Adaptive Traffic Control System: “SmartLights”

Project from group 6

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The “N” Way Lane

+This is the modelling for an adaptive traffic control

+This algorithm can be adapted for much complex scenarios and multiple lanes

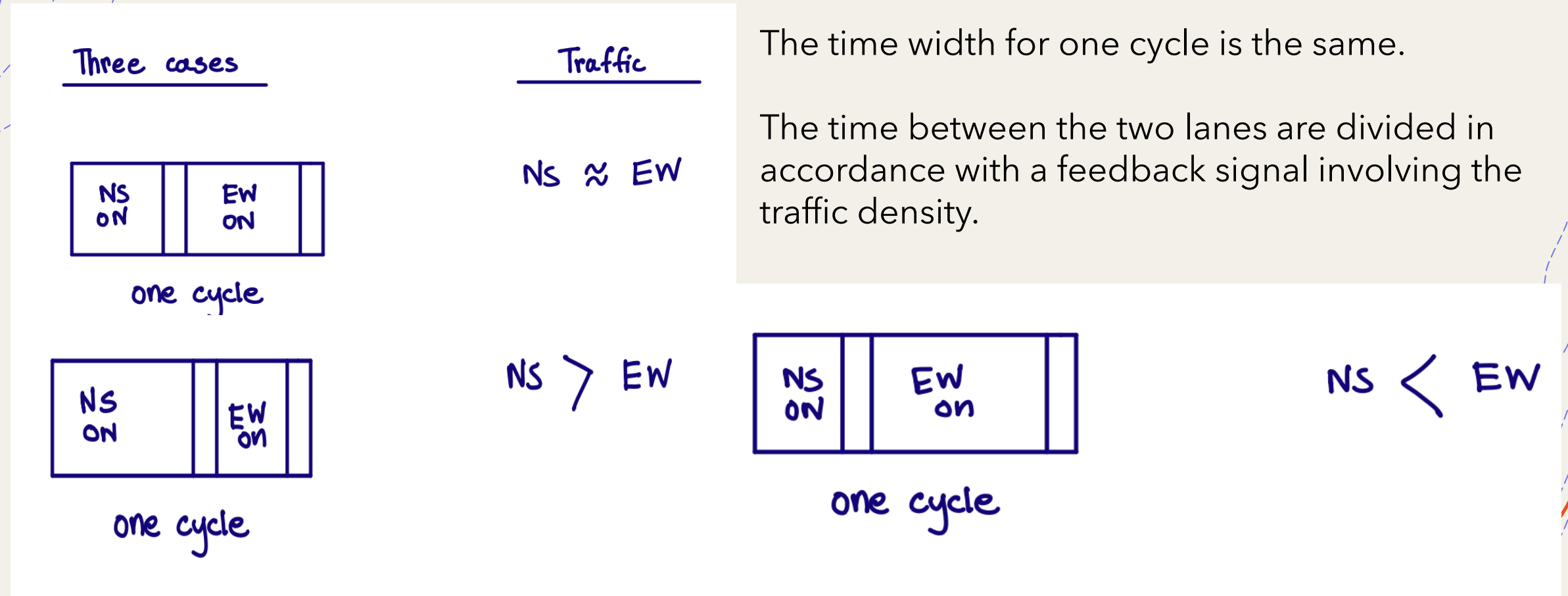
Traffic 101

The basic goal of our control is simple

1. To have a feedback from the traffic density .
2. Then use it to change the duration for which the lanes are on and off.
3. For our project we use a two-way lane NS and EW.

