• FSM (in Our Project)

a) Initialisation :- 'state_idle'

b) state_idle :- FSM waits for the 'start_measurement'

c) Trigger STATE :- * After signal measurement,
* Activates 'sensor_trigger' output signal - initializes the ultrasonic sensor
* Counts the clock cycles until the trigger pulse duration is reached. (COUNT_TRIGGER_PULSE)

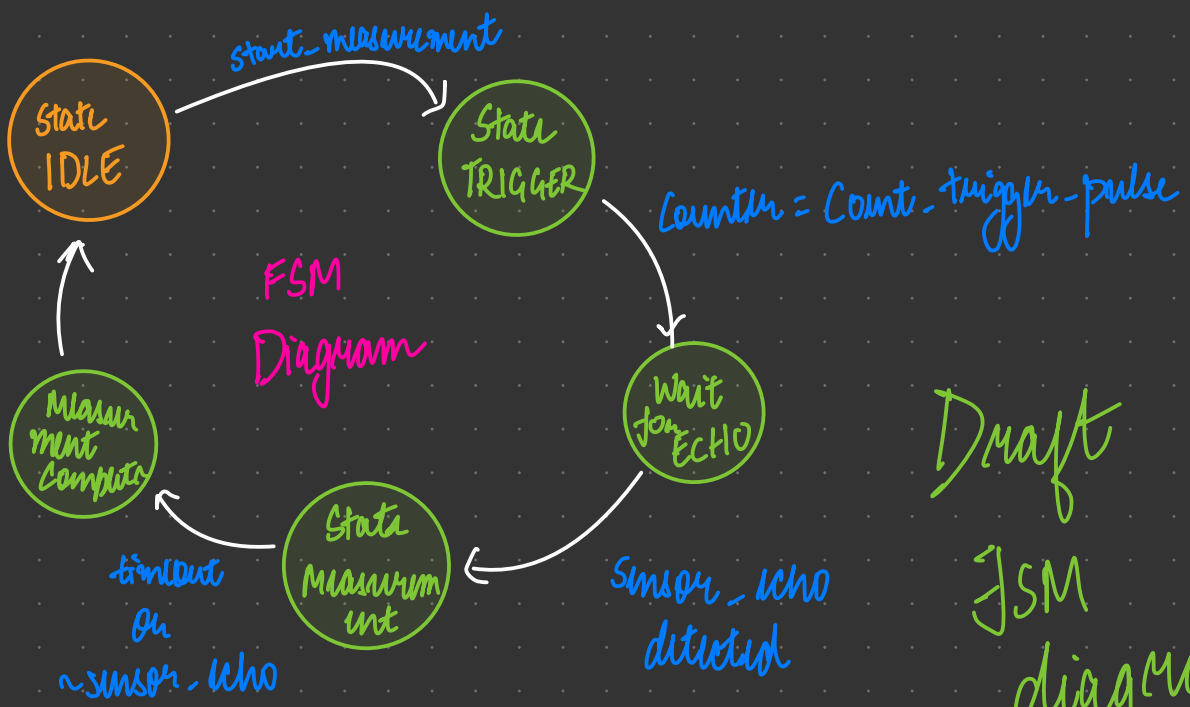
d) STATE_WAIT_FOR_ECHO :-
*After sending Trigger pulse
↳ Waits for the (SENSOR_ECHO) signal. (Return of ultrasonic signal)
↳ When sensor_echo is detected measurement state.

e) MEASUREMENT State :- 'State_Measurement'
* FSM measure the time taken for the ultra-sonic signal to travel (from target & back)
* Increments counter on each clock cycle.
* When 'Count_Timout' occurs / 'sensor_echo' goes down

