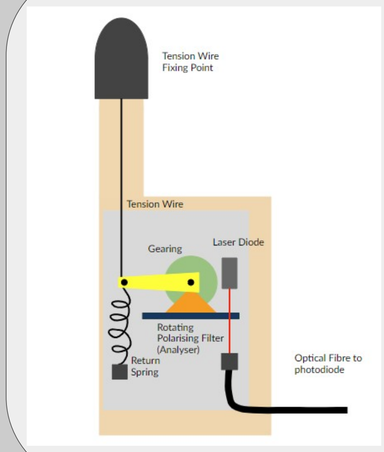
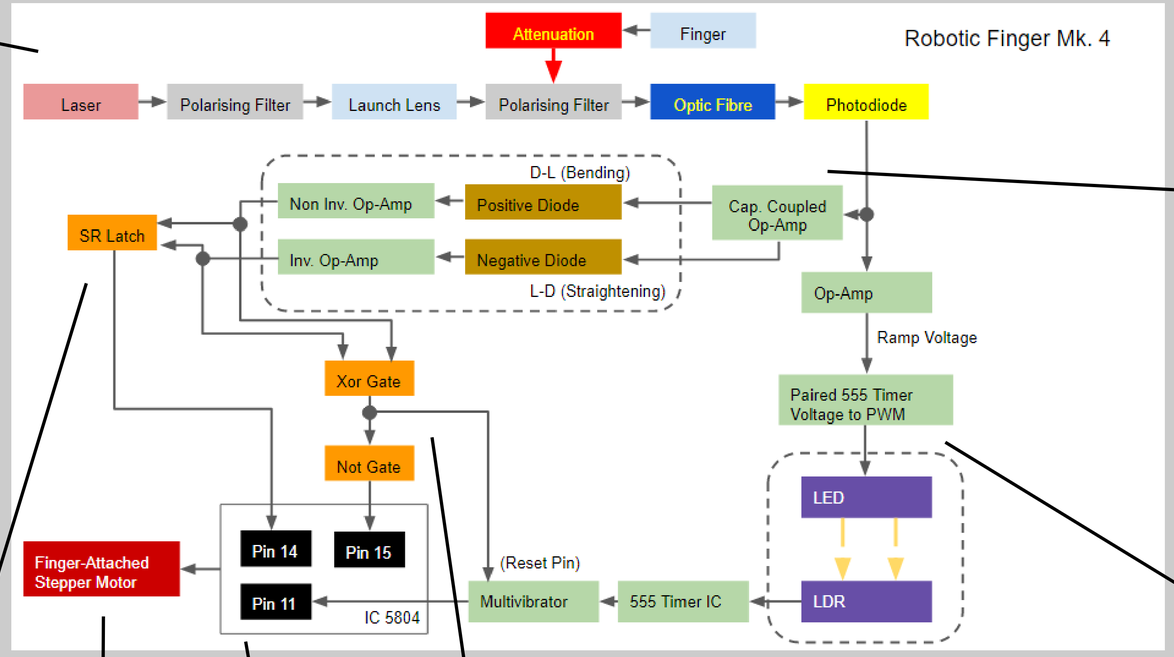
Robotic Finger Controlled via Triple Photon Polarisation

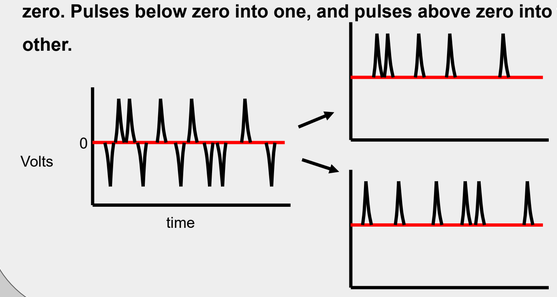


The input phase works by using the linear extension of a finger when bending to rotate a polarising filter with the attached gearing.

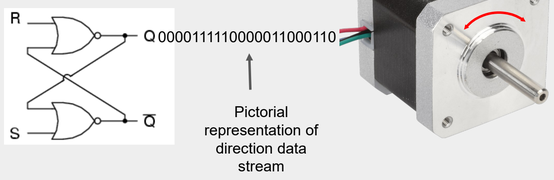
When the polarising filter is rotated, it changes the intensity of the photon beam of the laser travelling through it, which emits fewer incident photons on the photodiode.



