Midterm

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ENCM 511

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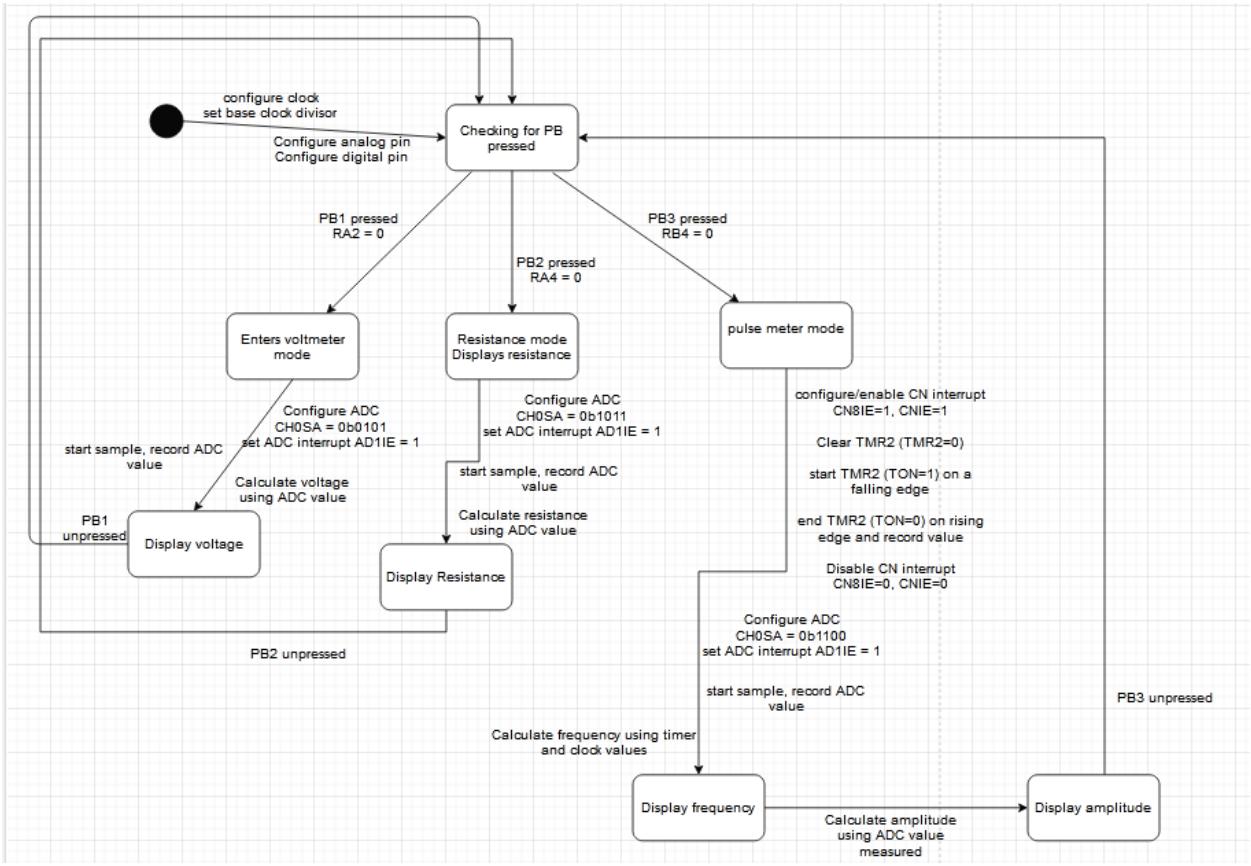
State diagram:



Formulas used:

Voltage:

$v = ADCvalue * V_{resolution}$ where $V_{resolution} = \frac{V_{ref}}{2^N - 1}$ and $N = 10$ and $V_{ref} = 3.25V$

Resistance:

$$R = R_{ref} * \frac{ADCvalue}{(2^N - 1) - ADCvalue}$$ where $R_{ref} = 1000\Omega$ and $N = 10$

Amplitude:

$A = ADCvalue * V_{resolution}$ where $V_{resolution} = \frac{V_{ref}}{2^N - 1}$ and $N = 10$ and $V_{ref} = 3.25V$

ADCvalue is measured on a rising edge.

Frequency:

$$t = \frac{tmr * 2}{clk}$$ $tmr =$ timer measured, $clk =$ clock value (kHz)

$$f = \frac{1}{2t}$$

$$f = \frac{clk}{tmr * 4}$$

Max/Min limits of resistance and voltage for our project:

Theoretically, the resistance range that can be measured is [0, 10k], since this is the range of the potentiometer. Also theoretically, the voltage range is [0, 3.25 V], since we're powering the PIC with 3.25 V. Of course, the real parameters measured are slightly off, but close to those stated above.

For mathematical formulas used in determining the pulse frequency (and the amplitude) please refer back to page 3

List of tasks:

Ruha – programming, testing, video demonstration

Jiho – programming, testing, state diagram, final report

Mehdi – programming, testing

Note: All testing and programming was done as a group through a virtual Zoom call due to COVID-19.