In short, an algorithm that is truly adaptive

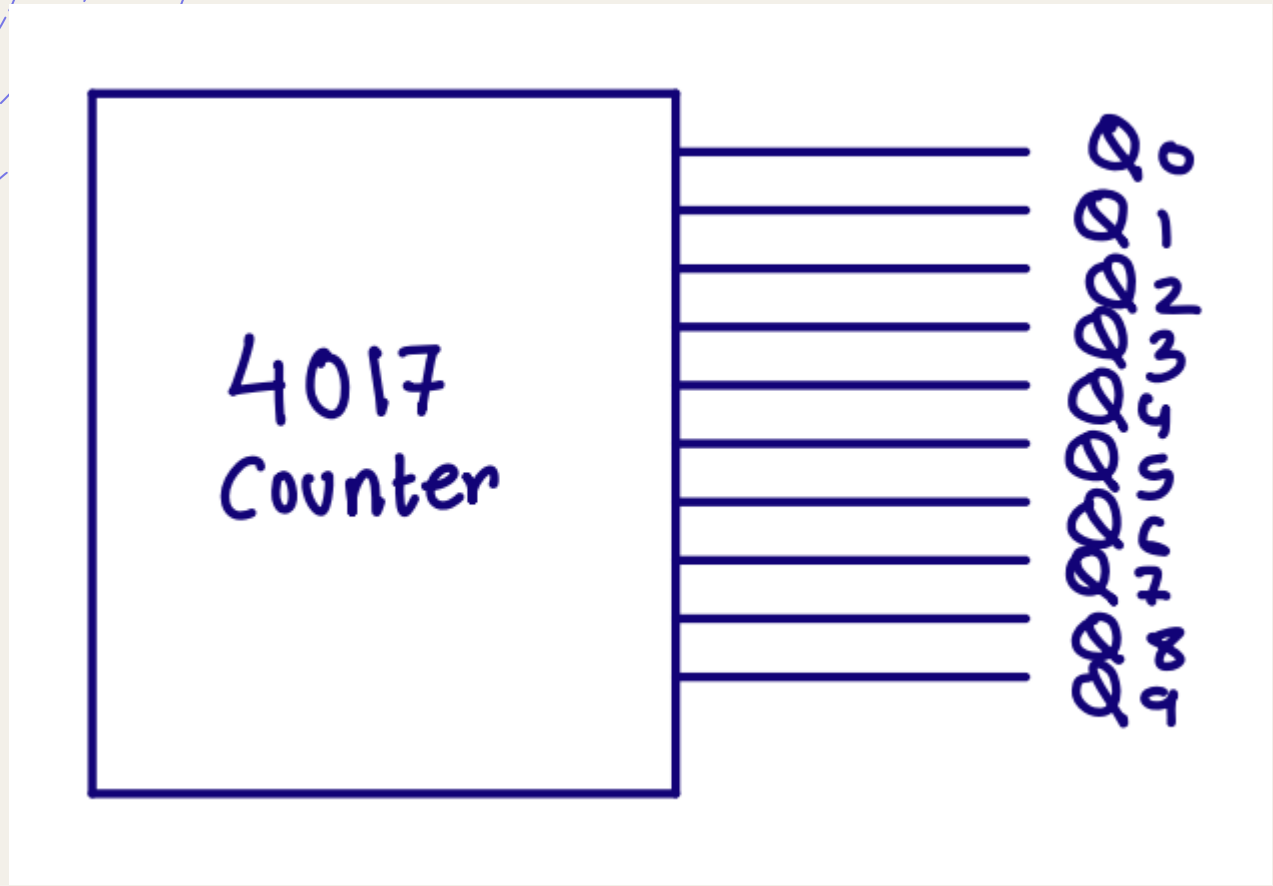
Development of the Algorithm



The time width for one cycle is the same.

The time between the two lanes are divided in accordance with a feedback signal involving the traffic density.

