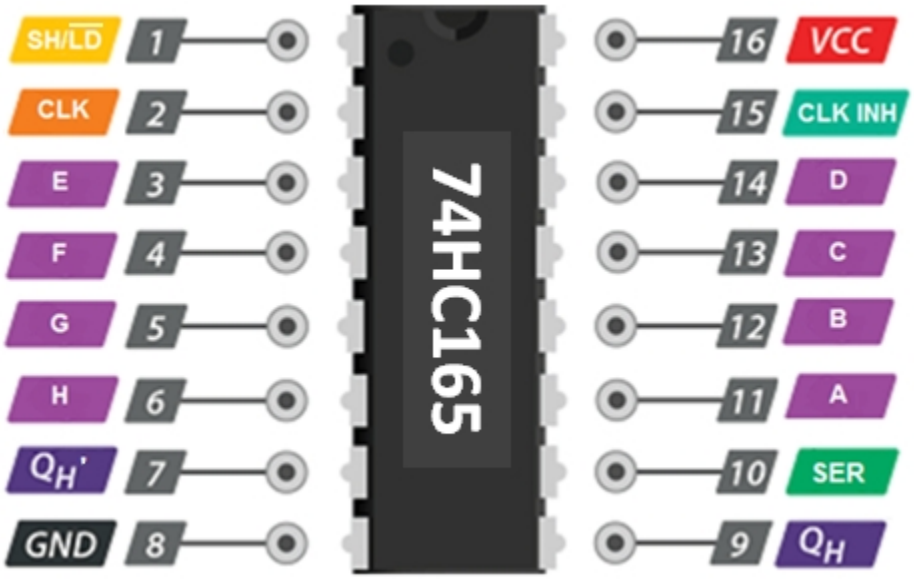
STEMKRAF - 74HC165 (Shift Register with 8-bit INPUT)
https://github.com/teaksoon/stemkraf

Each 74HC165 Shift Register IC provides 8 digital input for a single micro-controller digital input pin. Each 74HC165 chip can be “chained” to another 74HC165 chip. That means we can have multiples of 8 additional digital input pins from each “chained” 74HC165chip. 1chip=8input, 2chips=16input, 3chips=24input and so on...



GND - To Arduino GND
VCC - To Arduino VCC
A to H - Each chip pin is connected to one Input Device. If not used with any Input Device, connect to GND on Arduino.

SH/LD - Connect to any Arduino Pin
Set this Pin to HIGH for chip to go into “Shift Mode”
Set this Pin to LOW for chip to go into “Load Mode”

CLK INH - Connect to any Arduino Pin
This is used with SH/LD “Load Mode”. When CLK INH change from HIGH to LOW, it will load Input Device digital value into the respective chip A to H pins

CLK - Connect to any Arduino Pin
This is used with SH/LD “Shift Mode”. When CLK change from HIGH to LOW, shifting happens. Value in chip pin H goes into QH, G into H, F into G,... A into B.

