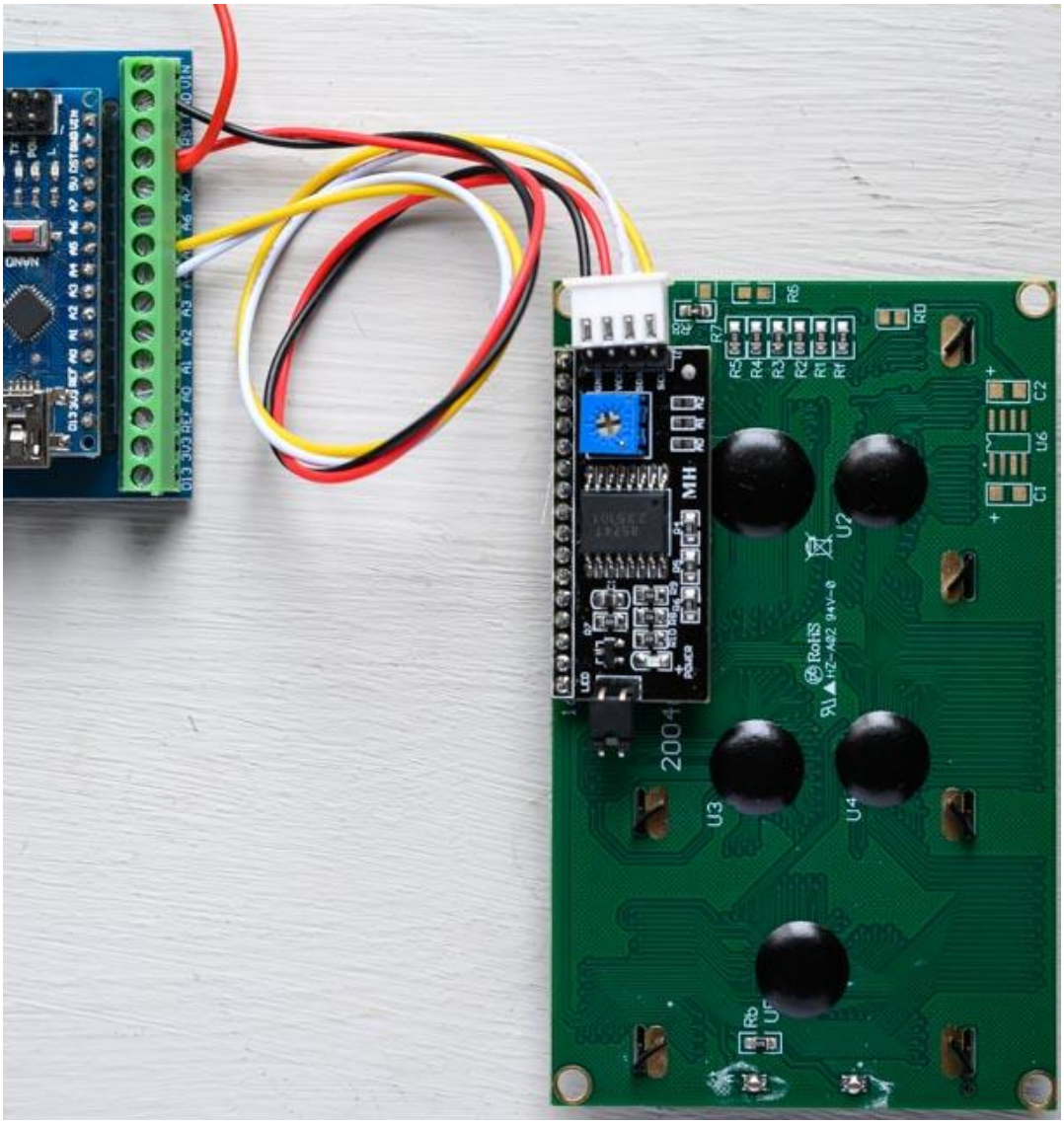
Arduino Shutter Tester Version 2

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.