The Tick Tock

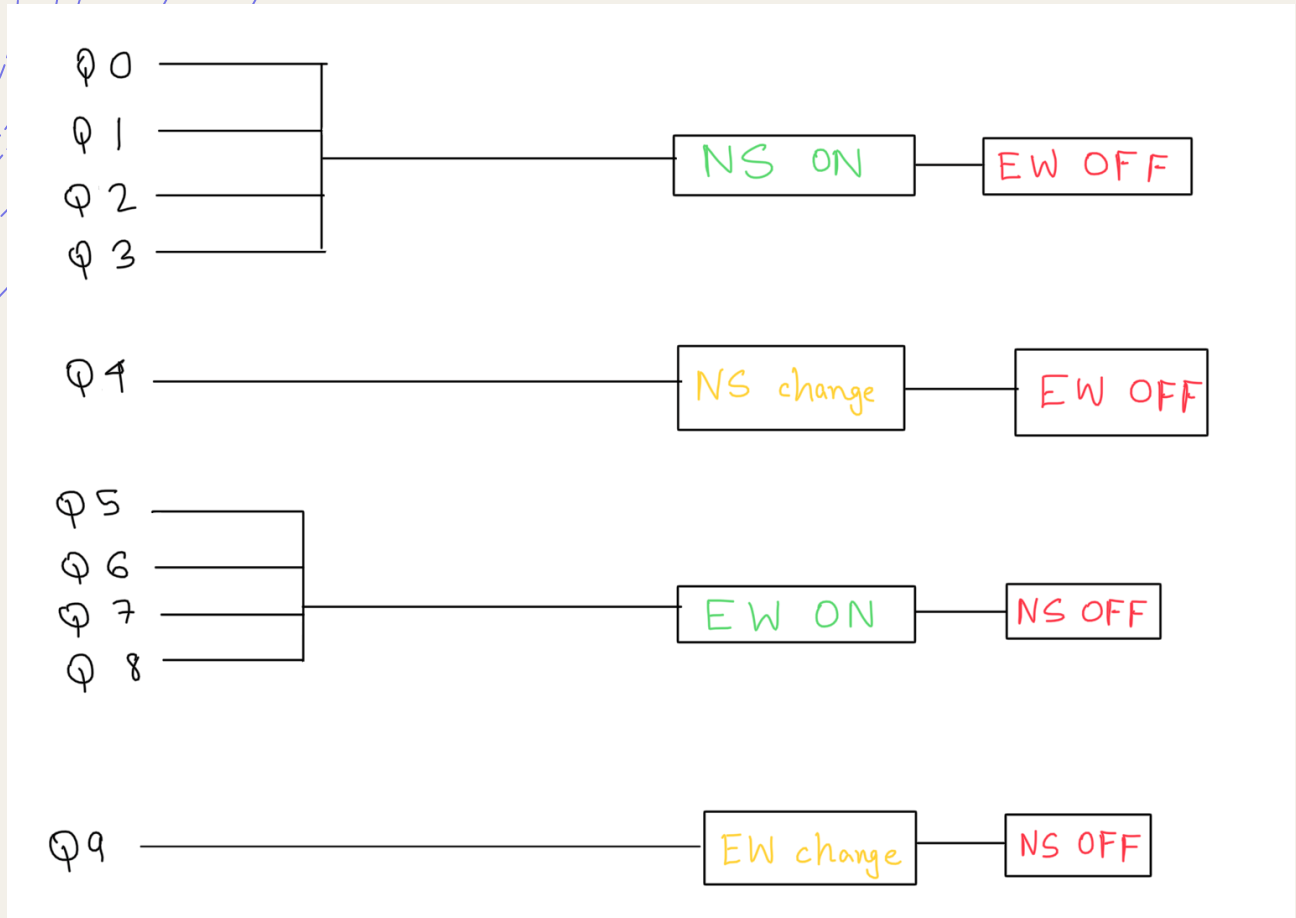


The heart of our circuit involves the counter 4017.

Q0 to Q9 is our one cycle.

We divided this each period's time into EW and NS lanes.

The normal operation



This is the operation of the circuit when the traffic is constant.

