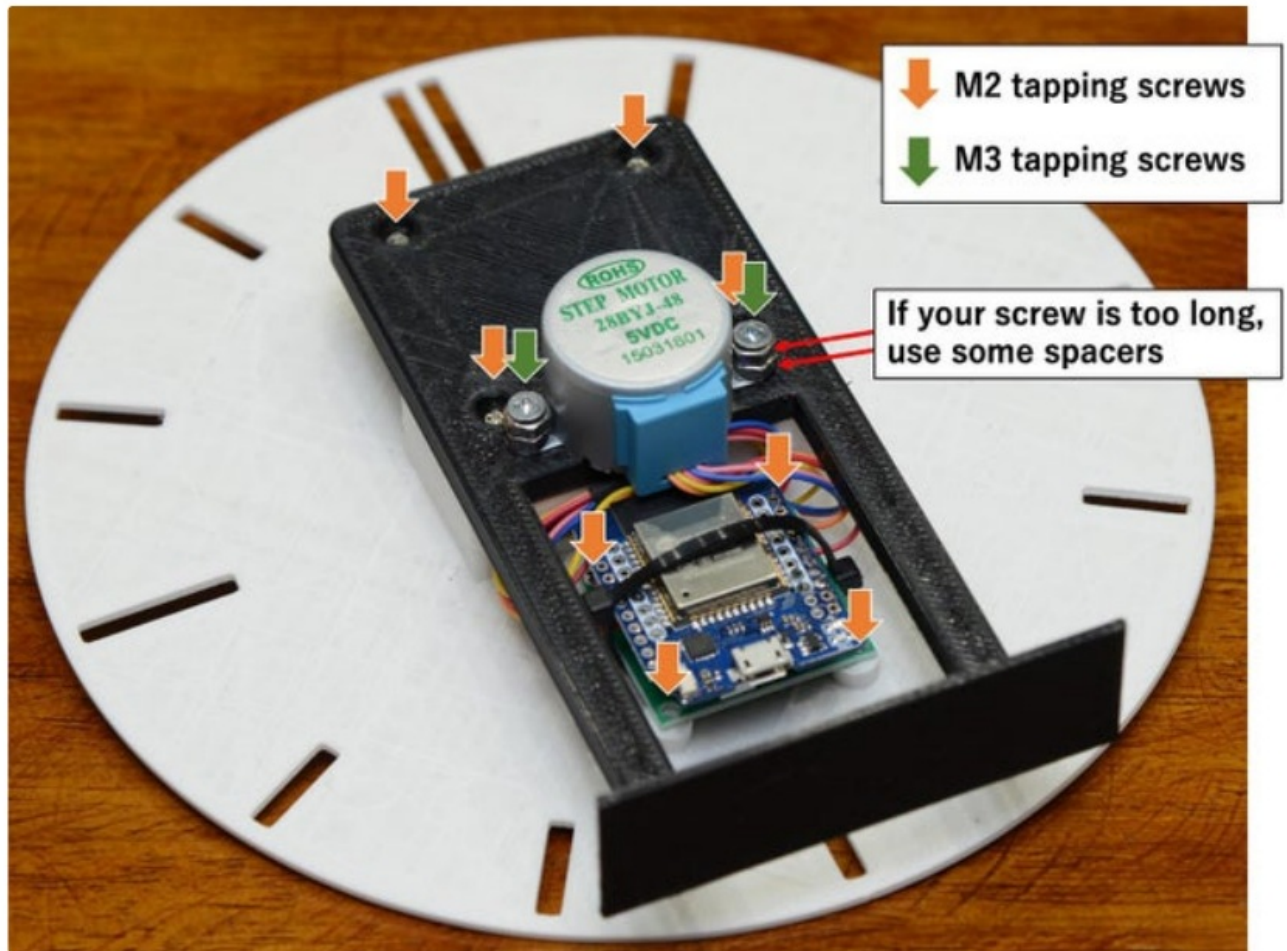
Assemble all parts by stacking each other.

- Fix the back plate to the front face(dial.stl) by using 2mm tapping screws.
- Fix the stepper motor with 3mm tapping screws. If the length of the screw is too long, please use some spacers.
- Fix the circuitry to the back of front face. Please use short 2mm tapping screws. If the ESP32 comes out from the driver board, use some tie wraps.

Step 5: Configure Your WiFi

You can configure your WiFi to the micro controller by two ways : Smartconhong or Hard coding.

Smartcon!g

You can set SSID and password of your WiFi using smartphone app.