Connection to the LCD is made using a 4-Pin JST XH cable. It is pre-made. Ensure the black wire of the cable plugs into the pin marked GND on the LCD.
There is a large blue rectangle near the pins. The middle is a little screw. Once everything is complete and the firmware loaded, this screw will require adjusting to make the text visible on the screen. Do not forget this important step.

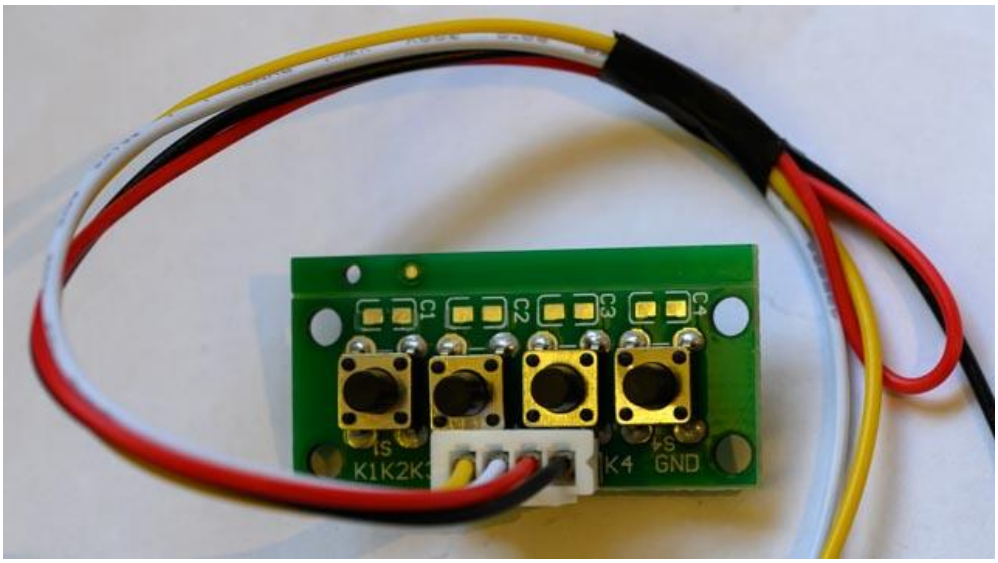


Connection of LCD to breakout board.

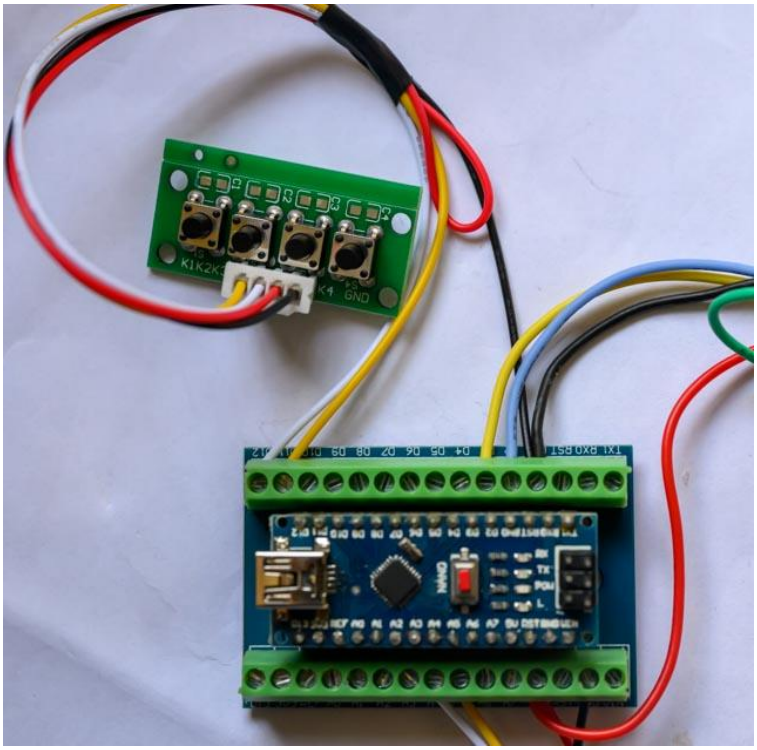
Connection to the Buttons

A 4-pin JST XH connector (five come in the bag) can be used to connect to the header pins on the four-button module.
Connect as shown below, with the Black wire connected to the GND pin.
There will be an unconnected pin on the right.
The Red wire is not used and to avoid confusion, has been taped back.