Notice the pins Q0,1,2,3 are keeping NS lane on

Q4 transition

Next Q5,6,7,8 are keeping the EW lane on

Q9 transition

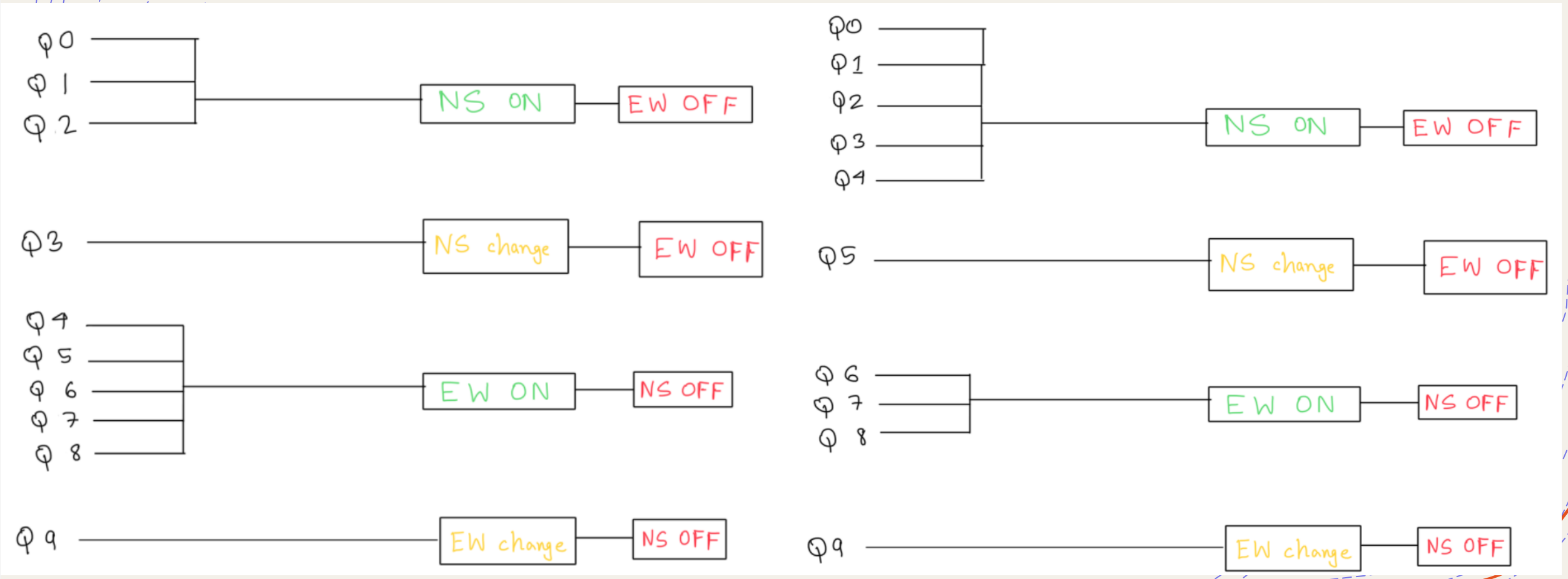
The smart pins and... the pins

Notice the change in position of the pins 3, 4, 5. In the next two cases

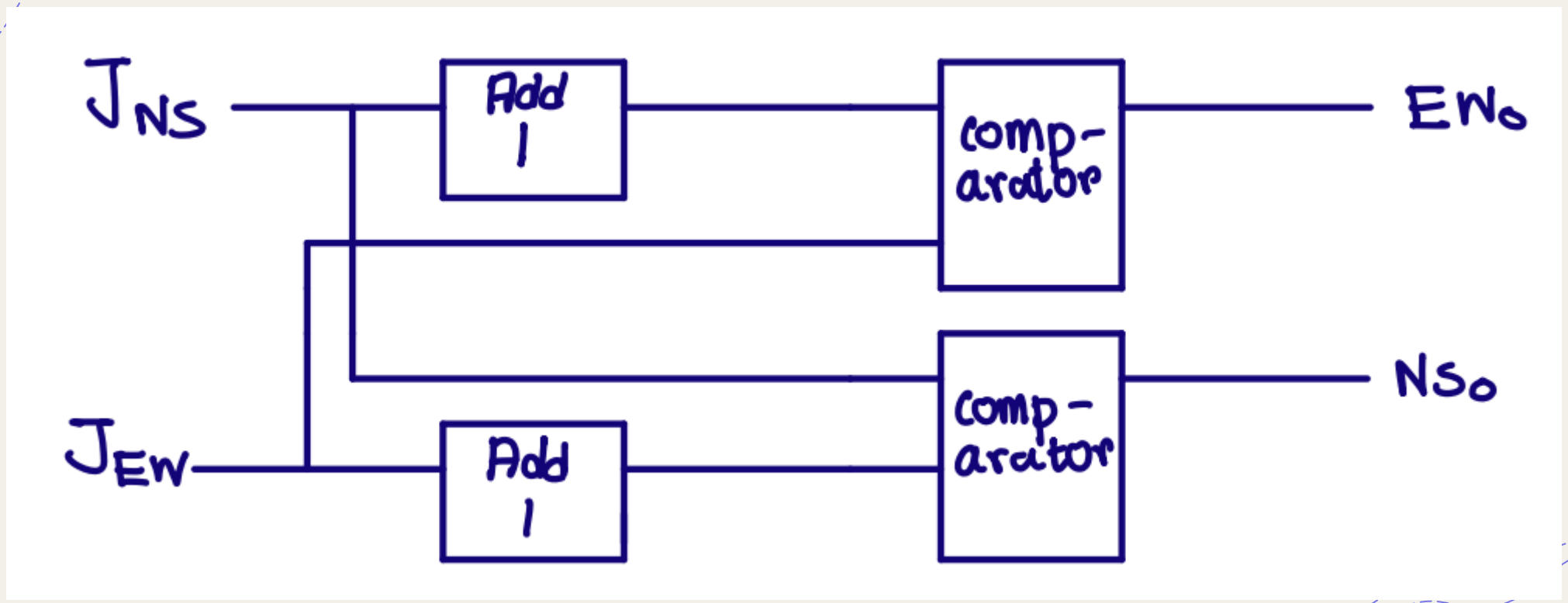
Pin 3, 4, 5 are our smart pins which will change position in accordance with the density of traffic.

The other pins are static, and they remain in the same place regardless of the feedback.

