ESP32 Hardware Build V1.6 11/04/2024

Building the shutter tester should be relatively easy. Below are some hints & advise on the build.

Refer to the ESP32 Wiring Guide schematic documents, for connections. Note. Schematics show a bare board, rather than it sitting in the breakout board.

All of the boards can be purchased from eBay, Amazon or AliExpress, which is by far the cheapest. Details of the parts required are detailed in the Parts List document

All of the boards are pre-soldered, you will not have to solder the components yourself. Most boards will also the header pins pre-soldered. The GY-302 (lightmeter) will be difficult to find with pre-soldered header pins.

Using DuPont jumper wires, the boards can be connected together. You will need one pack of 30cm (for the sensors, Lightmeter & Flash) and two packs of 10cm Dupont wires to get the correct colours match.

Additionally, there are more Brown and Black wires used, so one pack of each, 30cm Brown & Black wires will be required.

There are many 3.3V (Brown)& GND (Black) power connections. These will not all fit into the breakout board screw-terminals. It will be necessary to connect them in groups with a choc-block or similar, then to the screw terminal.

When fully built & tested, consider using a little hot-glue on the connectors, to stop them working loose.

ESP32 comes in either 30 or 38 pin boards. The parts list specifies the 38 pin version and compatible 38 pin breakout board. If selecting a different ESP32 or breakout board from that specified in the parts list, ensure they are compatible.

Ensure you pay particular attention to the polarity of the connections. The boards are clearly marked.

The LCD is marked Vcc and is connected to 5V. (Red wire) and GND, (Black wire)

The GY-302 Light Sensor is marked Vcc and is connected to 5V. (Red wire) and GND, (Black wire)

The Laser tx board is marked as S (3.3V) and - (GND) Do not connect anything to the centre pin.
On many Laser boards, the Laser barrel is only held to the board by its wires. This means it can easily be knocked out of alignment. Consider using hot-glue or similar to affix the Laser barrel to the board.

The Sensor (rx) board is marked VCC (3.3V) and GND. The centre pin is marked OUT, which is wired to one of the input pins on the ESP32

Be very careful when fitting the receiver sensor into the board. Refer to the photograph. The little lens must be pointing towards the header pins on the board.

The TFT is marked VDD (3.3V) and GND (0V). The tft board LED pin is also connected to 3.3V

The Shutter Tester can be built with the TFT screen, with the LCD, both or neither.
If both are omitted, all the output data is still available to view on the computer screen.
The TFT screen gives almost as much output as the computer screen and uses colour to distinguish readings.

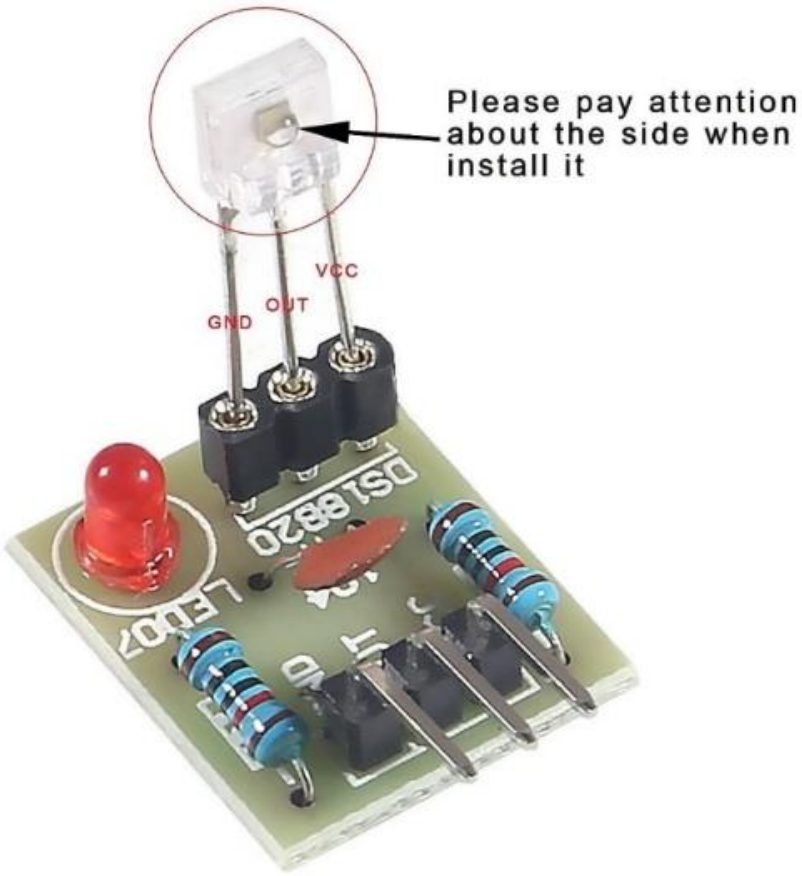
The LCD is a legacy from the Arduino unit and cannot display as much information as the tft or PC screen. The text size is larger and clearer than the tft, so can be used as a quick reference display.

