V1

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

Refer to the Arduino_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.

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 quite easily.

If using the Arduino breakout board specified in the parts list, there are plenty of +V and +0 pins on the board. If using a screw terminal board, it will be necessary to join all the +V wires together, with a choc-bloc or similar, with just one wire going to the screw terminal. Do the same with the 0V wires.

Arduino Nano are all a standard size, so you can choose a screw terminal or pin type breakout board.

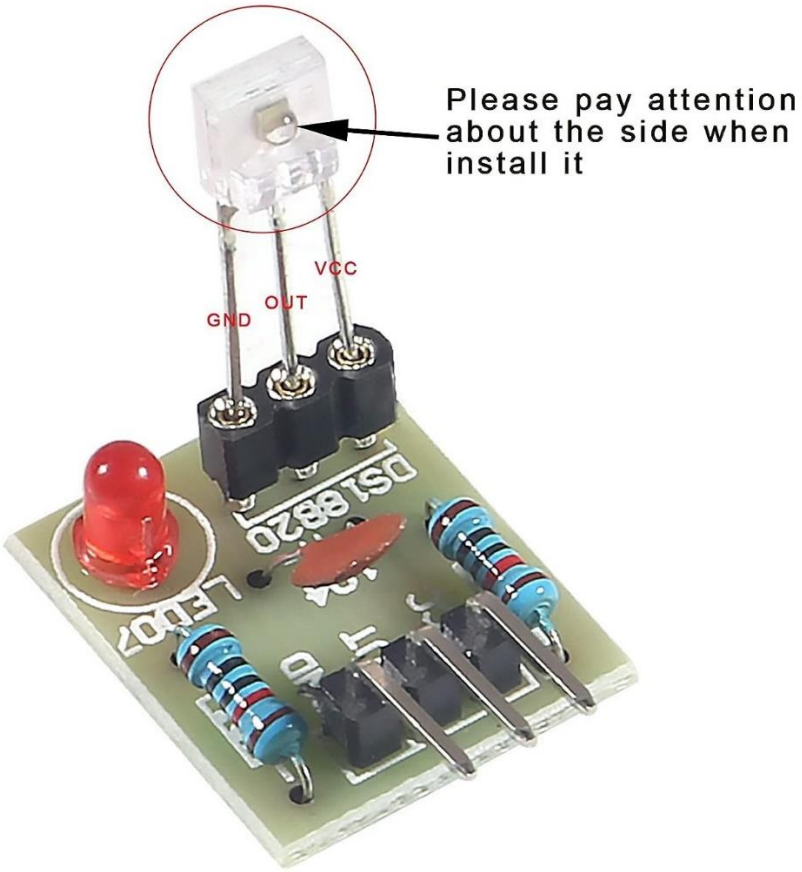
ESP32 comes in either 30 or 38 pin boards. The parts list specifies the 38 pin version and compatible 38 pin breakout board. If selecting a different ESP32 or breakout board from that specified in the parts list, ensure they are compatible.

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

The Laser tx is marked as VCC (positive or +V) and GND (0V) Do not connect anything to the centre pin. On many Laser boards, the Laser barrel is only held to the board by it's wires. This means it can easily be knocked out of alignment. Consider using hot-glue or similar to glue the Laser barrel to the board.

The Laser rx is marked S (+V) and – (0V). The centre pin is marked OUT. This will go to either pin 2 or 3 on the Arduino

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.



rx – showing correct sensor placement

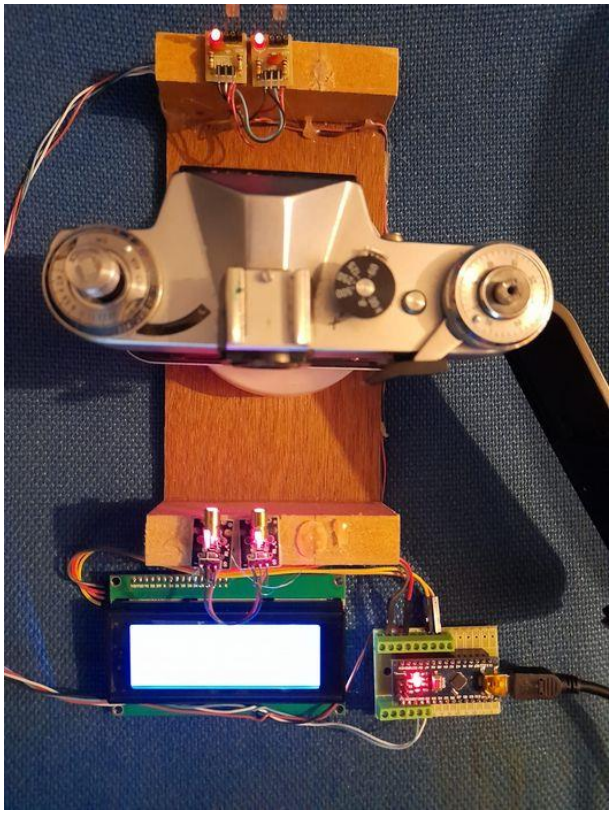
The project is powered via the USB connector on the processor board. No other power is required. Before connecting the USB power lead, check, double check and then treble check all of your connections and the correct orientation of the receiver sensor.