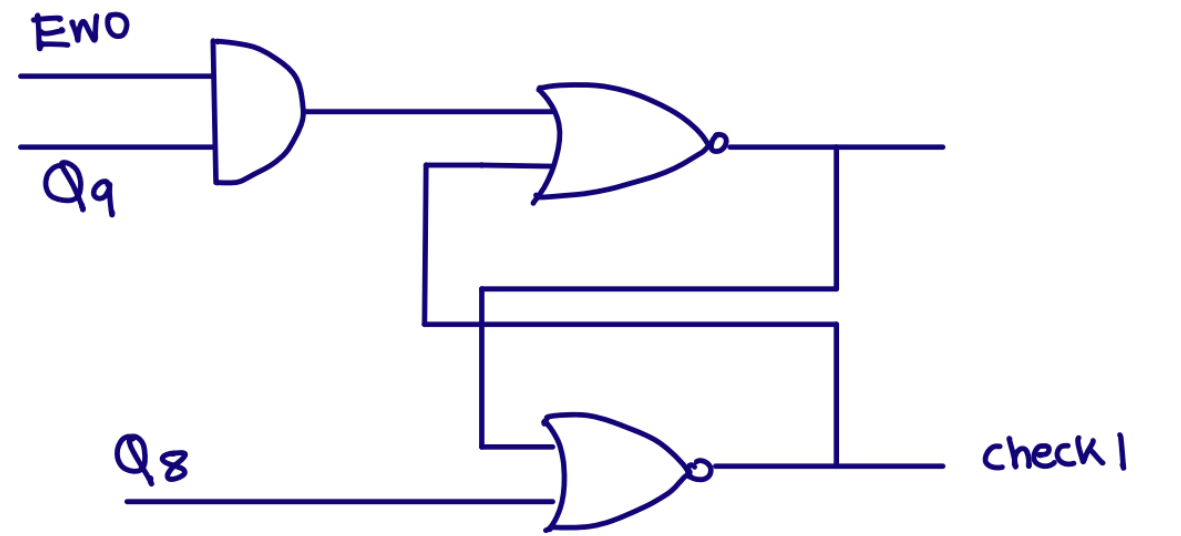
Adaptive!


Q0
Q1
Q2
NS ON
EW OFF
Q3
NS change
EW OFF
Q4
Q5
Q6
Q7
Q8
EW ON
NS OFF
Q9
EW change
NS OFF
Q0
Q1
Q2
Q3
Q4
NS ON
EW OFF
Q5
NS change
EW OFF
Q6
Q7
Q8
EW ON
NS OFF
Q9
EW change
NS OFF

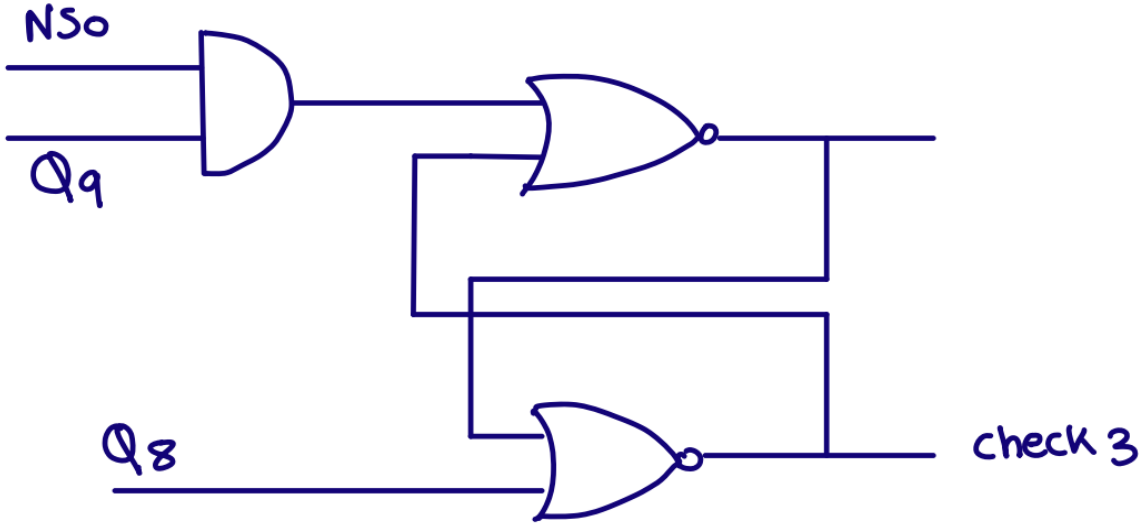
The comparator to find the relative traffic density



The Multipurpose Q9, Q8



Check 1 is latched at if EWo is 1 at clock pulse9



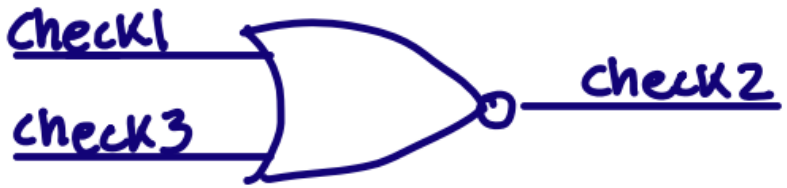
Check 3 is latched at if NSo is 1 at clock pulse9