The flash connection can be used to see when the flash will fire during the shutter cycle. The simplest method is to purchase a cheap PC sync cable. One end plugs into the camera PC sync socket & the other connects to the ESP32 (centre pin on cable) and GND (outer on PC sync cable). Many cables come with a 3.5mm jack plug on one end. Using a suitable 3.5mm socket, this could be mounted on the project box & then wired to the ESP32.
Note:- only cameras with mechanical flash contacts should be connected.

If just testing horizontal shutters, using the block-of-wood frame to hold Lasers & sensors works well. This is an easy way to get up & running. For measuring both horizontal & vertical shutters, the slightly more complicated film-gate sensor is a better option. This is detailed in a separate document.

O O O

[----------32mm horizontal spacing----------]



Sensor rx – showing correct sensor placement.

Note:- To protect the sensors from damage, they can be omitted before the initial power-up. The LED on the module should light, proving connection & polarity is correct. After de-powering, the sensor can then be fitted to the module.

The project is powered via the USB connector on the processor board. No other power is required. Before connecting the USB power lead, check, double check and then treble check all of your connections and the correct orientation of the receiver sensors.

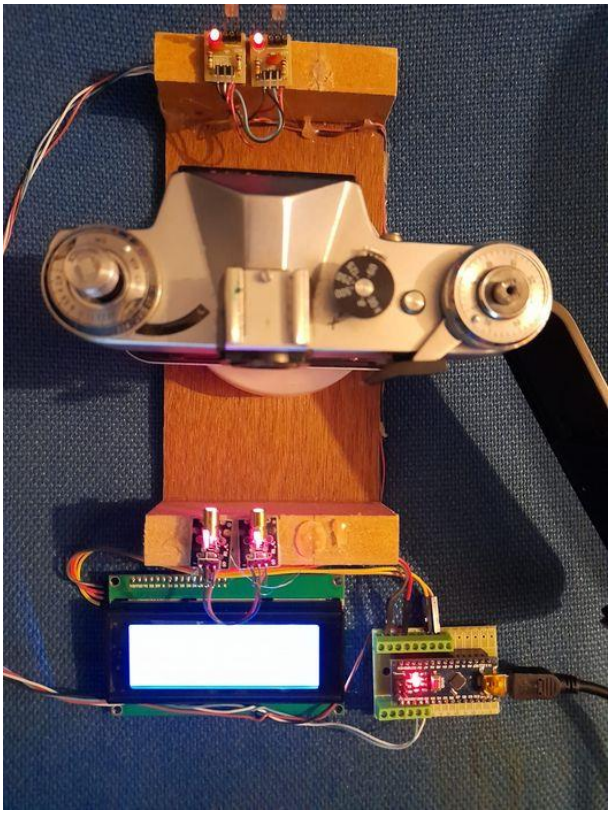
When applying power, the Lasers will shine red and also the red LEDs on each of the rx boards should light.

For the Arduino prototype, two pieces of wood were cut, one 40mm high, to mount the Lasers (tx). The other 28mm high, to mount the receivers (rx) Spacers under the camera (scrap wood, beer mats etc) used to raise different camera models to the correct height.

The Laser & sensor modules were then hot-glued to the top of the wood. Hot-glue allows the lasers to be moved for alignment, whilst the glue cools.

The below photo shows the Arduino prototype, which could still be used as a quick build for ESP32 version, by adding the central Laser & rx. However, this will only allow for horizontal curtain testing.

Photos below are all of the Arduino 2 Laser version.