Note: - The middle two buttons will be 'Display Average'(nearest the Yellow wire) and 'Reset Average' (nearest the White wire).



The wires from the Button Module arethen connected to the scre terminals as shown below.
Black wire to GND, Yellow to pin 11 and Yellow to pin 12



Connection to the Sensors

This is the most complex part. Be careful with the wiring, the 5V and 0V wires must not be crossed or connected to each other.

A) On each of the Laser Modules, there is a pin marked '**S**'. These are in fact 5V. They must be connected to the **Red** wire on the multicore cable.

B) On each of the Sensor Modules, there is a pin marked '**VCC**' these are in fact 5V and they must both be connected to the **Red** wire on the multicore cable.

C) C)On each of the Laser Modules, there is a pin marked '**-**'. These are in fact 0V. They must be connected to the **Black** wire on the multicore cable.

D) On each of the Sensor Modules, there is a pin marked '**-**' these are in fact 5V and they must both be connected to the **Black** wire on the multicore cable.

E) Finaly the centre pin of one Sensor Module, marked 'OUT', must be connected to the Blue wire on the multicore cable and the centre pin of the second Sensor Module, marked 'OUT', must be connected to the Yellow wire of the multicore cable.

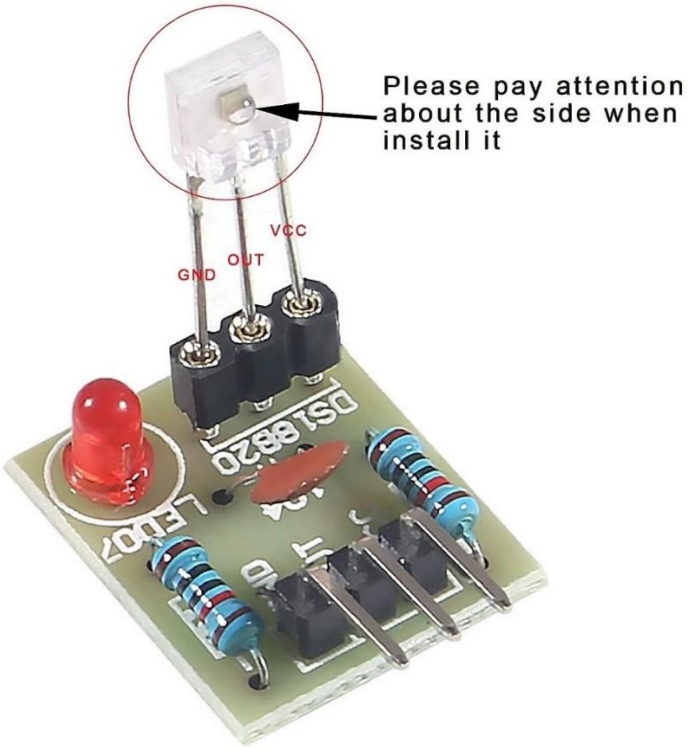
Note: - Nothing is connected to the centre pin of the Laser Module.

There are different methods of joining the wires. For the 5V and 0V, the neatest way is to solder a wire to each pin in a daisy chain. For those who do not wish to solder, using Dupont wires to connect to each pin, then join all the Read together and all the Black together is another option.

JST XH 3-Pin connectors can also be used, however the colours will be wrong, with Black becoming 5V!!!
It is possible to remove the metal pins from the plastic housing & swap them round, it is a little fiddly & outside the scope of this document. Look at Youtube for more details.

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 glue the Laser barrel to the board.

Do not fit the sensor itself until the project is finished and powered up for the first time. If the red LED on the board lights, you know the connections are correct. The project can then be de-powered and the sensor **carefully fitted** as per the photo below. Be very careful to ensure the senor is fitted the correct way round, failing to do so, will destroy the sensor.