+Q9 check the lane densities

+Q8 resets in the next cycle ready for Q9 to take the new values

The default

Basic

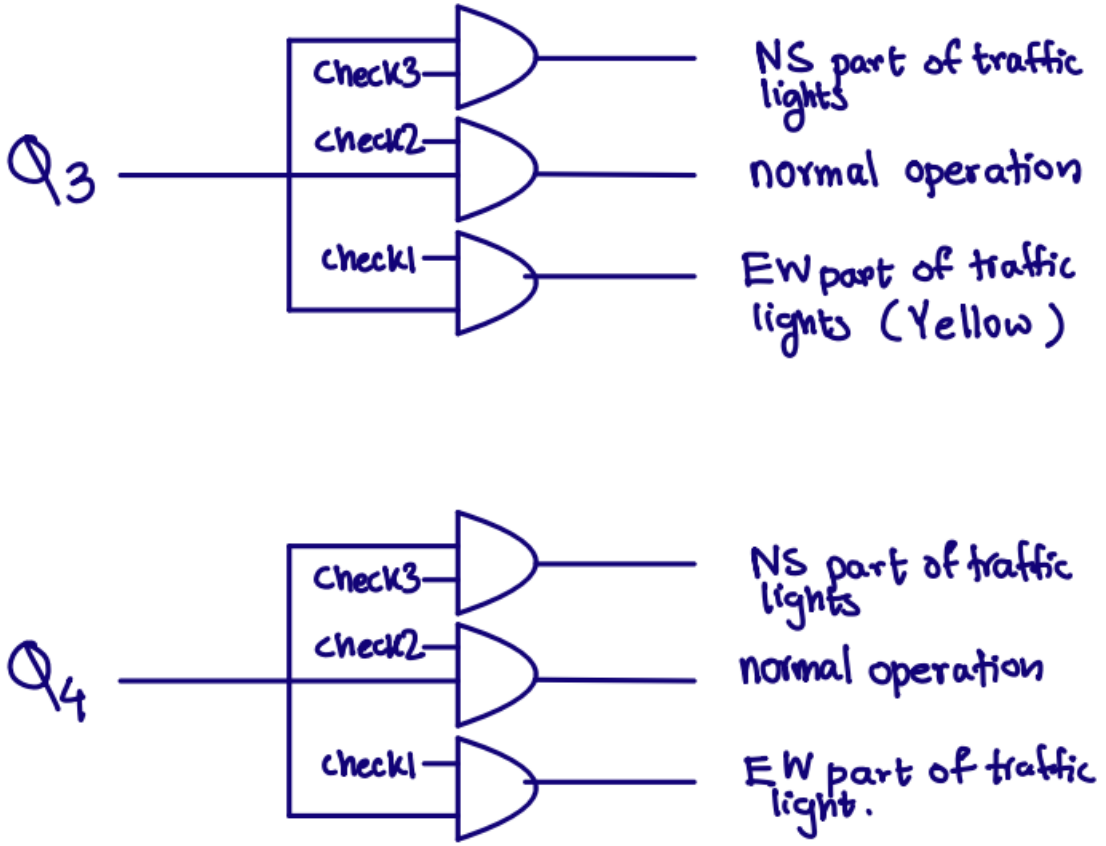


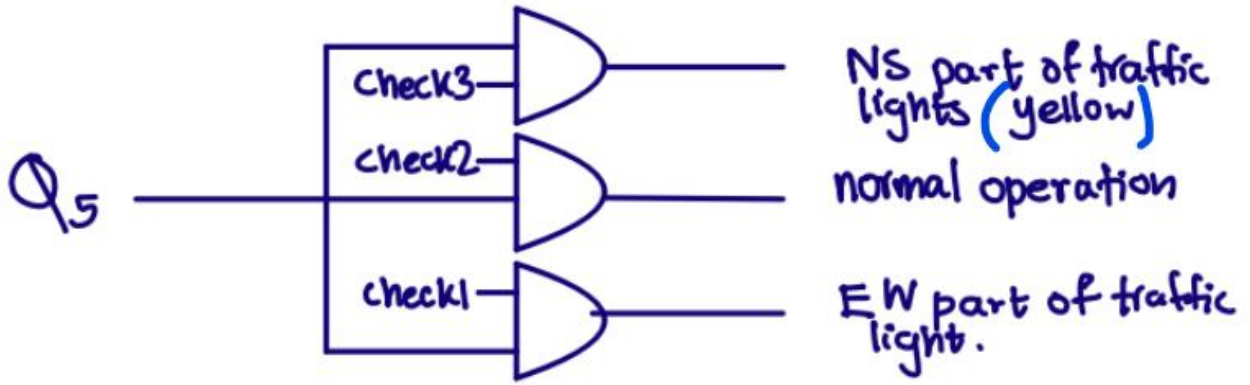
When
$NS_0 \approx EW_0$

At Q_9 we check the condition of traffic.

Q_8 after one full cycle unlatches the check 1 and check3.