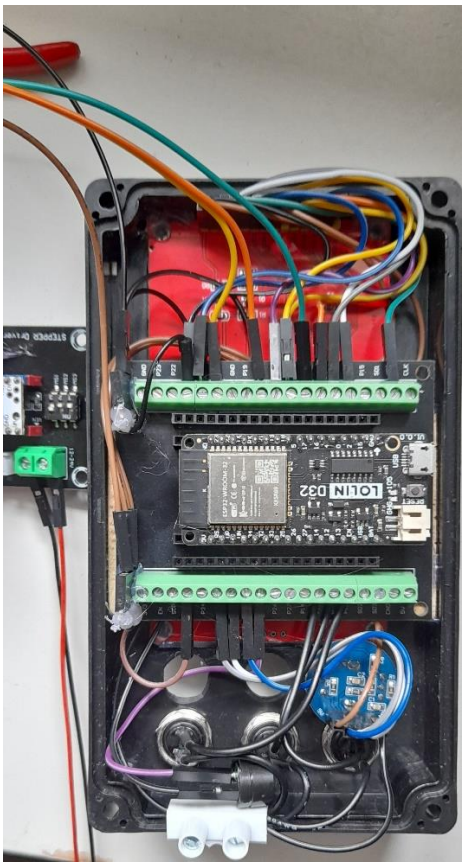
Prototype shutter tester with two Lasers.

In this example, wires (taken from an Ethernet cable) are directly soldered to the Laser boards, rather than jumper wires being used.

This simple design works perfectly well & the third Laser & sensor for the ESP32 version easily added.

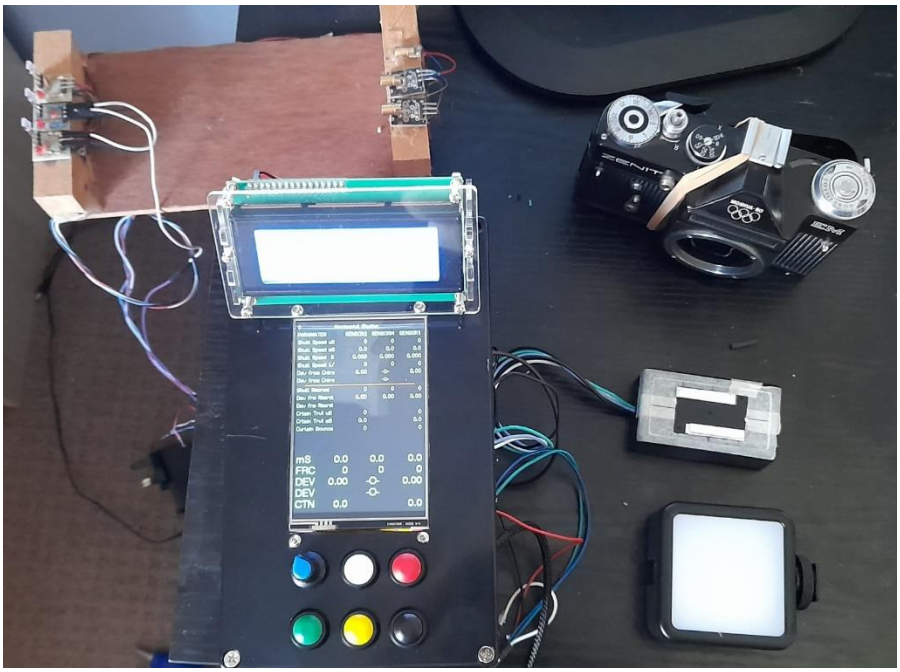
Here is the smaller 158-90-60 project box with just the TFT display.
(It is running the Developing Timer firmware).

Here is the inside of the Developing Timer, showing the breakout board mounted transverse on blocks of wood, to clear the tft screen. The USB socket can then easily be accessed via a suitable hole in the side of the box. A small USB-C to USB-C port saver can be used to bring it right to the edge of the box.

