Project Report

3.1 Power Supply Circuit

I connected the wires between the power and ground rails of the two breadboards in the respective holes as shown in the diagram (Figure 1). This would allow both the breadboards to be supplied with power and the + and – rails of both the breadboards act as power and ground rails respectively when a voltage source is connected to + and – rails of a breadboard.

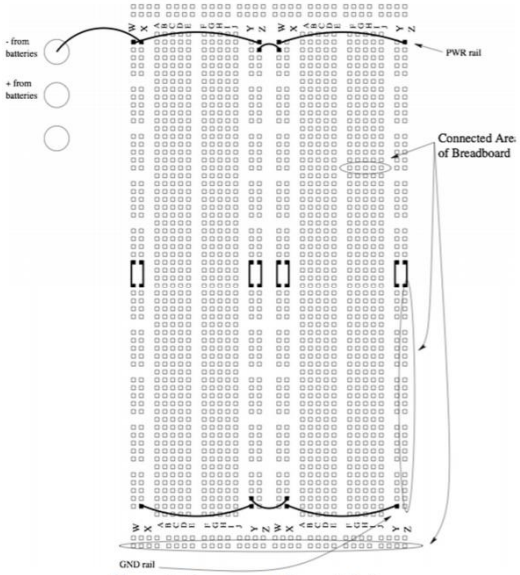


Figure 1: Power and Ground Rails

I then connected a voltage regulator and a capacitor along with the power source on the breadboard as shown in the diagrams below (Figure 2 and Figure 3). I connected it in order to regulate the voltage to 5V as the supply voltage was 6V.

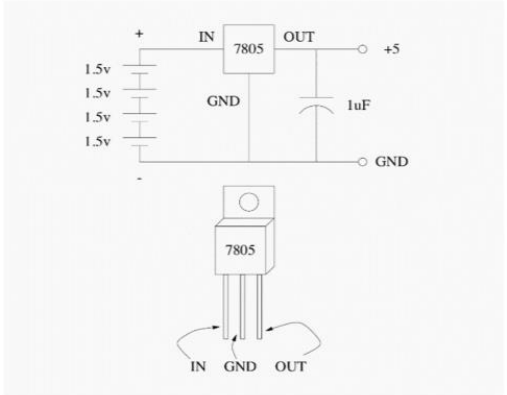


Figure 2: 7805 Voltage Regulator Diagram

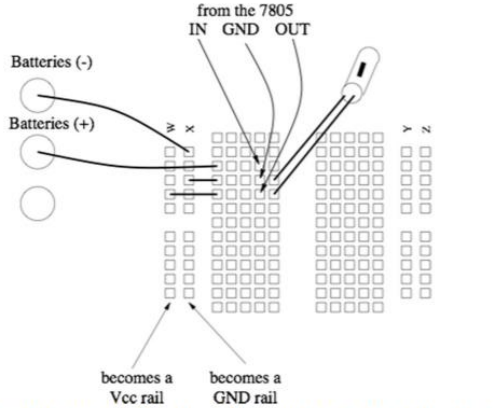
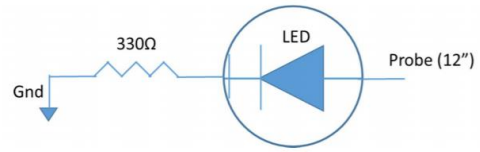


Figure 3: Layout of Voltage Regulator on Breadboard

I then made a probing circuit in order to see if the circuit was functioning properly, the breadboards are connected to each other, power is supplied to both the breadboards etc. I made the circuit as shown below and used the probing wire to test it. When I connected the probing wire to the +5V source, the LED would light up and the LED would be dark if I connected it to the GND.



3.2 Buffered LED Indicators

I then set up the Buffered LED indicators circuit as shown in Figure 5 in order to check the outputs. The circle represents LEDs where the long lead is connected to the Vcc rails. The chip is 74LS05, a hex inverter.