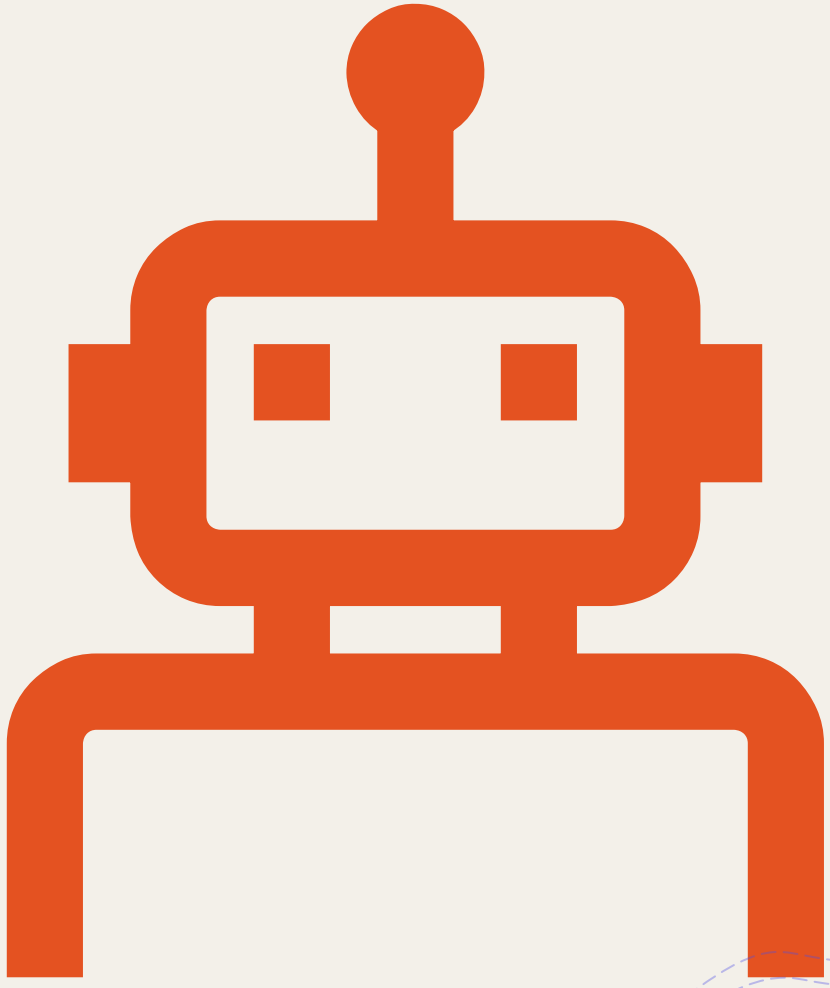
Finally, the check 1,2,3 controls our “smart” switches



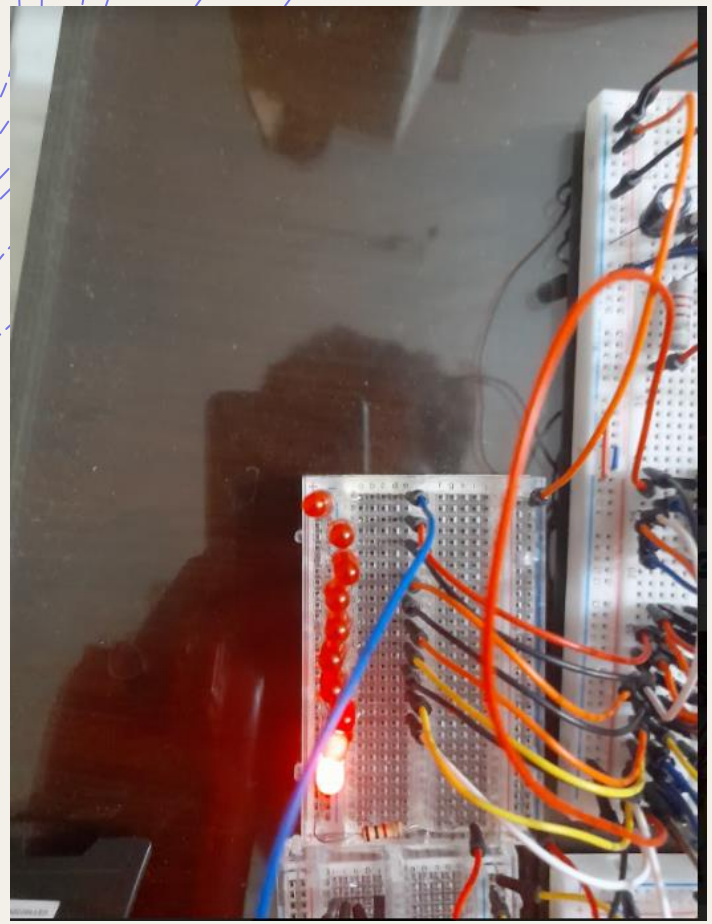


The Q3,4,5 are hence controlled by the checks to take them to their desired output.

