ESP32 Hardware Build V1.3

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

Refer to the ESP32_wiring_diagram.pdf for connections. Note. A bare board is shown, rather than it sitting in the breakout board.

All of the boards can be purchased fully assembled from eBay, Amazon or AliExpress, which is by far the cheapest.

There are also options to purchase the processor and breakout boards without the header pins soldered. These are often cheaper, but obviously require soldering at home. Ensure you pick the right boards.

Using DuPont jumper wire, the boards can be connected together. There are more Brown and Black wires shown in the wiring diagram than one gets in a single set of Dupont wires. Packs of single colour Dupont wires can be purchased cheaply from AliExpress. Any colour wires can be used for the connections, but using the same colours as shown in the diagram is recommended to help avoid mistakes.

There are many 3.3V & GND 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. The same is required for the 0V wires.

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.

Note 5V is used for LCD. (Red wire)

3.3V is used for the Lasers and rx. (Brown wires)
The tft display, 3.3v is used for VDD and for the LED.
Note the tft board specified is a 3.3V version.

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.

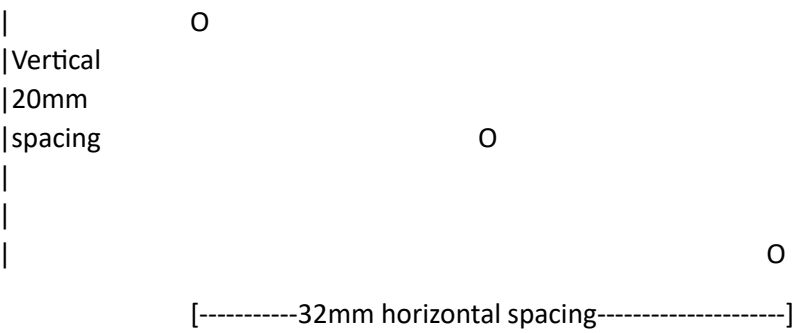
The Sensor (rx) board is marked VCC (5V) and GND for the power connections. The centre pin is marked OUT, which is wired to one of the input pins on the ESP32

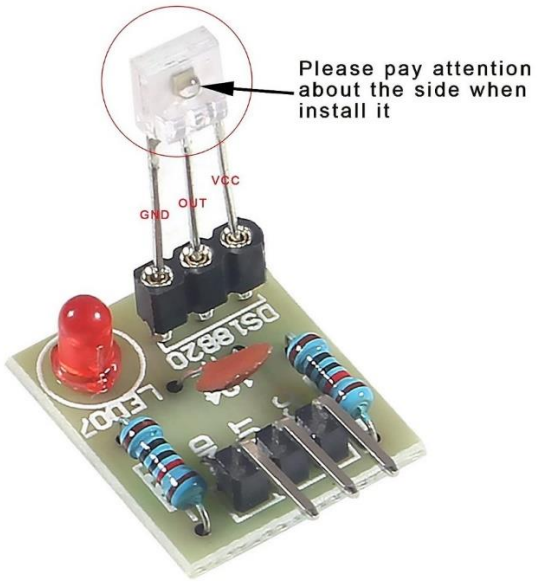
Be very careful when fitting the receiver sensor into the board. Refer to the photograph. The little lens must be pointing towards the header pins on the board.

The 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 (future updates will add all computer screen output to the tft).

The LCD is a legacy from the Arduino unit. It only displays basic test results, shutter speed from left & right sensors in mS and fractions, curtain travel speeds etc.

The Lasers & sensors are arranged so the left and right Laser are spaced 32mm horizontally and 20mm vertically, with a central Laser & sensor as per the diagram below. With this layout, they can be used for both horizontal and vertical shutters.





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.