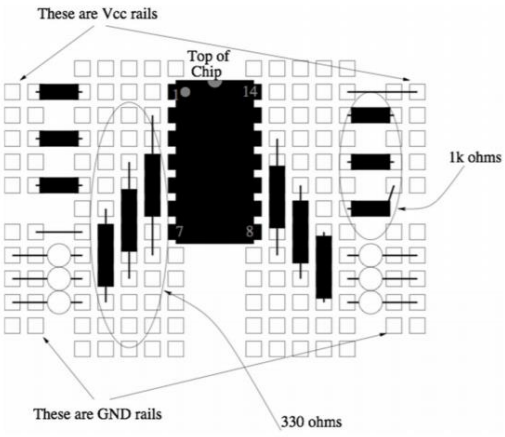


Figure 5: LED Setup on the Breadboard

The functioning of the Buffered LED indicators circuit for different input values works based on the circuit diagram (Figure 4) given below.

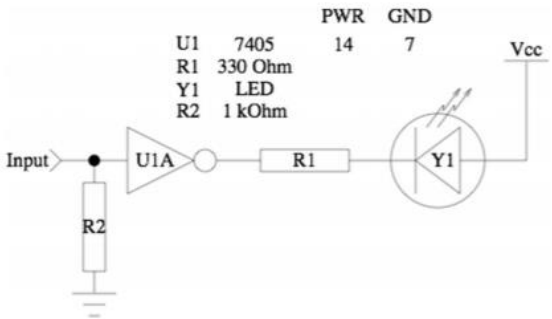
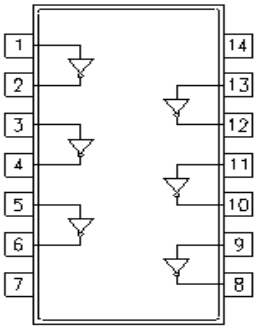


Figure 4: Buffered LED Indicators

I then tested each LED by connecting a wire from the IC input pin to +5V and to GND. The LED turned on when connected to +5V, and turned off when connected to GND. I used the datasheet below to refer to which pins were the input pins and which were the corresponding output pins.



AD2 Push Button	IC Pin	Matching AD2 LED	IC Pin
DIO-7	1	DIO-8	2
DIO-9	3	DIO-10	4
DIO-11	5	DIO-12	6

Table 2: Static I/O Probe to Pin Mapping to Three LEDs

I then connected DIOs 7,9 and 11 as inputs to the IC and 8,10 and 12 to the output pins of the IC as shown in the table above and figure below. I configured the respective DIOs as push buttons and LEDs in Static I/O.