1. Set true to the >ag named WIFI_SMARTCONFIG at line #7 in the source code,
   #define WIFI_SMARTCONFIG true then compile and >ash it to the micro controller.
2. Install the apps for setting WiFi. The apps are at
   • Android: **https://play.google.com/store/apps/details?
   id=com.khoazero123.iot_esptouch_demo&hl=ja&gl=US**
   • iOS: **https://apps.apple.com/jp/app/espressif-esptouch/id1071176700**
3. Power on the clock and wait for a minute. The status of WiFi connection is indicated by the motion of the
   second hand.
   • Large reciprocal motion : connecting to WiFi using previous setting stored in non-volatile memory.
   • Small reciprocal motion : Smart Config mode. If 30 seconds of WiFi connection trial fails, it automatically
   moves to the the smart Config mode (waiting for the configuration from smartphone app.)
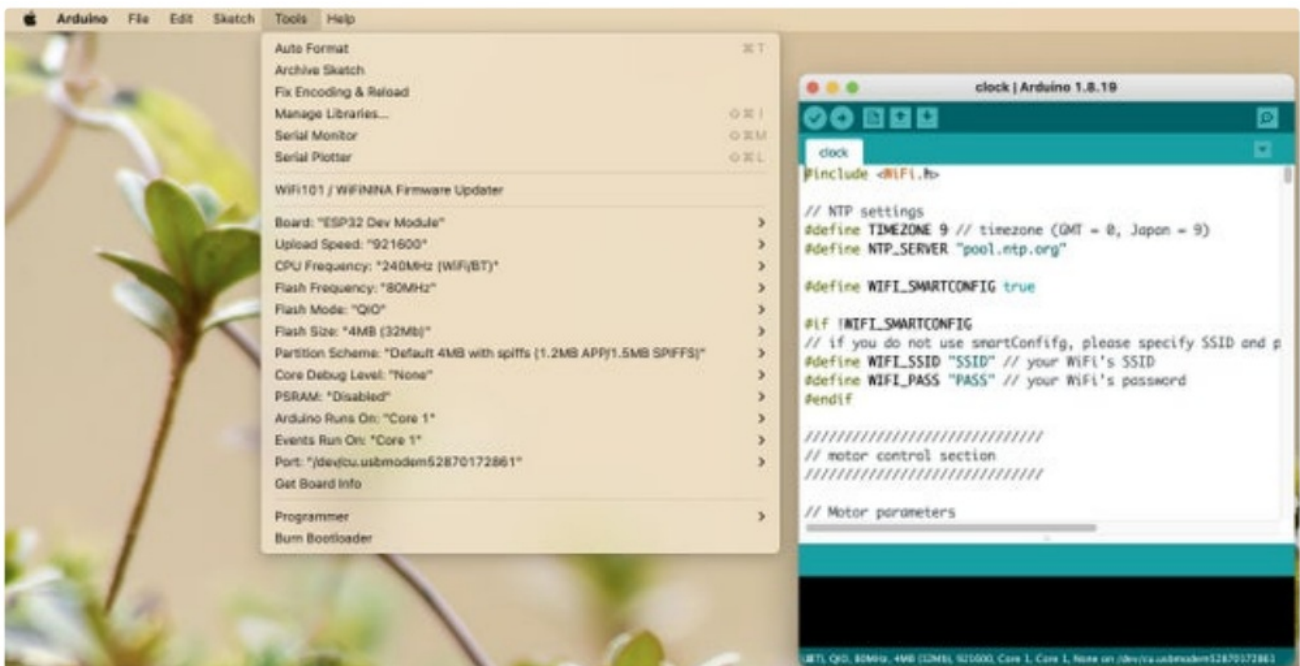4. Set the password of your WiFi using the app as shown above.

Please not that your smartphone should connect to 2.4GHz WiFi. Configured WiFi settings are stored in non volatile memory and are kept even when the power is turned off.

Hard coding

Set the SSID and password of your WiFi in the source code. It is useful if you can not select 2.4GHz wifi via SSID.

1. Set false to the fag named WIFI_SMARTCONFIG at line #7 in the source code,

   #define WIFI_SMARTCONFIG false
2. hen set SSID and password of your WiFi in the source code directly at lines #11-12,

   #define WIFI_SSID "SSID" // your WiFi's SSID

   #define WIFI_PASS "PASS" // your WiFi's password
3. Compile and fiash it to the micro controller.