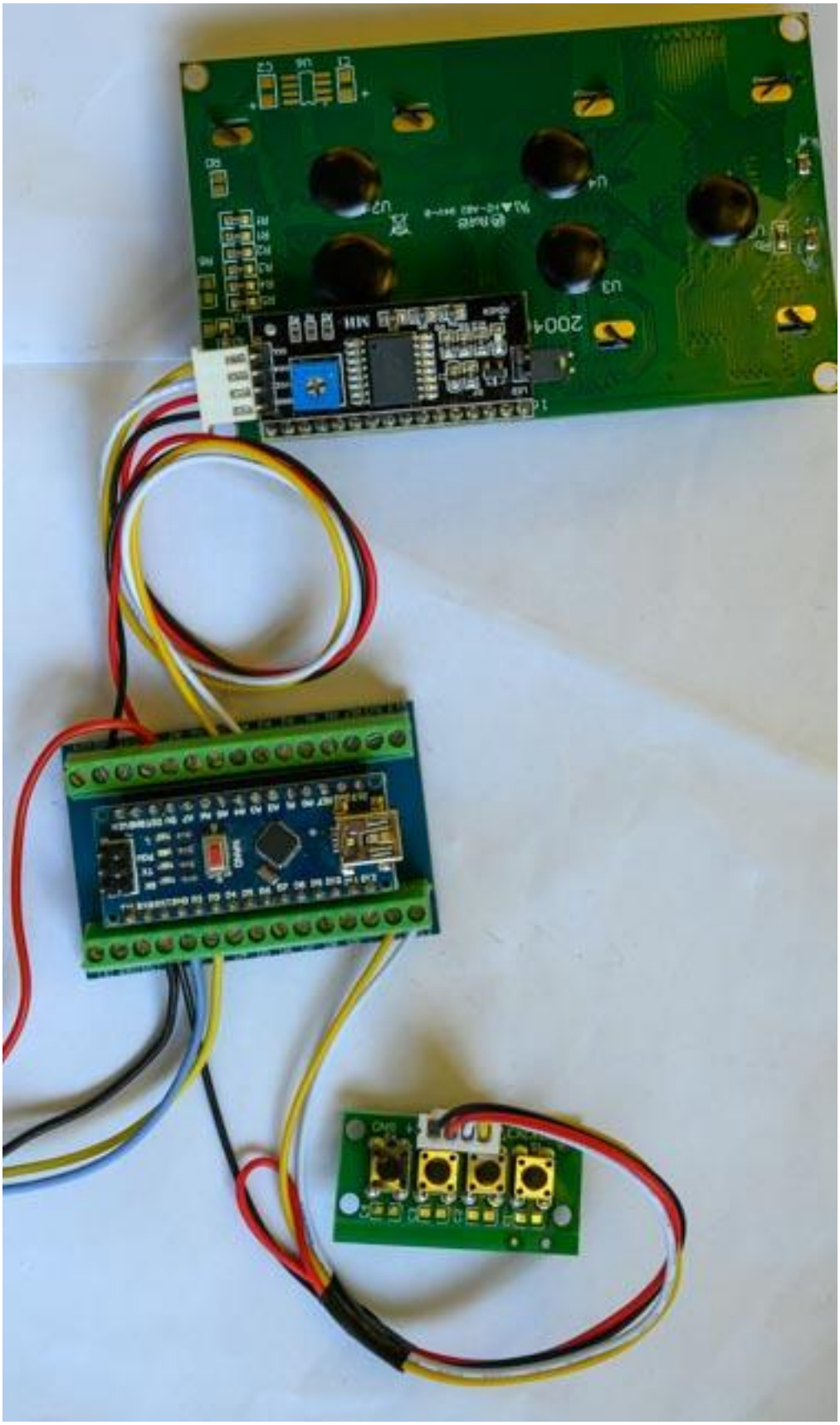


Rx Sensor – showing correct sensor placement

Multicore cable Connection

The multicore cable can now be terminated into the screw terminals of the breakout board referring to the schematic diagram.

Red is 5V, Black is 0V (also called GND). The Blue any Yellow wires being the sensor output, connecting to pins 2 & 3.



Completed wiring to the breakout board.

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 (if you have naughtily already fitted it :o).