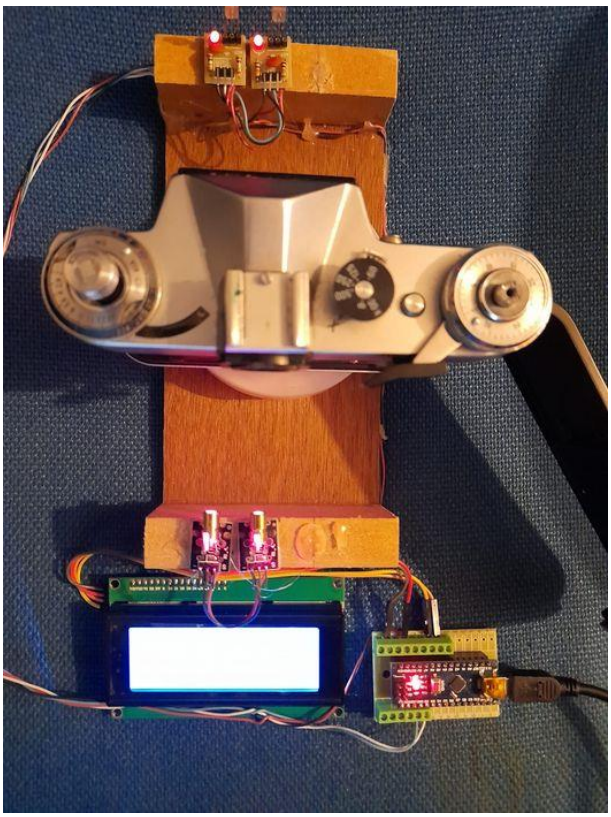
When applying power, the Lasers will shine red and also the red LEDs on each of the rx boards should light.

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 rx & tx 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.



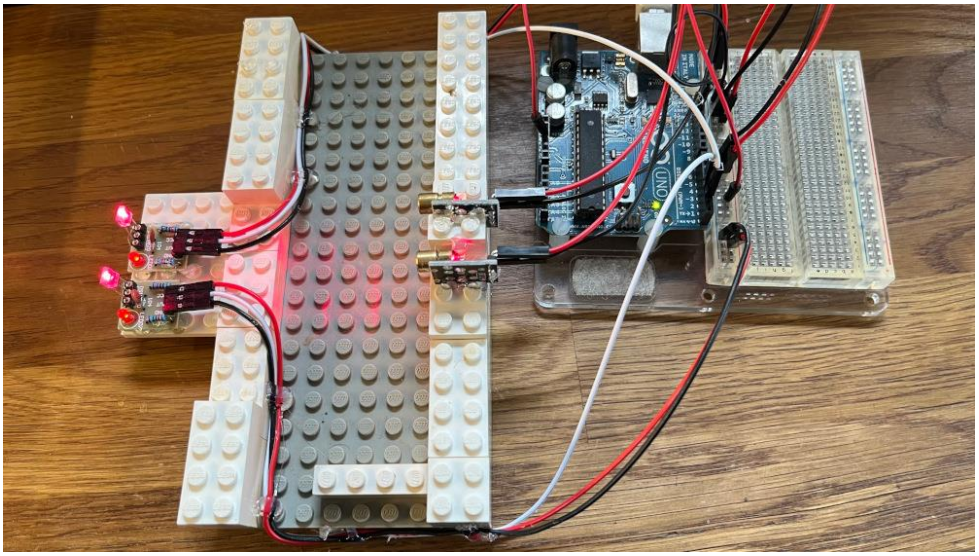
Prototype shutter tester with two Lasers.

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, up to around 1/250s shutter speed. Above this, the sensor width to the narrowing curtain slot ratio will cause the tester to under-read. A simple solution is to use a mask, with holes of 0.8mm, placed in front of the receivers. The best way to achieve this is to mount the receivers inside a project box, behind 0.8mm drilled holes.

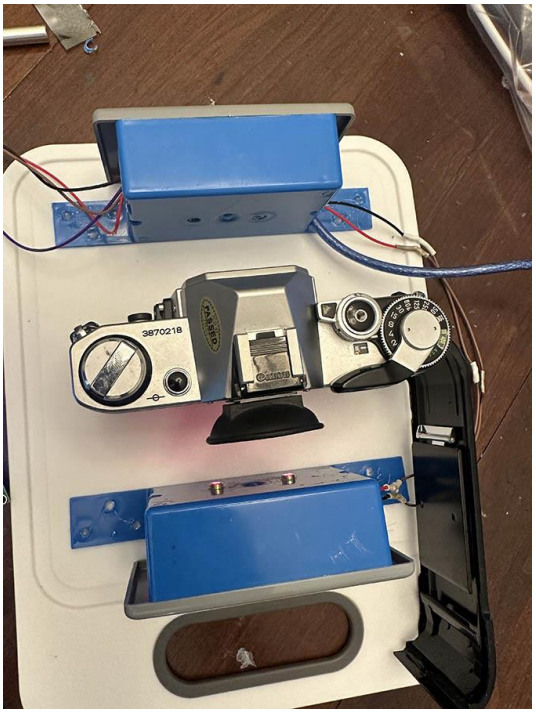
Note:- Arduino code from 3.1.3 and all ESP32 code incorporates dynamic self-calibration which resolves the known issue of under-reading when measuring a point light source at narrowing slot widths.