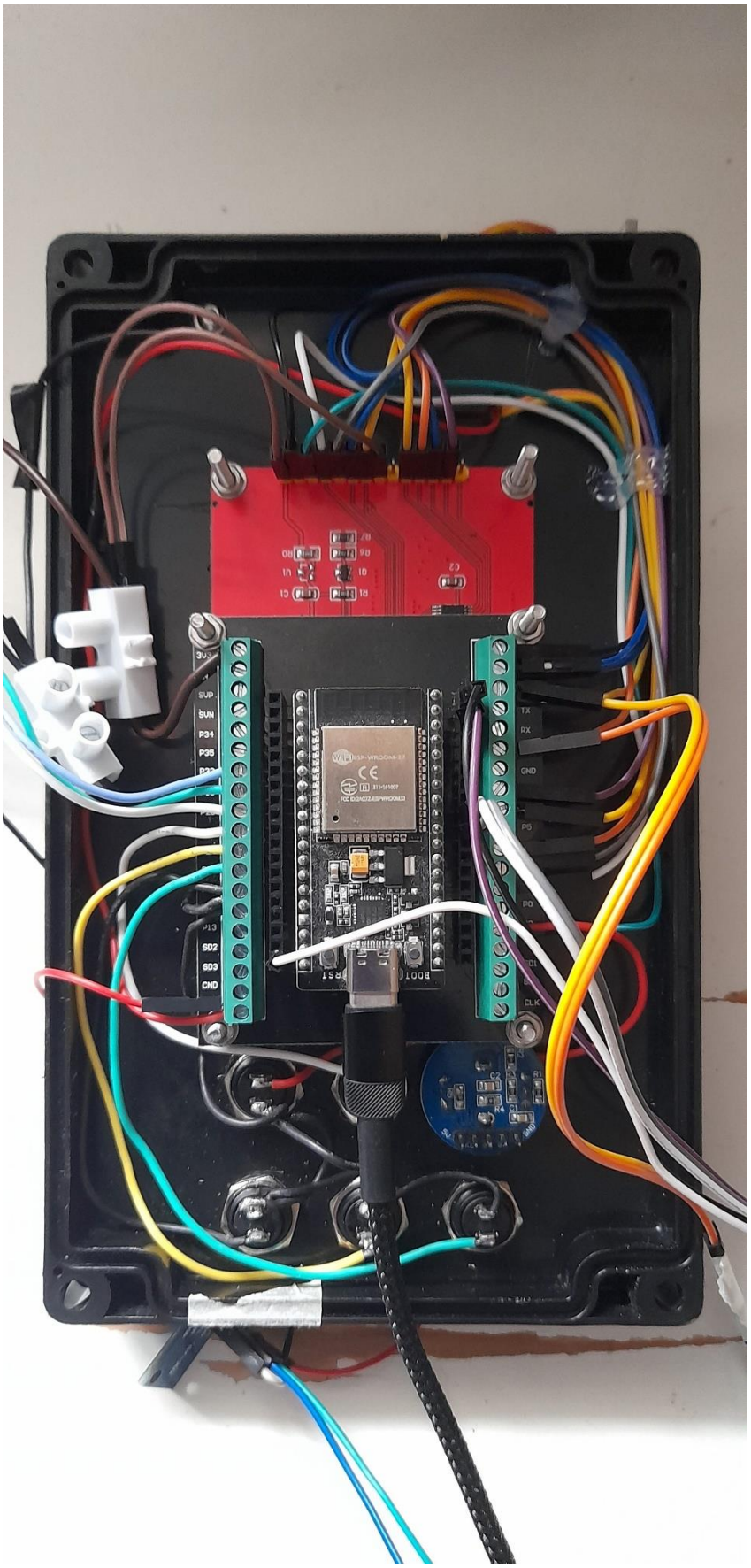


Here is the ESP32 Shutter Tester in the larger 200-120-75 project box, with both tft & LCD. The LCD is mounted in an acrylic frame and bolted to the top of the project box.