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

For the prototype, two pieces of wood were cut, one 40mm high, to mount the Lasers (tx). The other 28mm high, to mount the receivers (rx). These were then glued to a piece of thin ply.

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.

For a horizontal focal plane shutter, the lasers should be glued 32mm apart, measured from the centre of each laser. Same for the receivers. For a vertical shutter, the spacing should be 20mm.

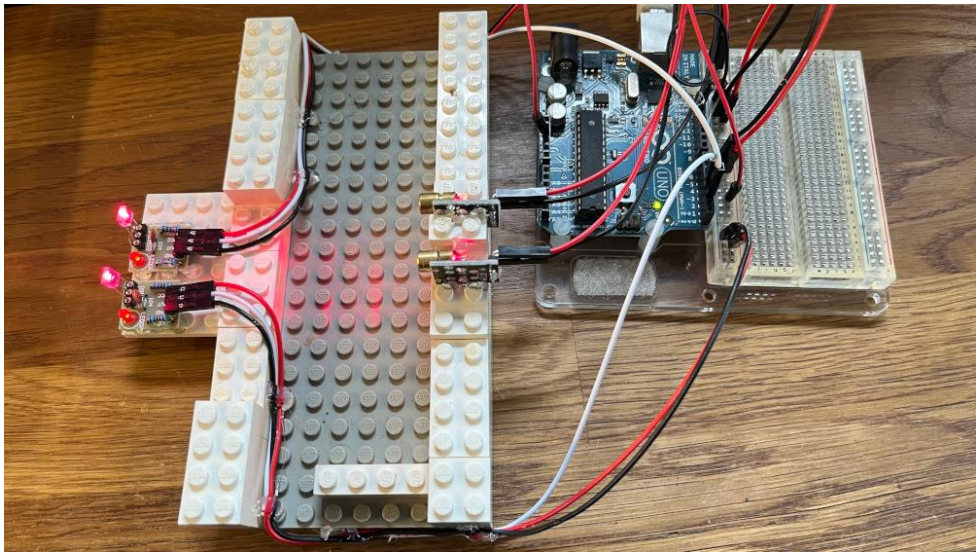


Prototype shutter tester

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

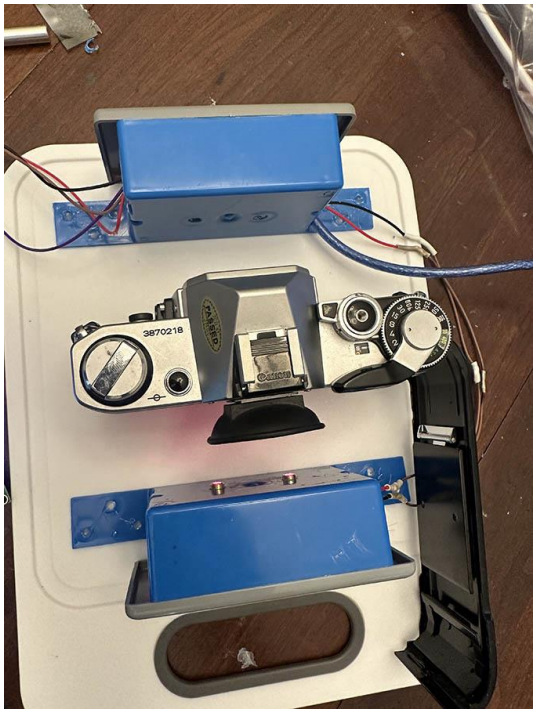
This design works perfectly well, up to around 1/250s shutter speed. Above this, the laser beam width to the narrowing curtain slot ratio will cause the tester to under-read. The solution is to use a mask, with holes of 0.8mm, placed in front of the receivers. The best way to achieve this is to mount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