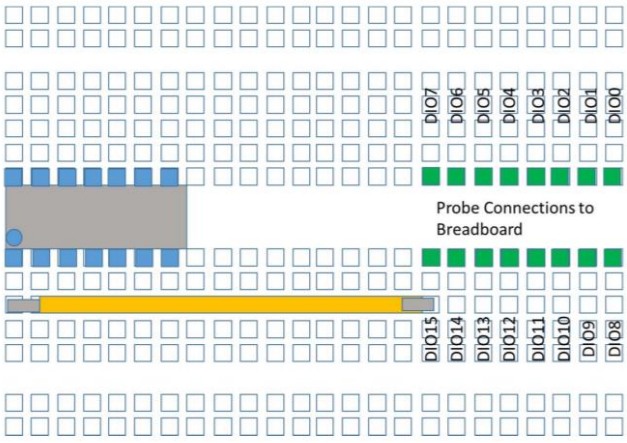
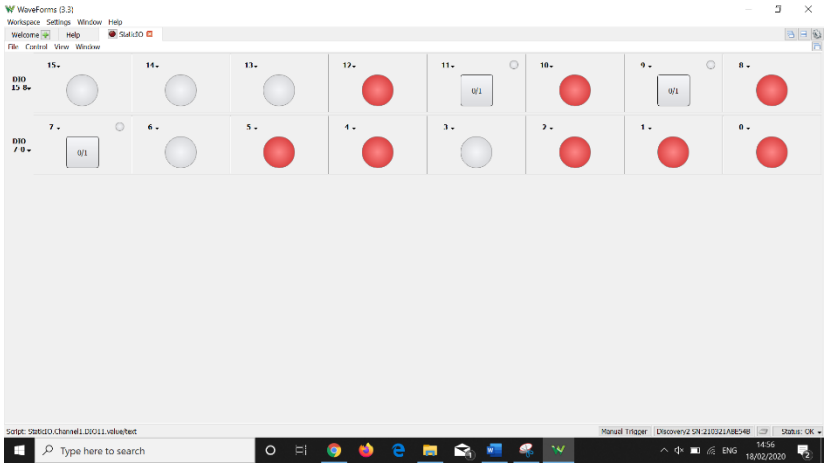
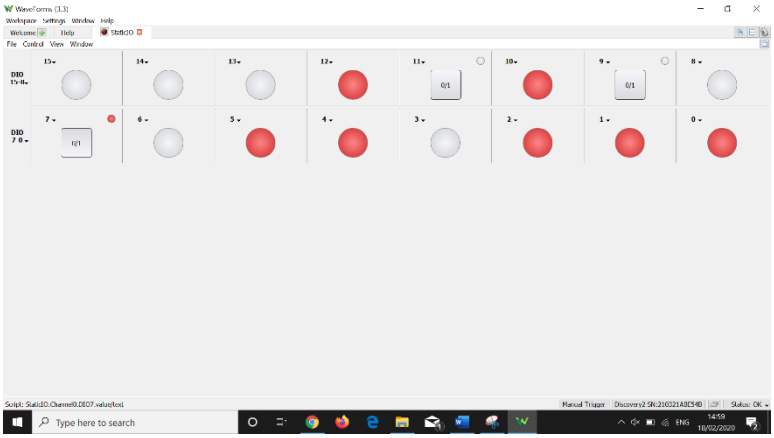


Figure 5b. Top View of Breadboard showing connections between IC circuits and AD2 Pod Connections. Only one connection wire is shown for clarity.

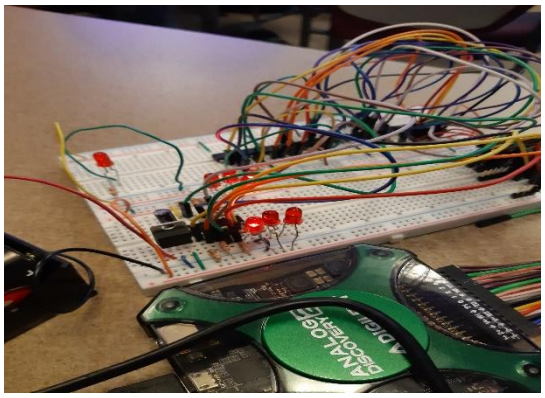
I then tested whether the LEDs on the left were working using AD2 and Static I/O in Waveforms. I connected the GND lead of the AD2 to the breadboard.



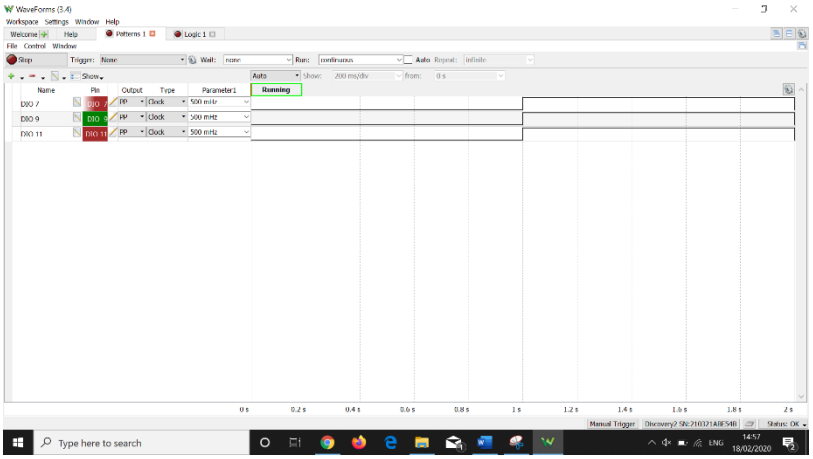
All LEDs are OFF (8,10,12)