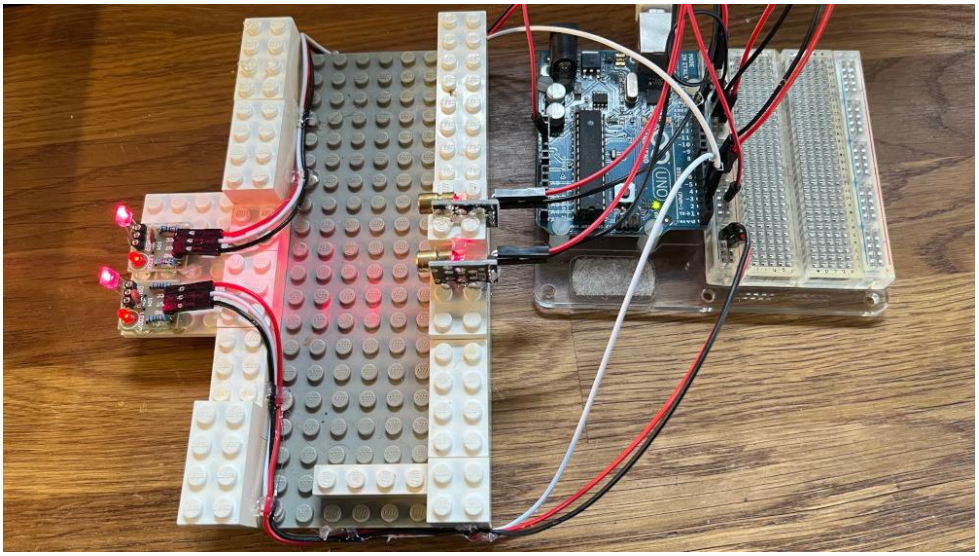
The original block of wood Laser and sensor frame can be seen at the top.
Below the camera is the newer film-gate sensor and below this, the LED light box used instead of the Lasers.



Inside the larger box.
Two holes in the breakout board can be elongated to fit onto the lower bolts holding the tft screen.
Extra nuts are required to lift the breakout board clear of the tft board. The upper two bolts on the breakout board are only resting on the tft board. Hot glue holds them in place.

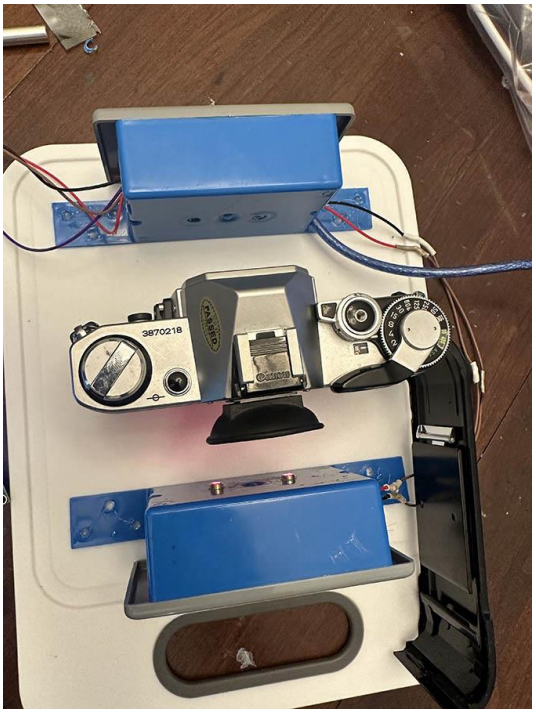


Here are some pictures from the Photrio thread, showing some of the designs people have made, of the Arduino versions.