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

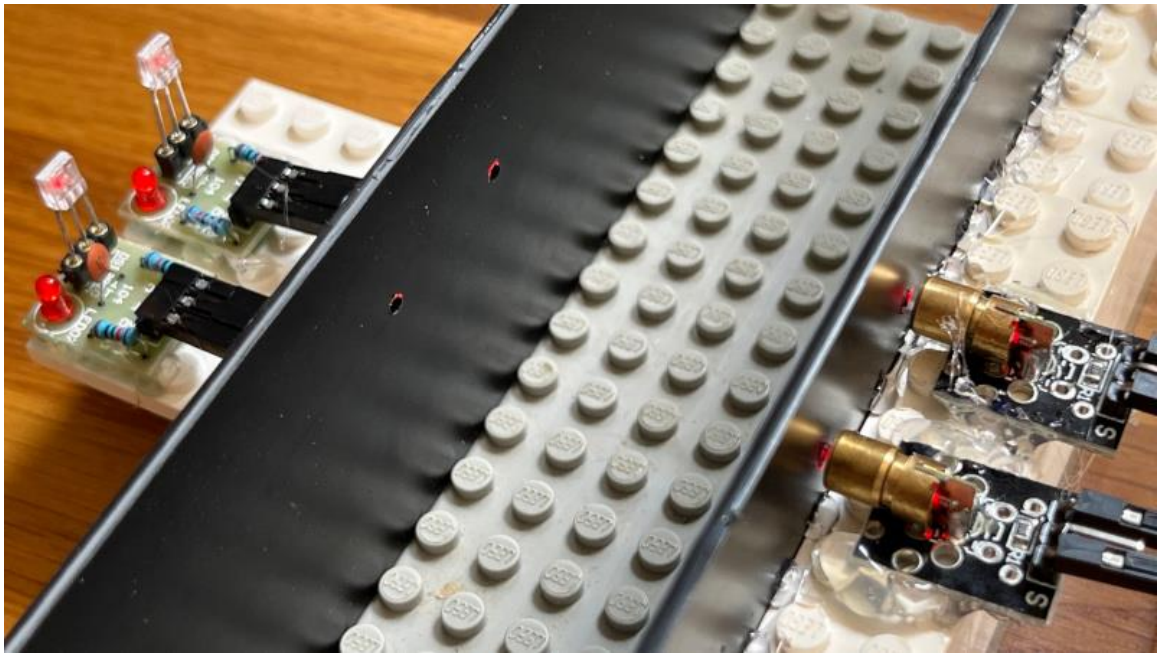


Lego :o)

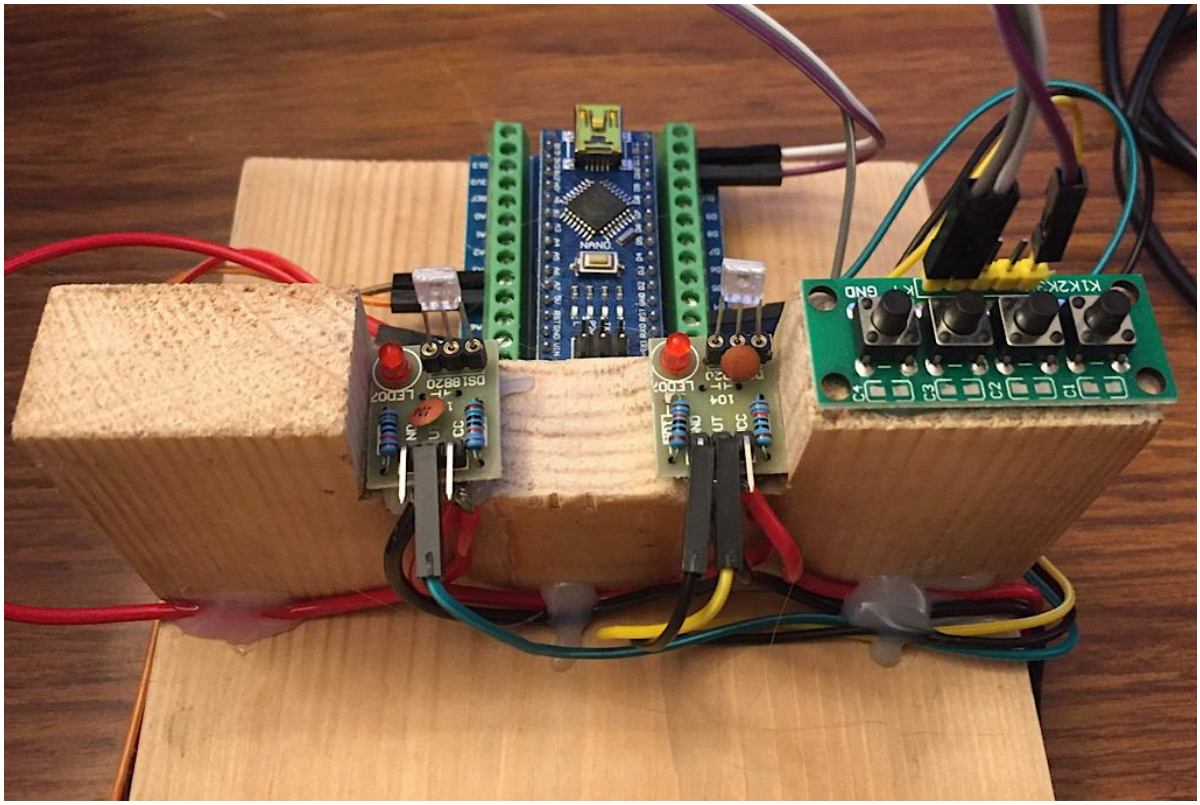
Three laser design for horizontal or vertical shutters. Switch toggles horizontal or vertical Laser.