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

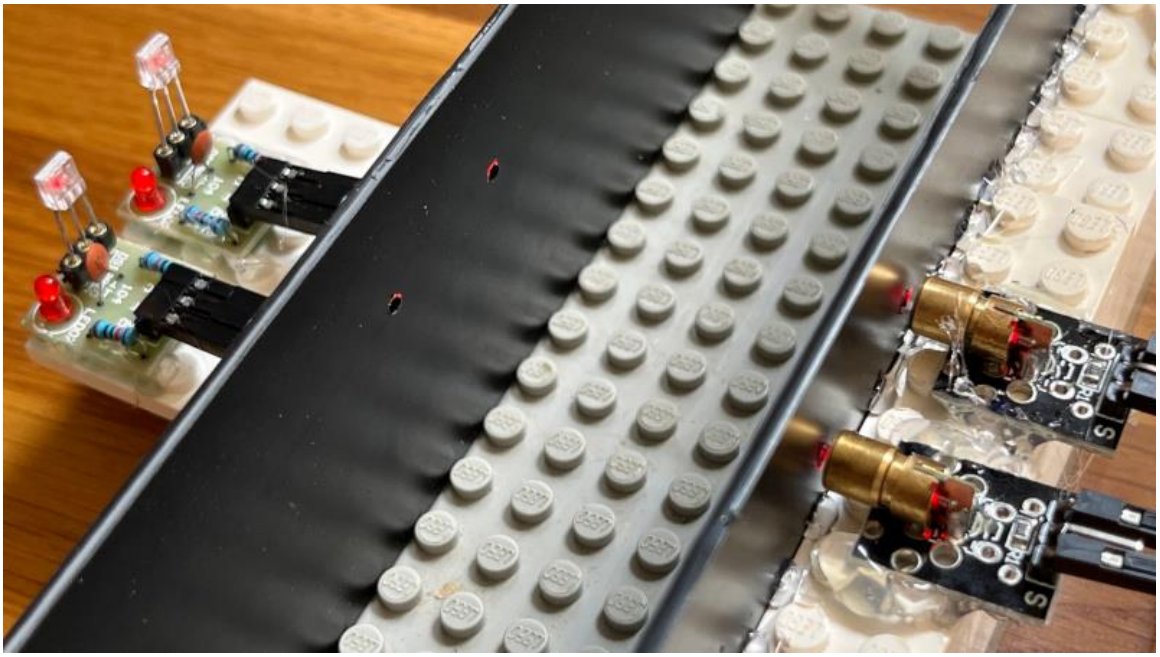


Lego :o)

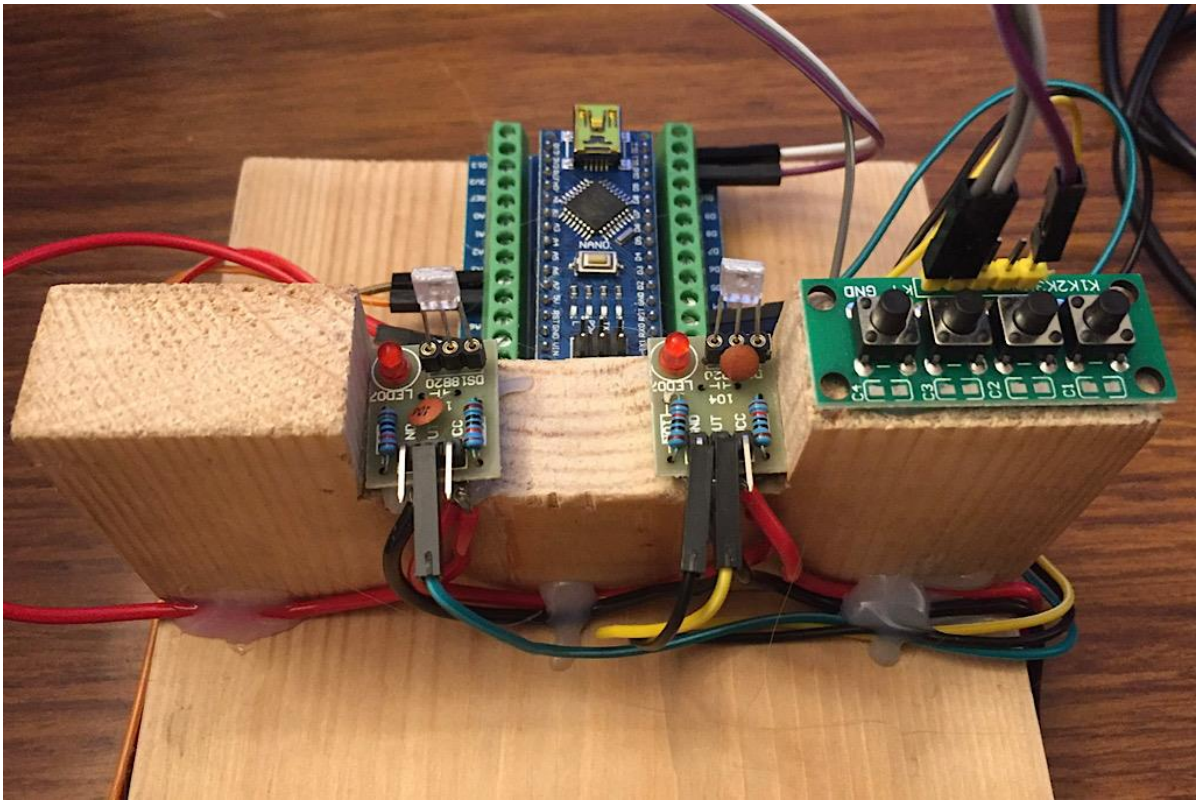
Three laser design for horizontal or vertical shutters. Switch toggles horizontal or vertical Laser.
For the ESP version, a switch is not required to change from horizontal to vertical.