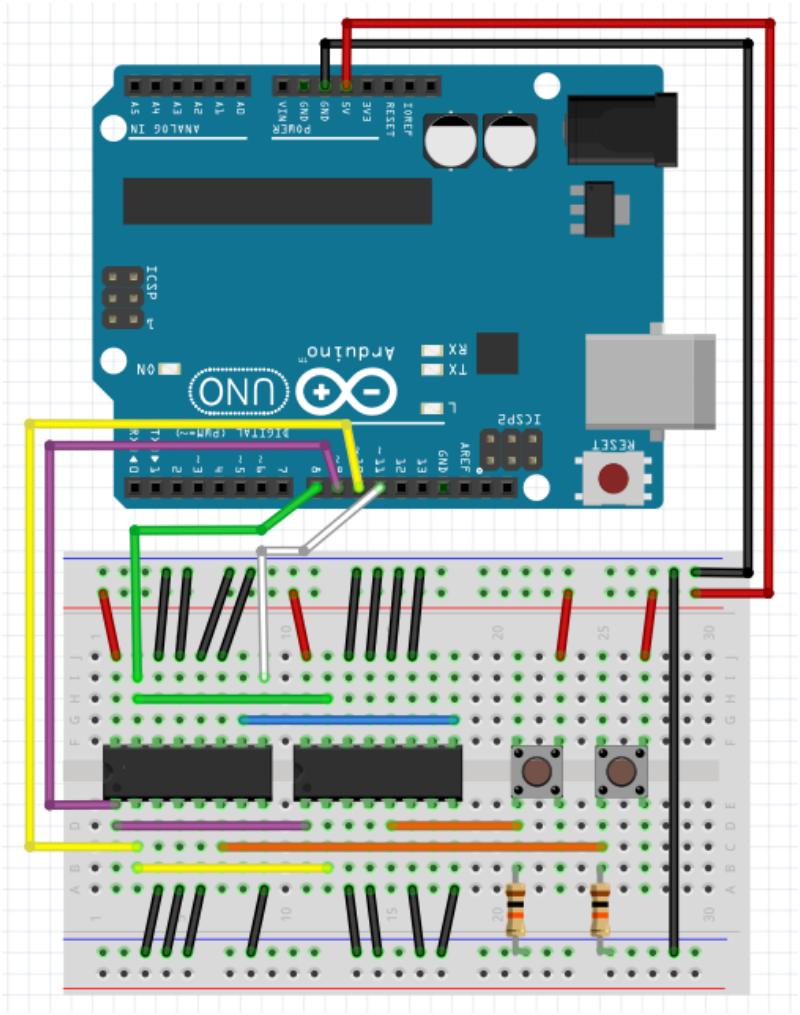
QH - Connect to any Arduino Pin
Gets the ‘H’ Pin value after shifting. Only the first chip in multiple chained 74HC165 is connected to Arduino Pin. Second chip owwards are connected from previous chip **SER** pin

QH' - Normally this is not used
It stores the opposite of QH, if QH=0, then QH’=1, if QH=1 then QH’=0

SER - This is for multiple chips chain use. To be connected to the QH pin of next chained chip

STEMKRAF - 74HC165 (Shift Register for 8-bit INPUT)
https://github.com/teaksoon/stemkraf

Program: **stemkraf_74HC165**
(1/2): test program for 74HC165
:
: by TeakSoon Ding for STEMKRAF (NOV-2021)



Hardware:
1x Arduino Uno
1x Solderless Breadboard

Jumper wires

2x tactile switch
2x Resistor 10Kohm

2x 74HC165 Shift Register

This setup has 2 chained 74HC165 chip (you can also set up a single chip or more than 2 chained chips)

Each 74HC165 chip have 8 input pins. In this setup we have 2 chips, means we have 16 Input Pins. We only use 2 tactile switch for Input, with 14 unused Input Pins

Each chip has output pin labelled as A to H, you can connect any digital Input device to it.