At this point in the system, the analogue voltage given by the photodiode is split into an operational amplifier which produces simply an amplified analogue voltage, and into a capacitor coupled operational amplified which produces pulses for changes in intensity that also indicate direction.
These are then fed into a set of diodes to separate them out from one signal into two separate ones, depending on orientation relative to zero. Pulses below zero into one, and pulses above zero into the other.

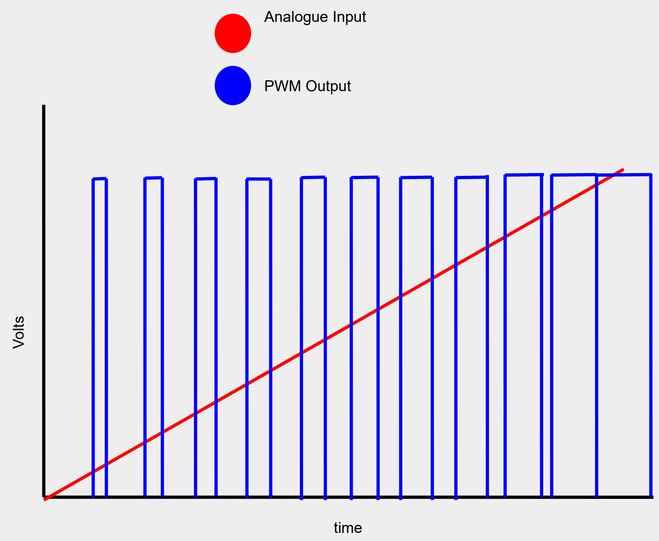


This portion of the circuit is used to indicate the direction of the stepper motor on the output finger.
When the generated pulses indicating direction and change enter the SR latch, they will already not occur at the same time, so we know that the S/R latch will produce a signal of 1 for one, and 0 for the other.

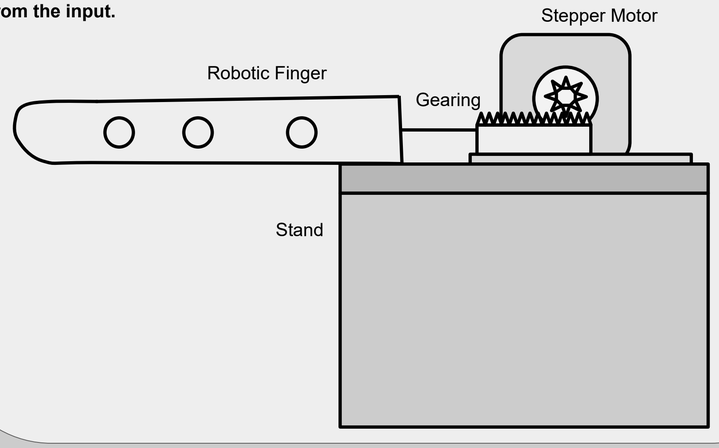


Here, both pulsed signals indicating changes in intensity are entered into an xor gate. The xor gate will determine if either of them are active (on). If neither are on, the interrupts for both the multivibrator and the stepper motor driver will be engaged and they will stop until they are required again.
When either a dark to light or light to dark signal enters the xor gate, it will enable both the multivibrator and stepper driver, and will allow the finger to move.

At this point, analogue voltage representing the intensity of the photon beam is converted into a PWM signal by paired 555 timers.
This is then fed into an LED, which is received by a light dependent resistor coupled with the multivibrator circuit for the stepper driver step signal.
This means that when the stepper is enabled, the analogue voltage of the intensity (and thus location of the finger) is directly converted into the step signal for use in the stepper driver.



This is the final output.
Here, the stepper motor with the inputs decoded as described in the section next to this one, will make a robotic finger move according to those inputs. It will be directly driven by the modulated input making it a very accurate method of controlling the output directly from the input.



At this stage, the IC 5804 (stepper motor driver chip), which drives the stepper motor, now has three inputs from the other sections of the circuit.
These inputs are the direction signal, step signal, and interrupt/enable signal.
This means that from the one photodiode input we have full control over all the core aspects of brushless motor control.