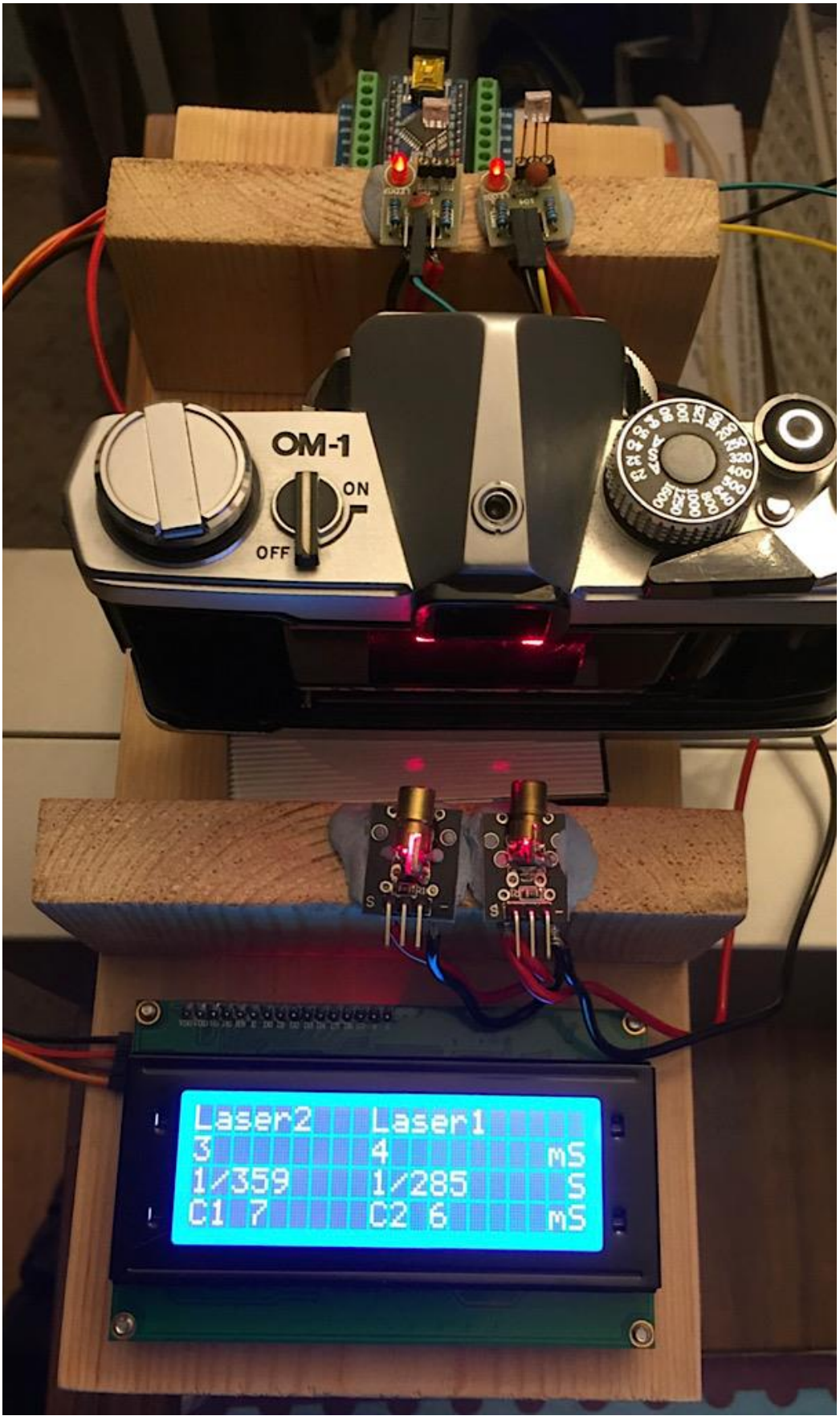


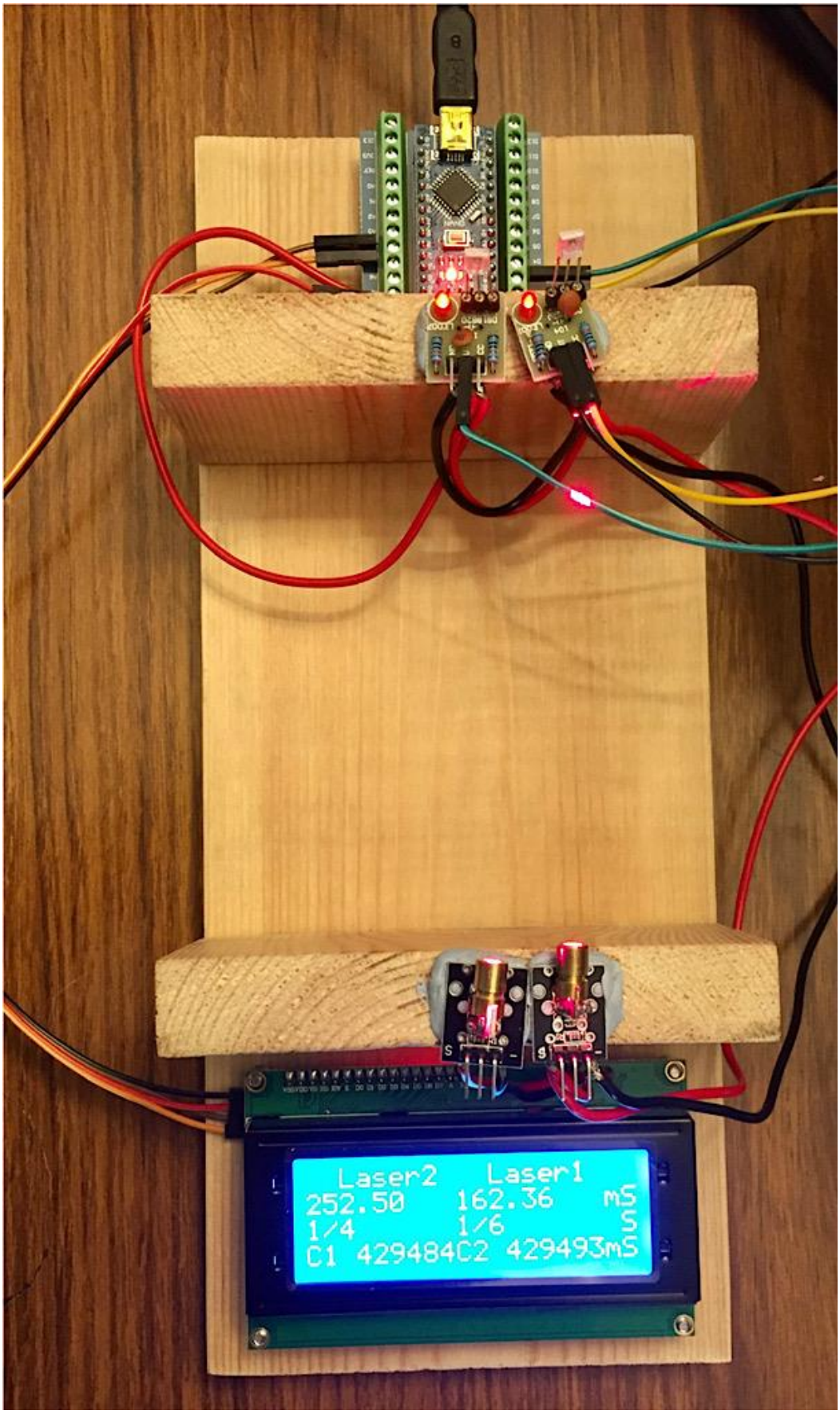
Chopping board used for base and electrical socket boxes used to house rx & tx.



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