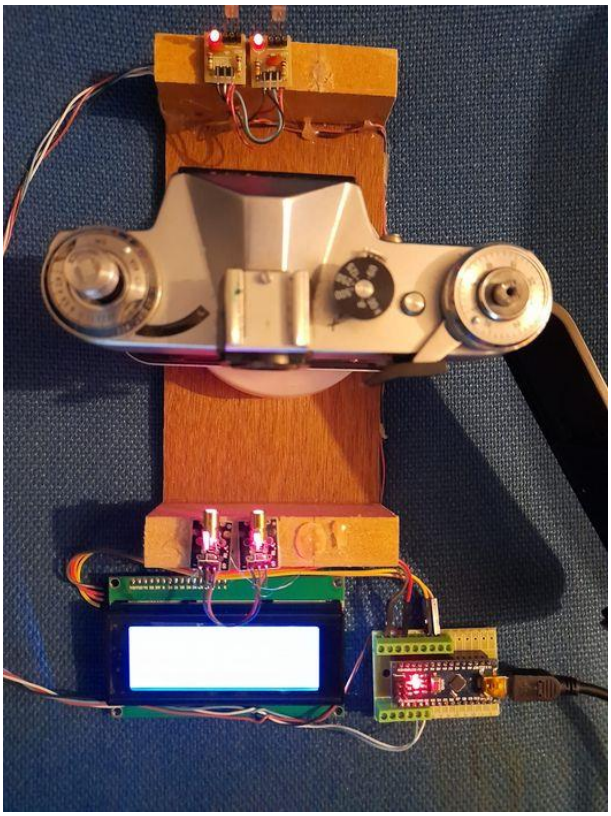
When applying power, the Lasers will shine red and also the red LEDs on each of the rx boards should light.
If they do not, immediately disconnect the USB cable and check the wiring.

Whilst the Lasers are low powered, NEVER look directly into them, or look into a camera viewfinder when the Lasers are on.

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

The Sensor & Laser 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.

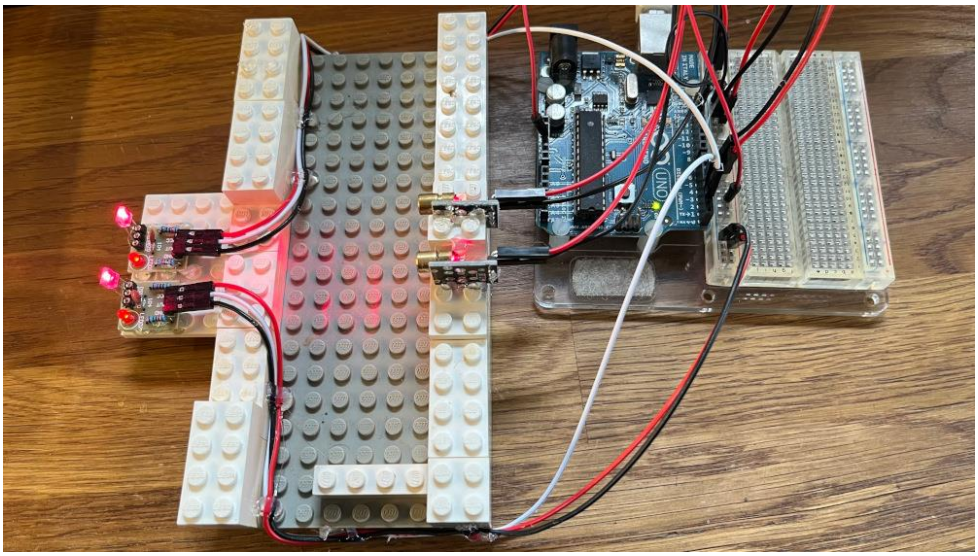
For a horizontal focal plane shutter, the Lasers should be glued 32mm apart, measured from the centre of each laser. Same for the sensors. For a vertical shutter, the spacing should be 20mm.