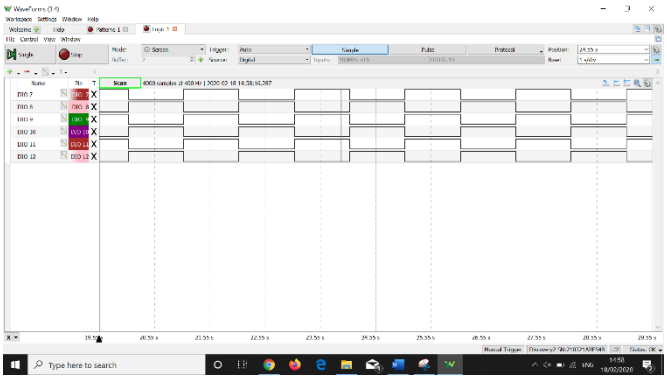
LED output connected to DIO-8 is ON and can be seen in circuit below



I then used the Pattern Generator and Logic Analyser to capture inputs and outputs as shown below.



Pattern Generator



Logic Analyser

4. Combinational Logic Circuits

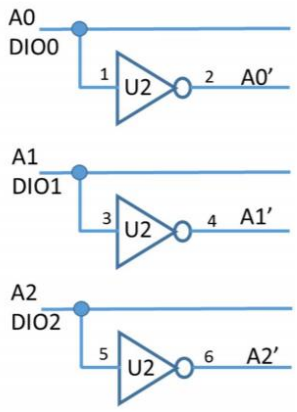
Below are the required inputs and corresponding outputs

A2	A1	A0	F2	F1	F0
0	0	0	0	1	1
0	0	1	0	0	1
0	1	0	0	0	0
0	1	1	1	0	0
1	0	0	0	1	0
1	0	1	1	1	0
1	1	0	1	1	1
1	1	1	0	1	1

Table 3: Truth Table

Setting up inverted signals

I set up the circuit as shown below using 7404 inverter(U2). This would provide inverted inputs along with the positive inputs to the circuit.



Circuit F2

I made the first circuit as shown below using two 7410 ICs(U3 and U4). Attached F2 to the first LED input and to the AD2 Probe DIO-6.

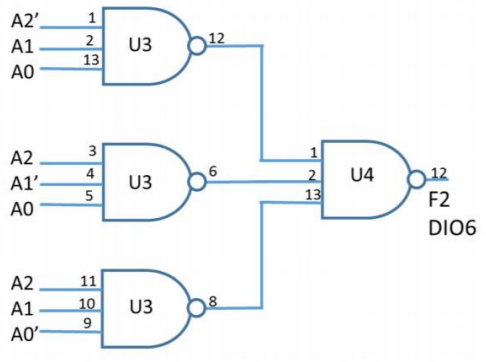


Figure 11: Circuit F_2

Circuit F1

I made the next circuit as shown below using 7408(U5) and 7432(U6). Attached F1 to the second LED input and to the AD2 Probe DIO-5.

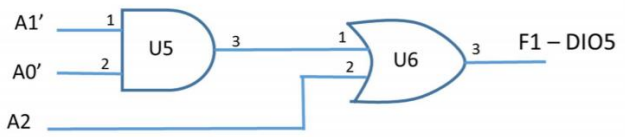


Figure 12: Circuit F_1

Circuit F0

I made the final circuit as shown below using the same 7408(U5) and 7432(U6) used in the circuit above. Attached F0 to the third LED input and to the AD2 Probe DIO-4.