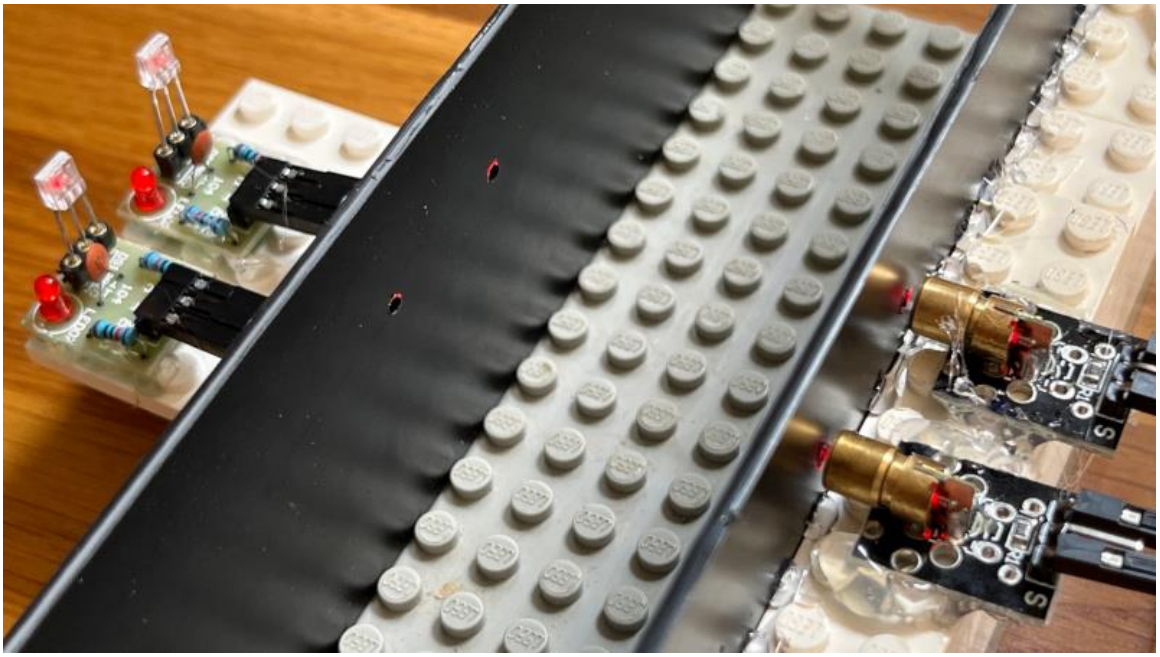


Lego :o)

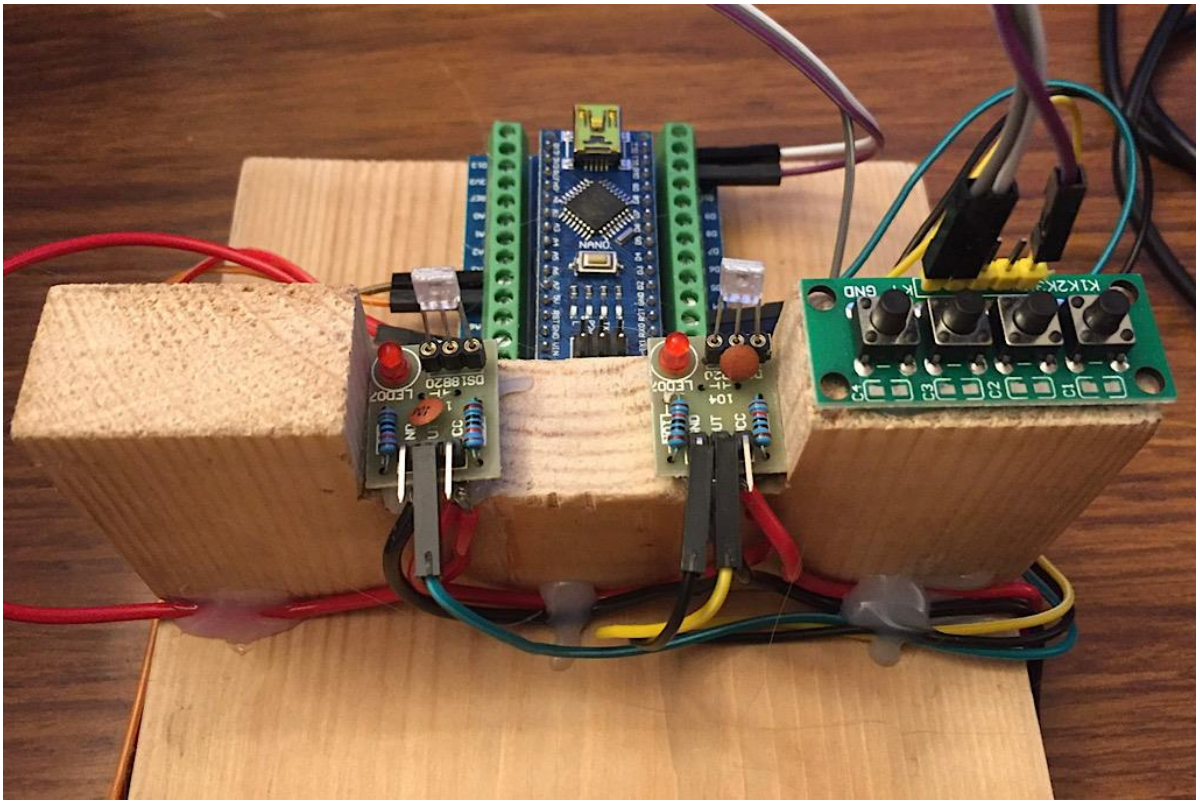
Three laser design for horizontal or vertical shutters. Switch toggles horizontal or vertical Laser.
For the ESP version, a switch is not required to change from horizontal to vertical.