Prototype shutter tester

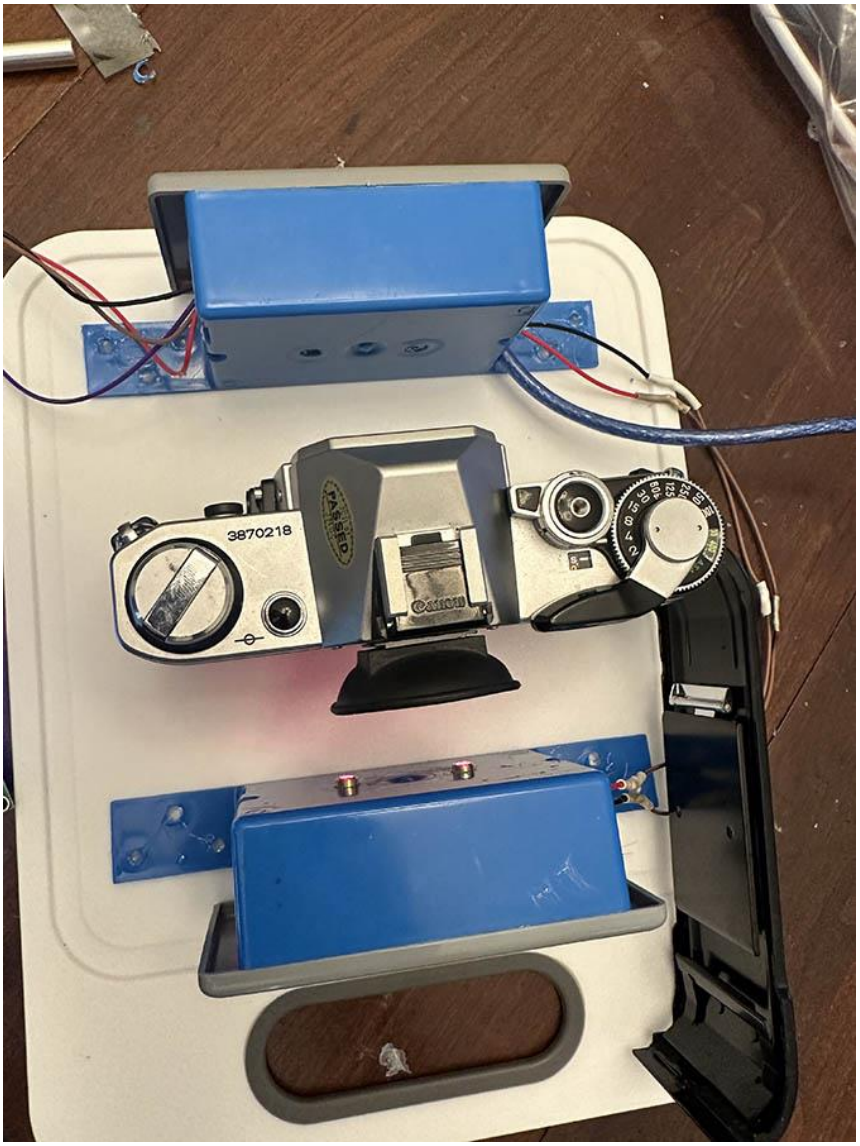
Note: - wires shown here are directly soldered to the boards, rather than using terminal block. Also the Lasers & sensors are not spaced at 32MM.