	[https://www.instructables.com/ORIG/FOX/71VV/L6XMLAAY/FOX71VVL6XMLAAY.inoDownload](https://www.instructables.com/ORIG/FOX/71VV/L6XMLAAY/FOX71VVL6XMLAAY.ino)

This is one of the most fascinating Arduino/3d printing projects I have seen and done. It is fun just to watch the crazy thing work! It is working well and we may even use it as a reference clock in our home. 3d printing went very well and was followed by a good bit of sanding and smoothing. I used an ESP32 board from Amazon **(https://www.amazon.com/dp/B08D5ZD528? psc=1&ref=ppx_yo2ov_dt_b_product_details)** and modified the port pinout (int port[PINS] = {27, 14, 12, 13} to match. The code would not compile until I moved the function void printLocalTime() ahead of void getNTP(void). I have made another shiura Instructable and will probably do more.
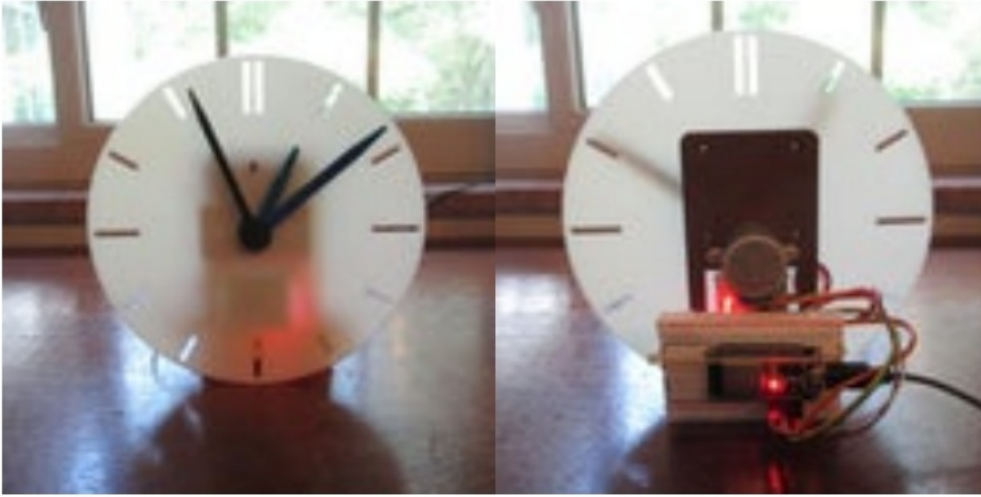
I love your creativity. I didn't think about such idea. thanks

ARE YOU KIDDING? This is absolutley fantastic. LOVE it. This is something I am going to start today. Well done!

this is an ingenious design. I wonder if there would be a way to put the third hand (the longest one) behind the face. That way one would only see the minute and hour hands advance without the distraction of the third hand moving around a bit erratically.

Replace the hand with a clear acrylic disc with a small dead stop glued in place or a screw.

It is easy to remove the second hand by mounting the minute hand directly to the motor. In this case, the strange motion of the minute hand occurs every 12 minute to advance the hour hand 6 degrees.

Great project. I like the stepper motor. Two suggestions you could incorporate using my previous instructorless.

i) ESP32 / ESP8266 Auto WiFi Config for Beginners **https://www.instructables.com/ESP32-ESP8266-Auto-W…** which avoids the need to download an app to your mobile as it uses webpages.
ii) ESP-01 Timer Switch TZ/DST Updateable Without Reprogramming **https://www.instructables.com/ESP-01-Timer-Switch-…** which again uses webpages to change the configured timezone.

Very creative mechanism! The pushing hand and then it has to avoid and go around. Could make a great "mickey mouse" type clock too, where the arms will do the "work"

Damn! This is genius. You are already a winner.

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Documents / Resources

[instructables WiFi Sync Clock](#) [pdf] Instructions
WiFi Sync Clock, WiFi, Sync Clock, Clock

References

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- [Amazon.com: ESP-WROOM-32 ESP32 ESP-32S Development Board 2.4GHz Dual-Mode WiFi + Bluetooth Dual Cores Microcontroller Processor Integrated with Antenna RF AMP Filter AP STA Compatible with Arduino IDE (3PCS) : Electronics](#)
- [Amazon.com: ESP-WROOM-32 ESP32 ESP-32S Development Board 2.4GHz Dual-Mode WiFi + Bluetooth Dual Cores Microcontroller Processor Integrated with Antenna RF AMP Filter AP STA Compatible with Arduino IDE (3PCS) : Electronics](#)
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