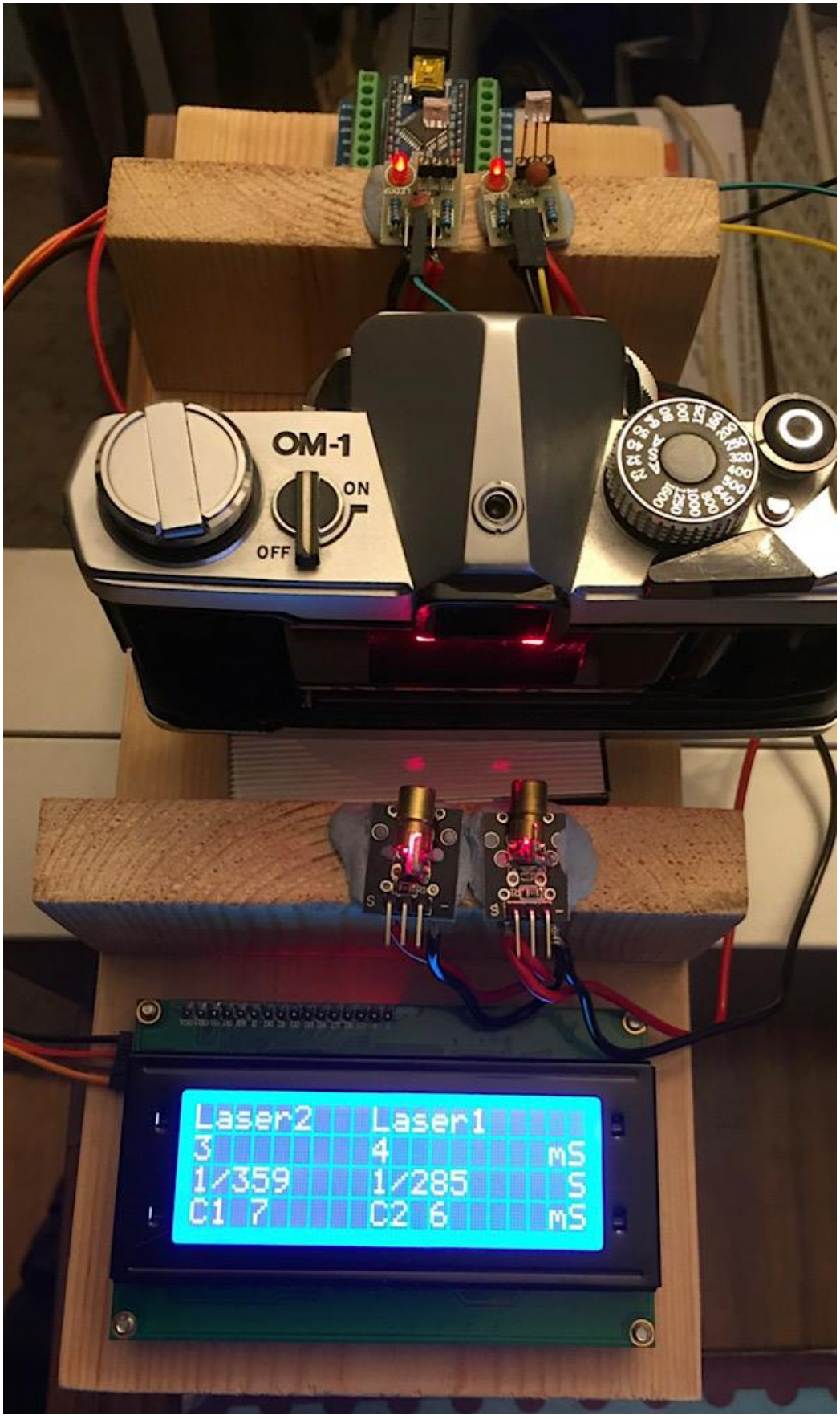


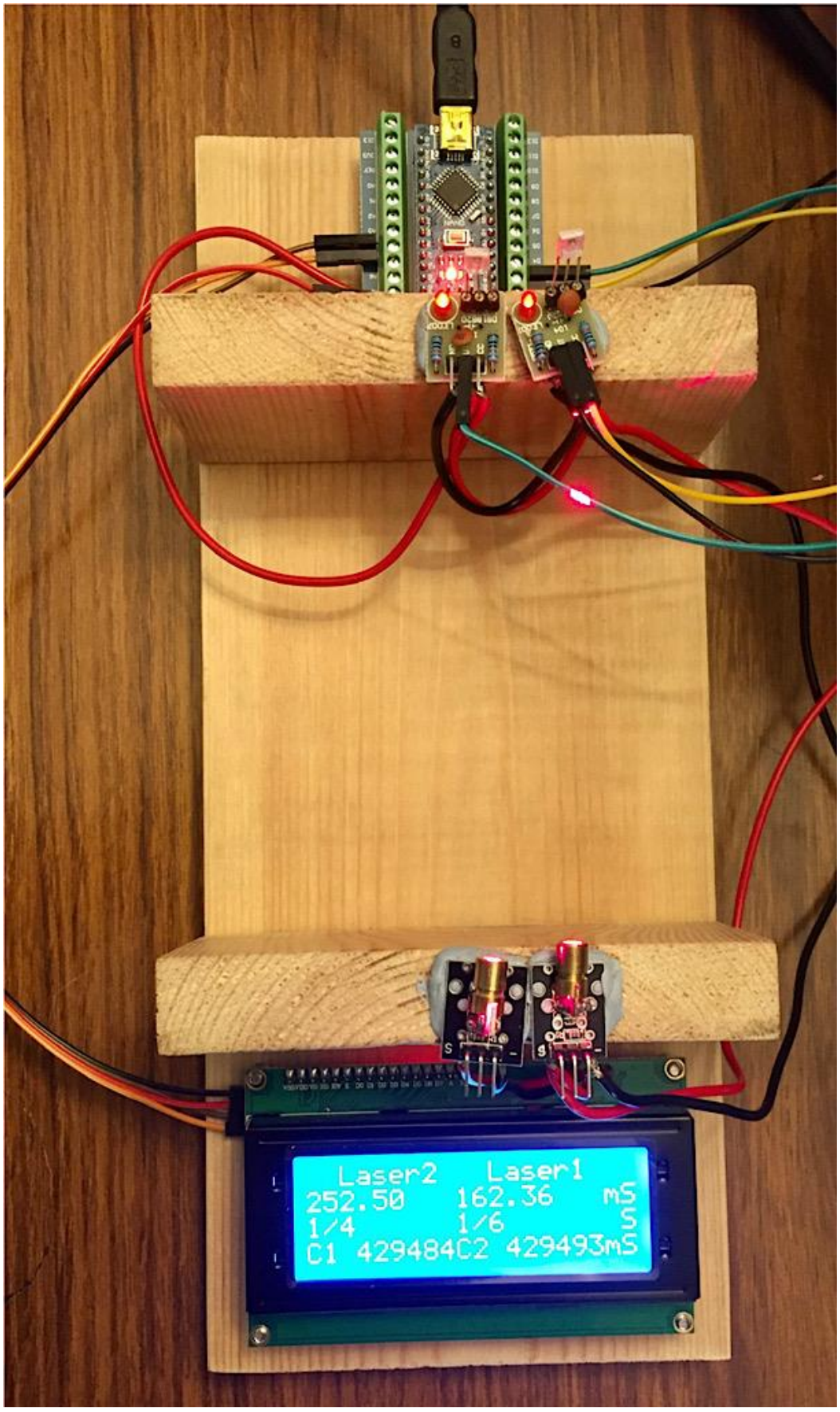
Chopping board used for base and electrical socket boxes used to house re & tx.



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




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