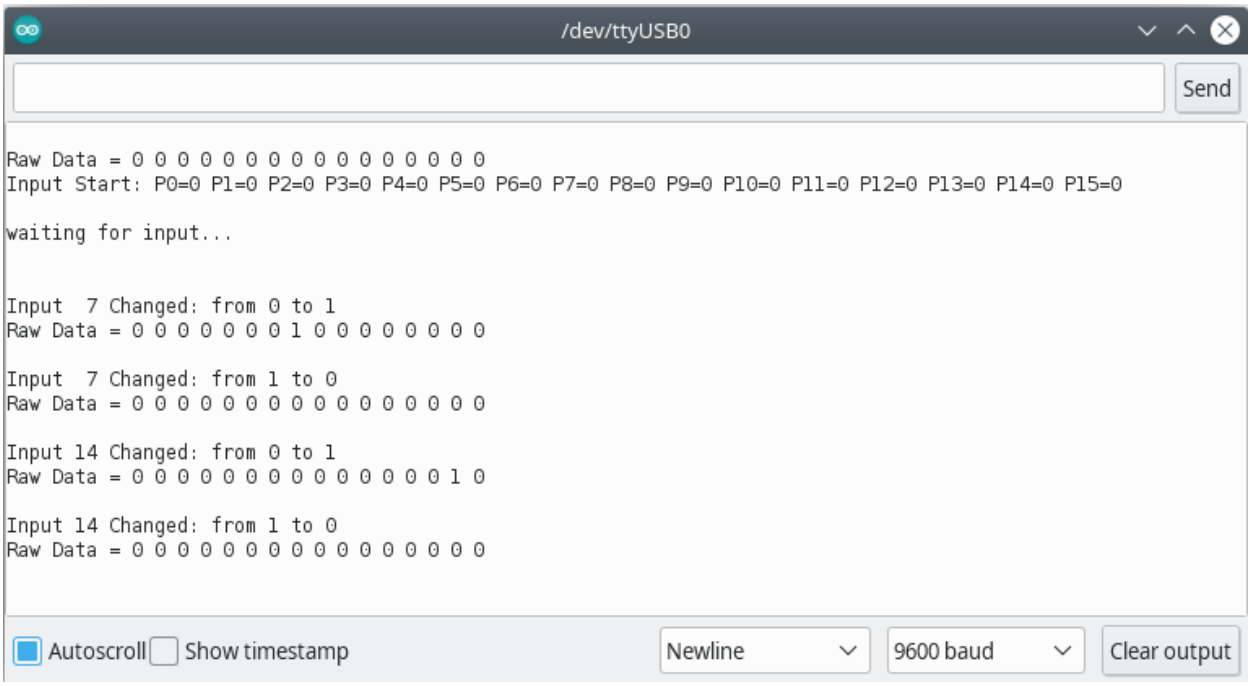
The number Arduino Uno pin used is the same for 1 chip or multiple chained chips.

All unused 74HC165 Input Pin should be connected to GND, so that we get a 0 for those pins. In this setup we only use Pin 7 (H) from first chip and Pin 6 (G) from second chip. When chained... Pin 6 from second chip index position is 14.

STEMKRAF - 74HC165 (Shift Register for 8-bit INPUT)
https://github.com/teaksoon/stemkraf

```
Program: stemkraf_74HC165
  (2/2): test program for 74HC165
       :
       : by TeakSoon Ding for STEMKRAF (NOV-2021)
```

- Upload this program with the Arduino IDE Software
- Open up the Serial Monitor from the Arduino IDE Software
- Watch the Serial Monitor Screen while pressing/releasing the tactile button



Each output is reference by a pin index position(iPos), starting from 0 to 7 for the first chip, second chained chip 8 to 15, third chained chip 16 to 23 and so on...

8-bits for each chip. 1-bit is one index position.

There are 2 main function in this program.

sreg_74hc595_read() - This function will read the state of all the chip input pin and store them in an array

sreg_get_state(iPos) - this function will retrieve the pin index position, state in our array loaded by the sreg73hc165_read() function.

iPos = 0 to ... (max iPos depends on number of chips connected)

This program uses an array of 8-bits (byte), this is to easily manage the chained chips. Each byte in the array is for each Chip. To have more chips, we only need to change #define TOTAL_CHIP

Some of you may be wondering why I did not have any delaymicroseconds() in my code (between the HIGH/LOW). I think they are not necessary. Why ?

The shift register requires less than 30 nano-seconds for state change operating at 5V. We are using the Atmega328 chip with Arduino, which is running at 16Mhz which requires 62.5 nano-second to complete one clock-cycle. To update a Pin state, we will surely need more than one clock cycle, that is more than enough for the 30 nano-seconds shift register.

Since we are using digitalWrite() function, each digital write() function requires 50 clock-cycles, that is more than 3000 nano-seconds.