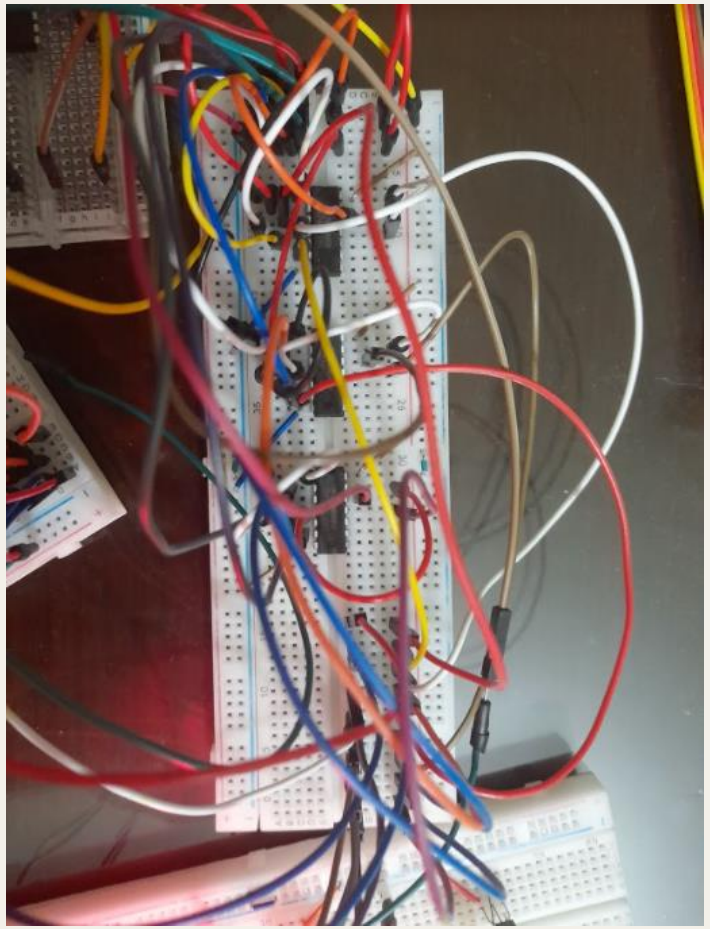
The “SmartLights” Simulation!



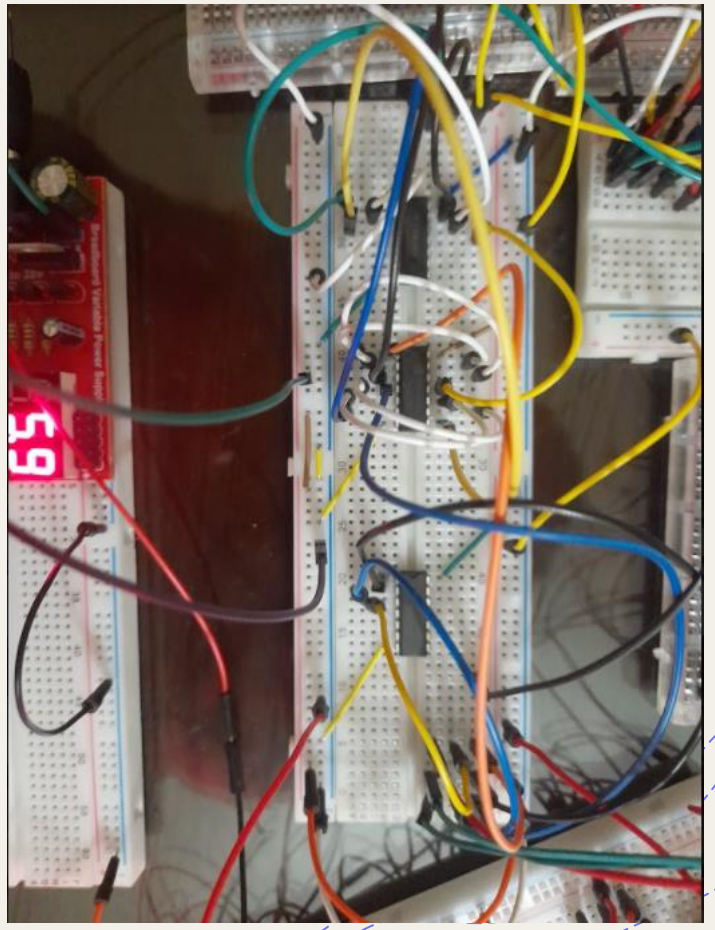
Messy Hardware!



Countdown timer output



2 stage AND chain



Latch case controll


Messier!
Let us just cut to the video