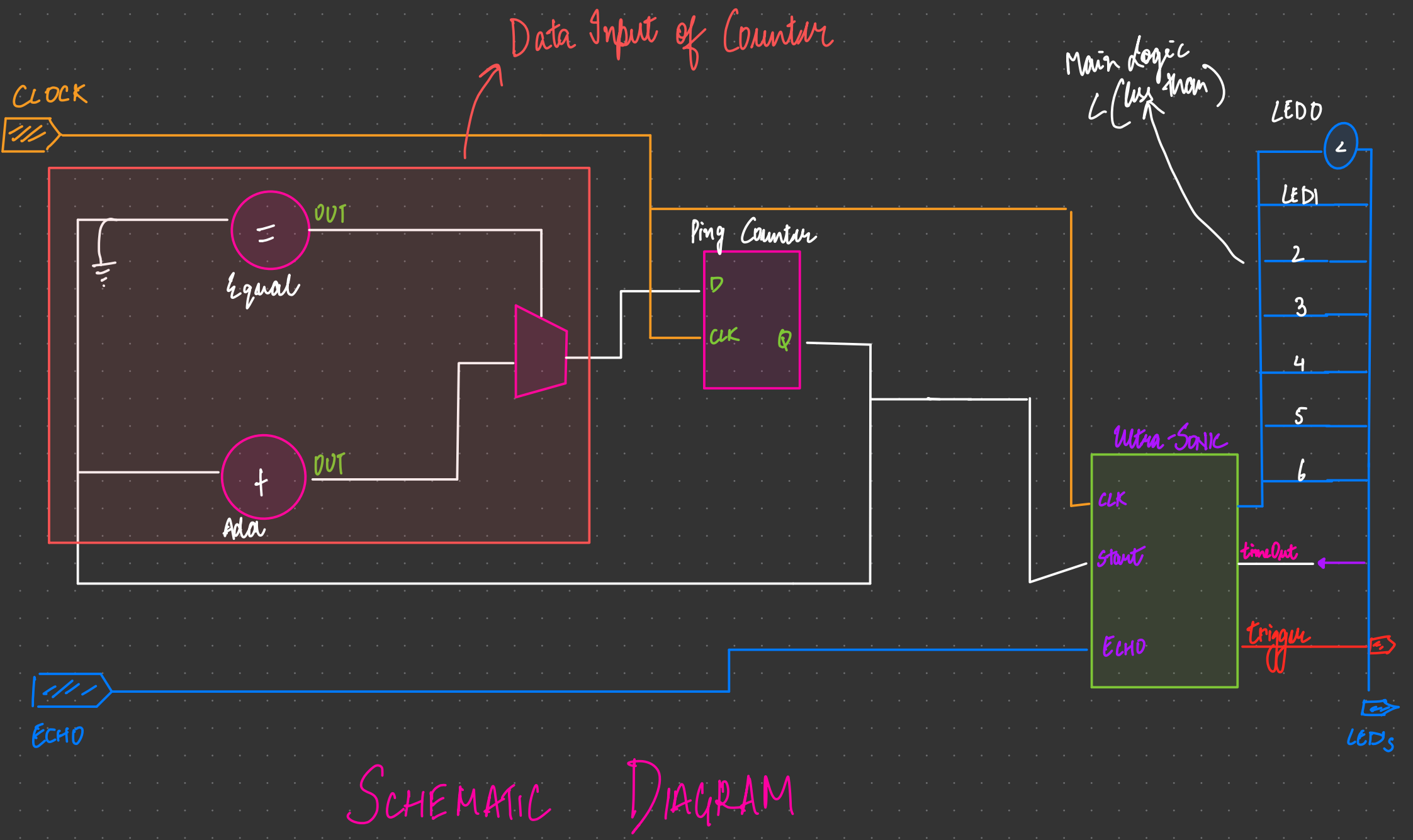
d) Measurement Complete state :-
* Completes the measurement
* Counter value is captured as 'counter_captured' ← time taken.
* Resets the counter & returns to idle state.