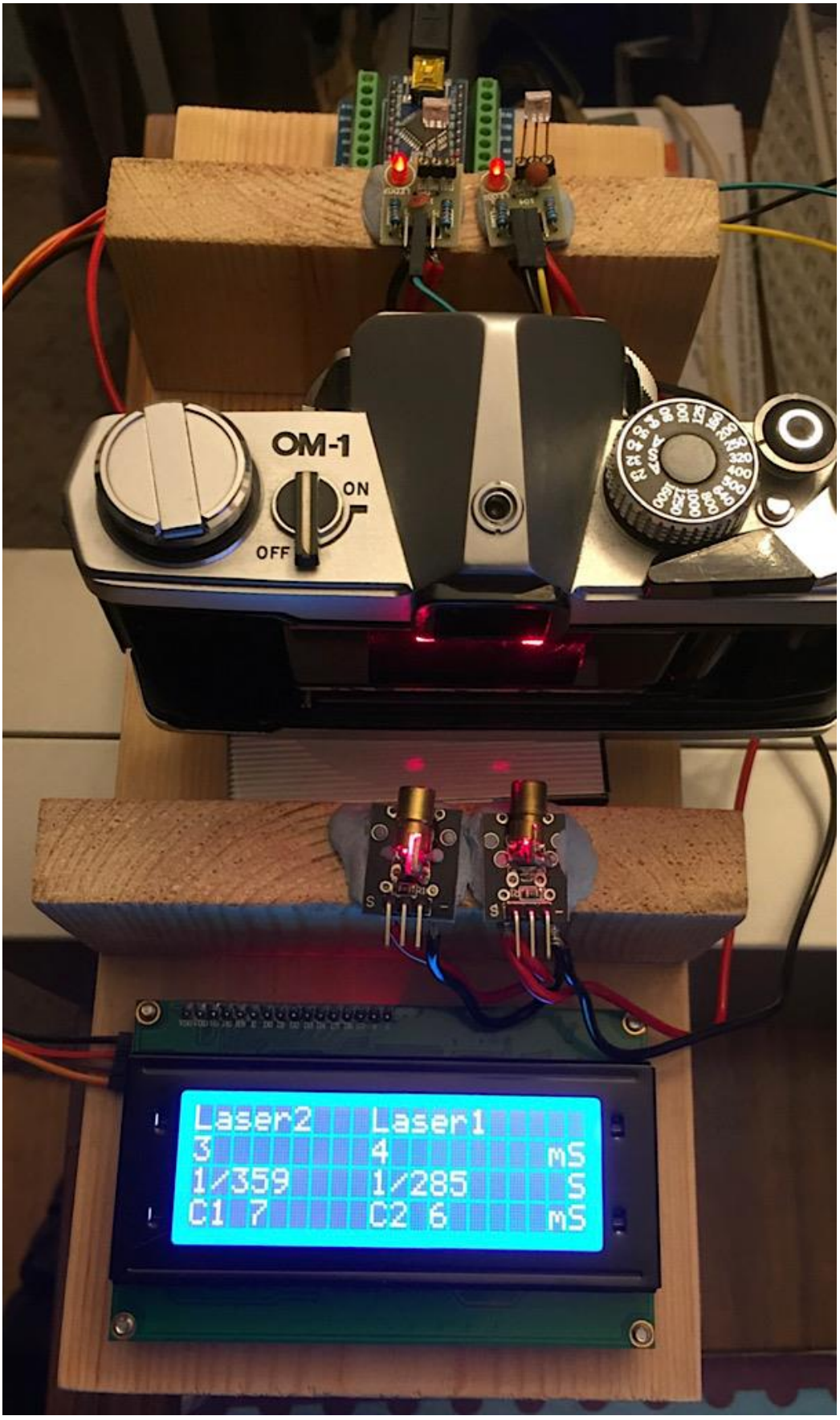


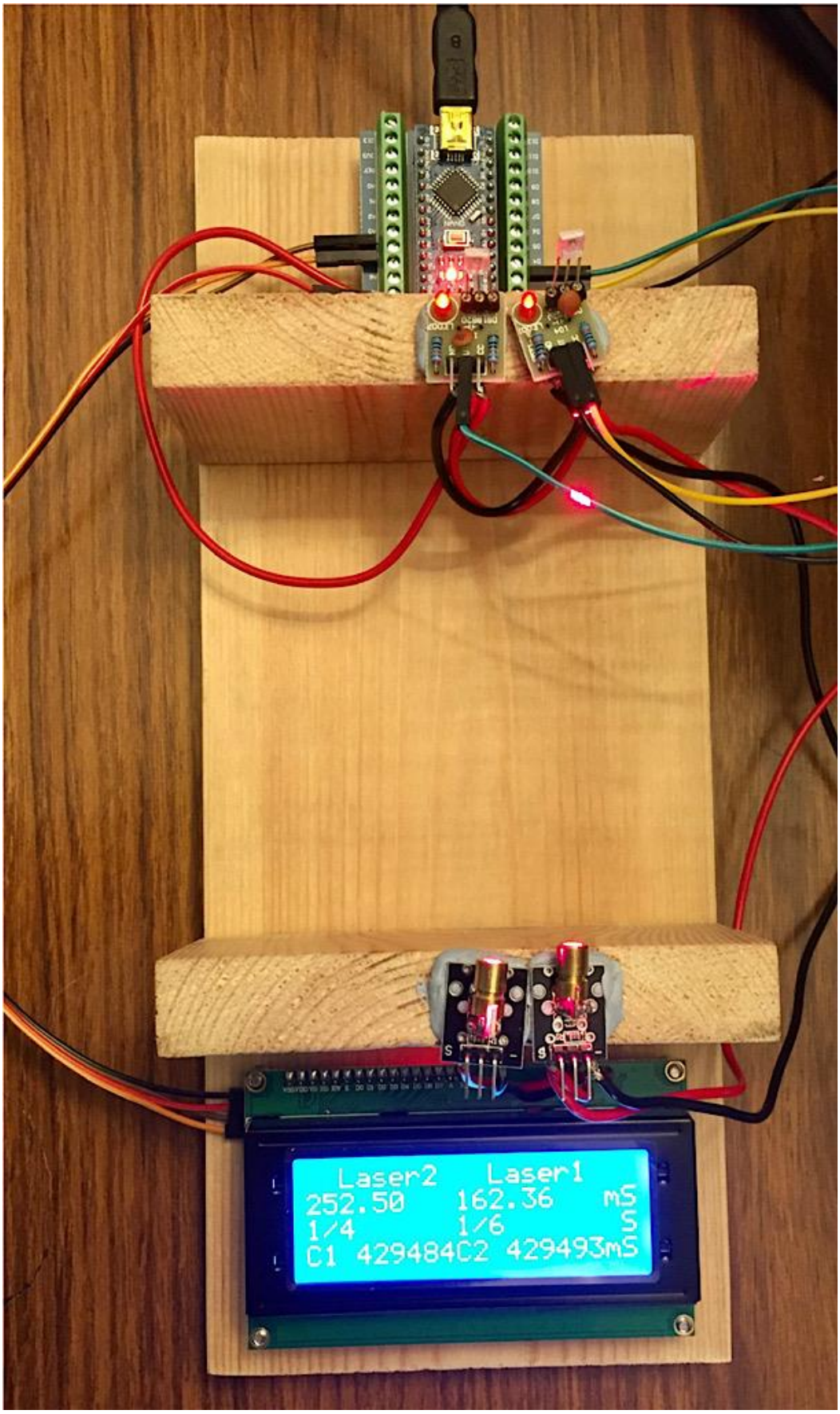
Chopping board used for base and electrical socket boxes used to house rx & tx.



Mask added to the Lego version, for better accuracy at higher shutter speeds.


NANO
GND


OM-1
ON
OFF
Laser2
Laser1
3
4
mS
1/359
1/285
S
C1 7
C2 6
mS


Laser2 Laser1
252.50 162.36 mS
1/4 1/6 S
C1 429484C2 429493mS