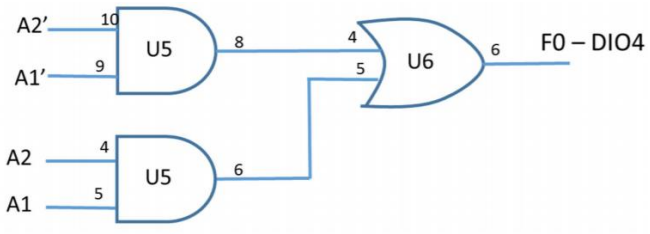
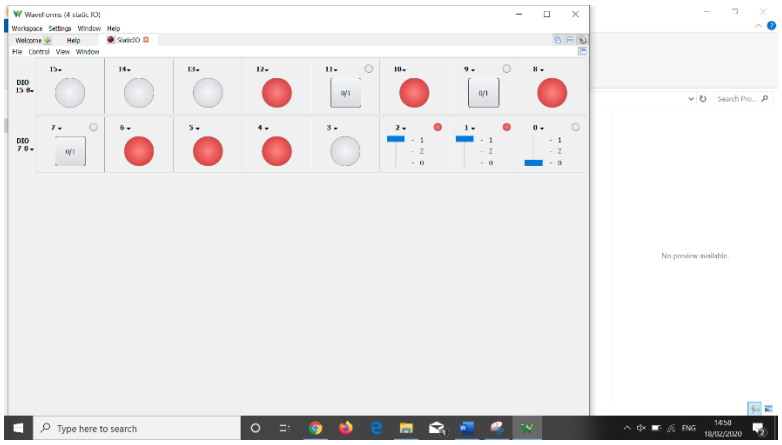
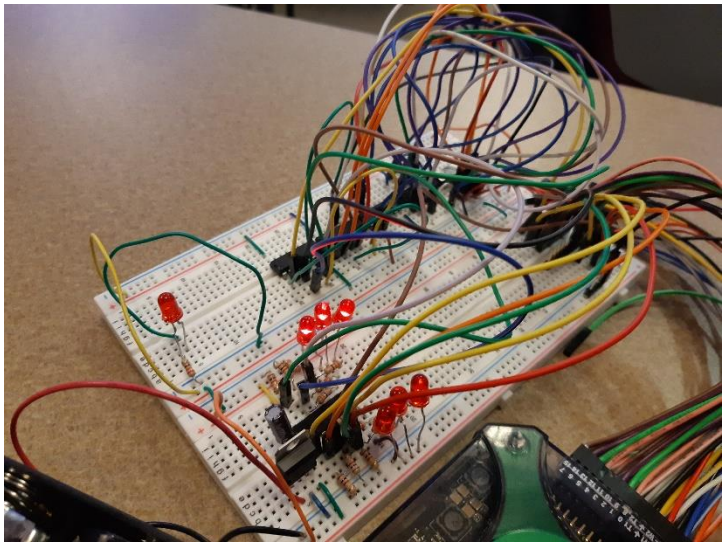


Figure 13: Circuit F_0

I then used Static I/O in Waveforms to monitor the outputs of the F0,F1 and F2 circuits by providing high/low level inputs.