- FSM TABLE :-

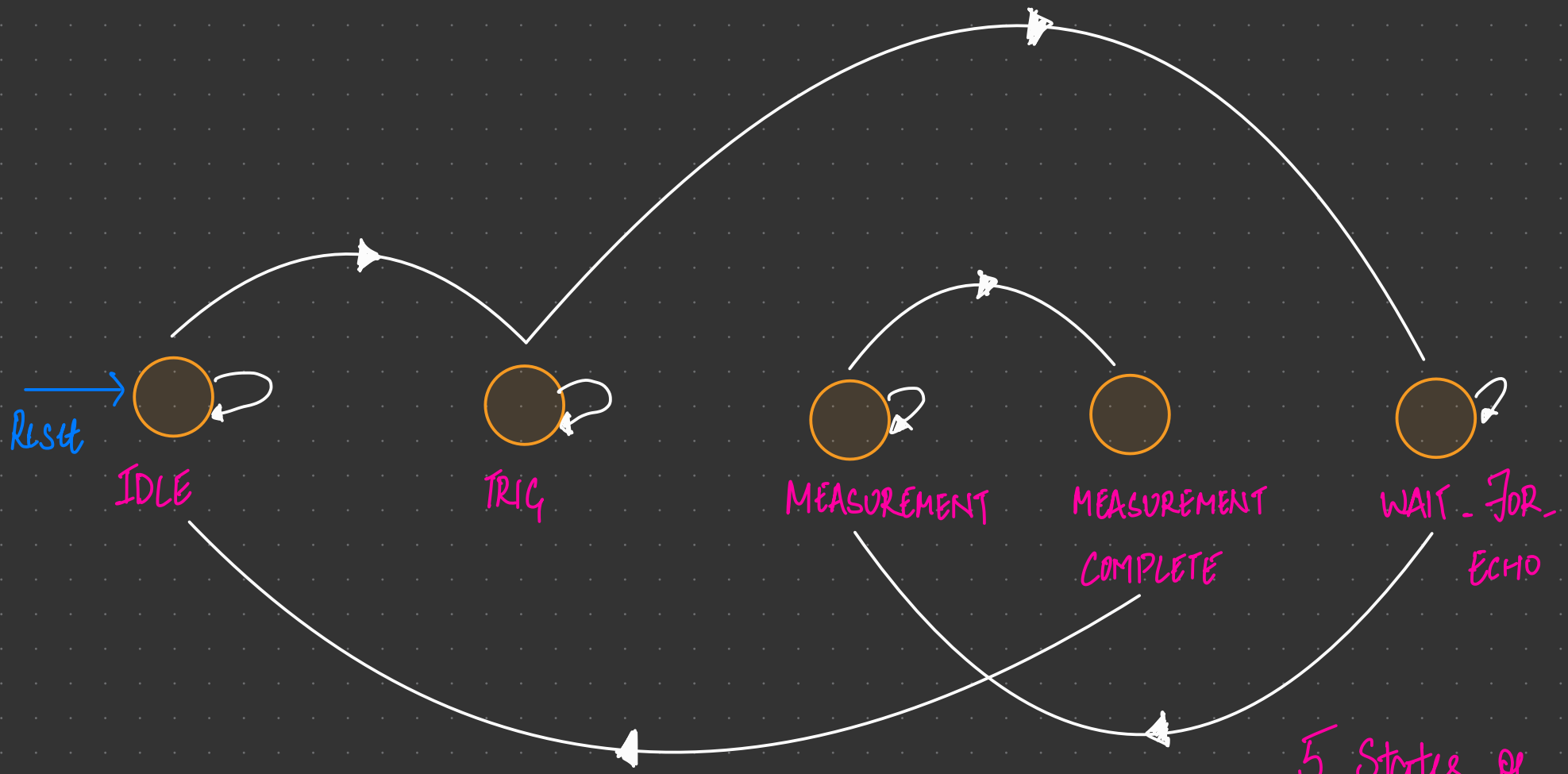
Current State	Input/Condition	Next State	Output Actions
STATE_IDLE	start_measurement asserted	STATE_TRIGGER	Activate `sensor_trigger` to initiate measurement.
STATE_TRIGGER	Counter reaches COUNT_TRIGGER_PULSE	STATE_WAIT_FOR_ECHO	Continue waiting for `sensor_echo`.
STATE_WAIT_FOR_ECHO	sensor_echo detected	STATE_MEASUREMENT	Begin distance measurement.
STATE_MEASUREMENT	Timeout or (~sensor_echo)	STATE_MEASUREMENT_COMPLETE	Measurement complete; capture measurement.
STATE_MEASUREMENT_COMPLETE	N/A	STATE_IDLE	Reset for the next measurement cycle.



Draft FSM diagram



SCHEMATIC DIAGRAM



FSM - DIAGRAM

Final

5 States of Ultra Sonic Sensor