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



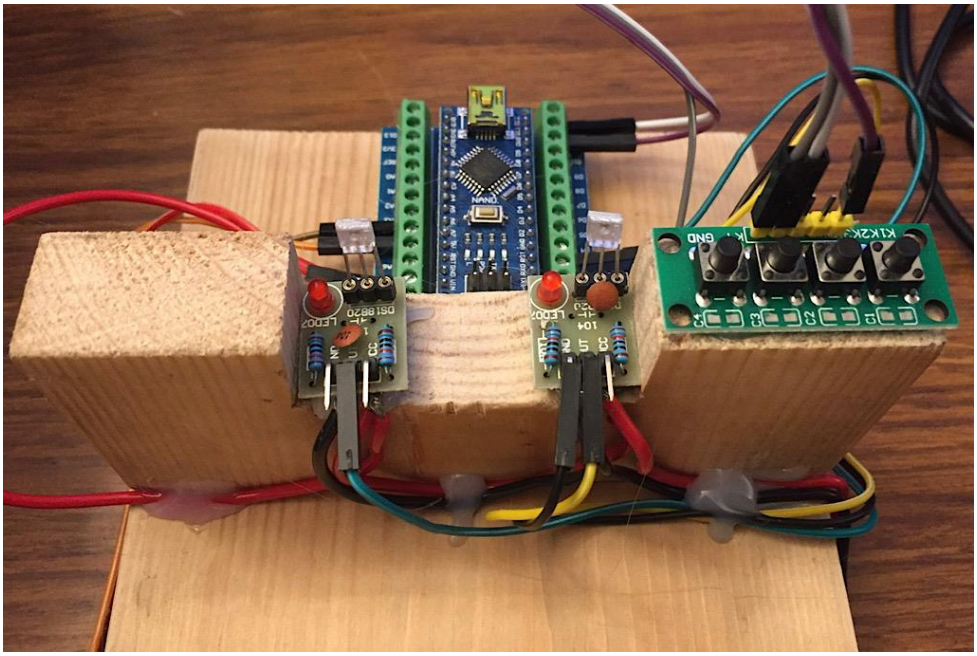
Lego :o)

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

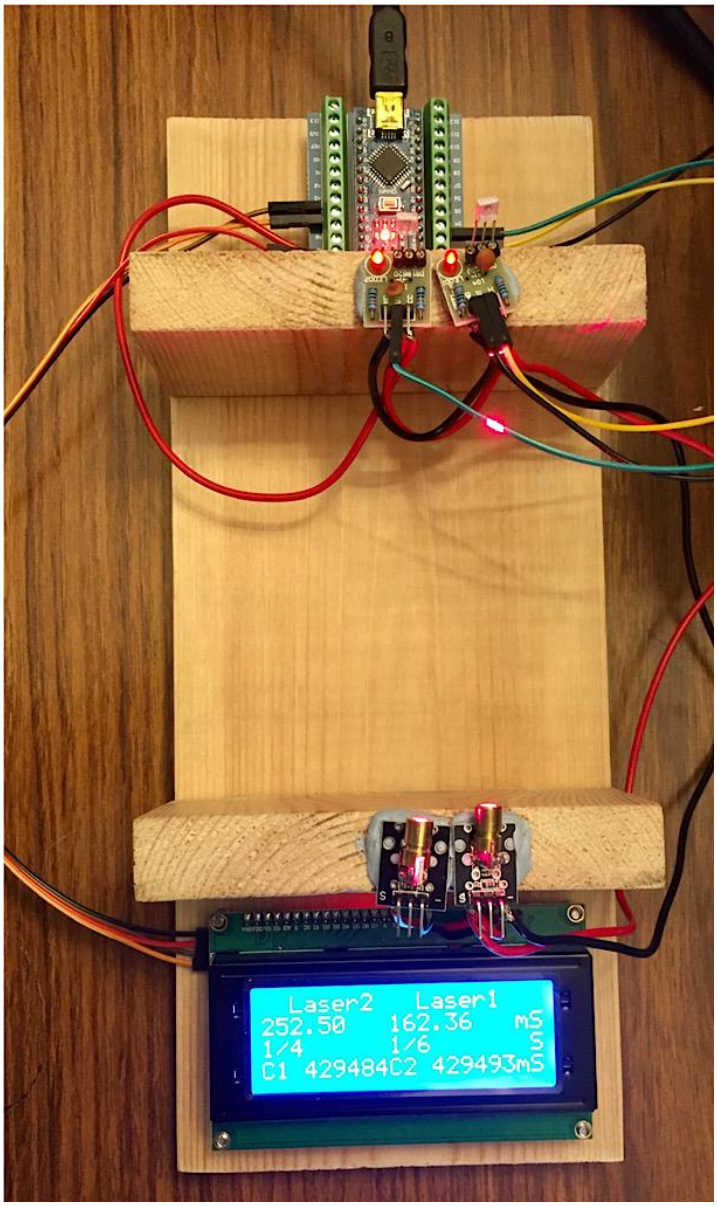


Chopping board used for base and electrical socket boxes used to house re & tx.

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



Variation on ‘the block of wood’ frame.



Hot-Glue gun still on order :o)