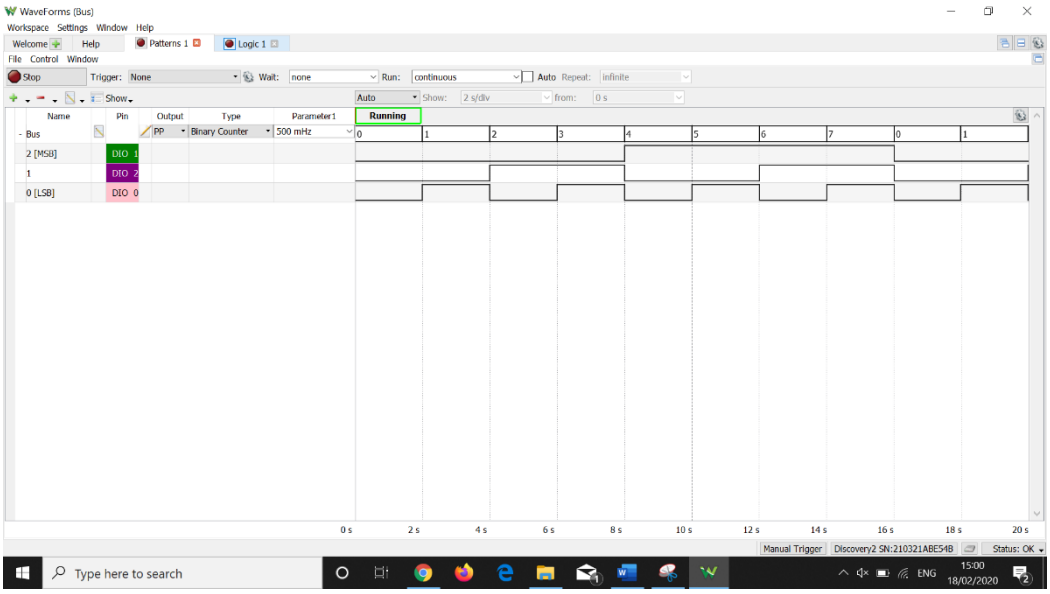


LEDs whose outputs are connected to DIOs 4,5,6 all glow for the output 110 as given in the truth table (Table 3)

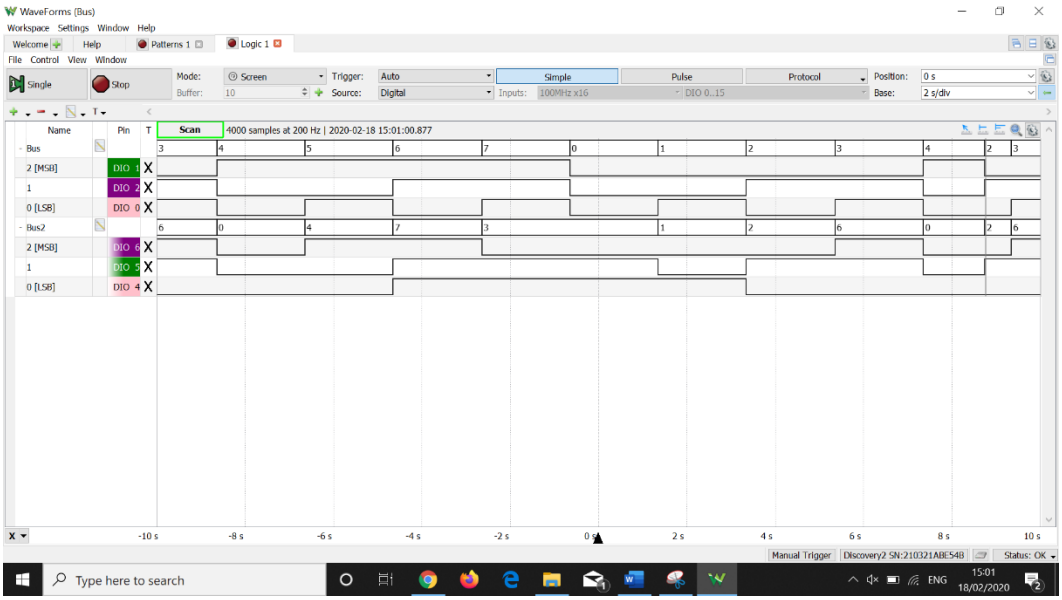


5.0 Bus

I used the Pattern Generator and Logic Analyser to create a bus for inputs and outputs to generate and capture their behaviour.



Pattern Generator



Logic Analyser

Final Circuit