1. Colpitts Oscillator

1k

to pin RB13

1k

10nF   10nF

≥?

91.774 V
wire

3.3 V
wire

t = 215.255 ms
time step = 5 μs

1.1 schematic of the oscillator

5 V
gnd
1K
resistor
0.33μFC
mosfets
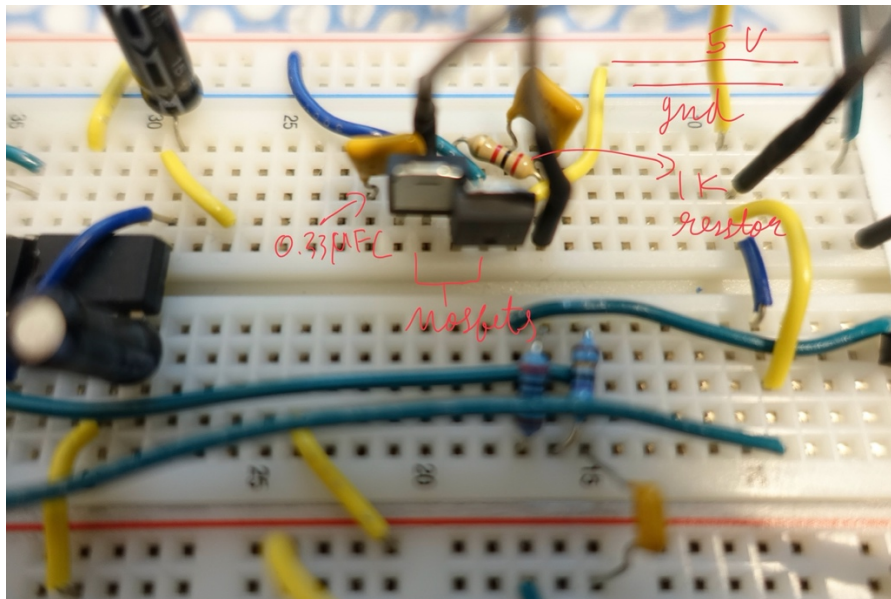
1.1 breadboard closeup of the circuit

2.sensor coil

input model
Noise

40Hz

40 20

1H 10µF 1µF

reciver coil **Low pass filter**

op07cp

100k

390

3.3v

1k

to pin RB5

LM339n

21.987 mV
wire

20.542 mV
wire

5.274 V
wire

3.3 V
wire

t = 1.877 s
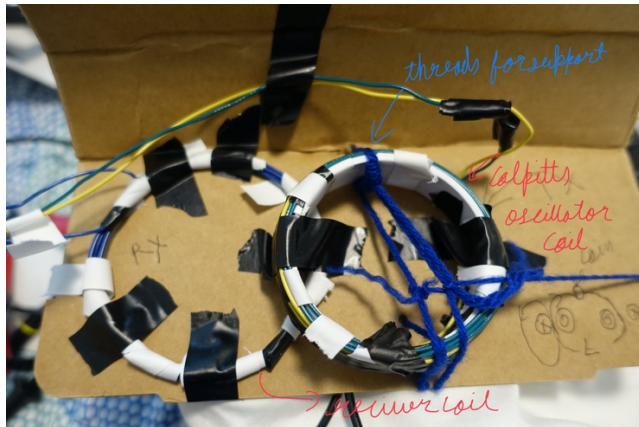time step = 5 µs
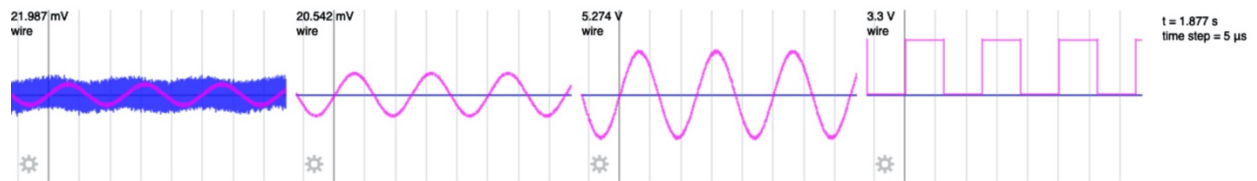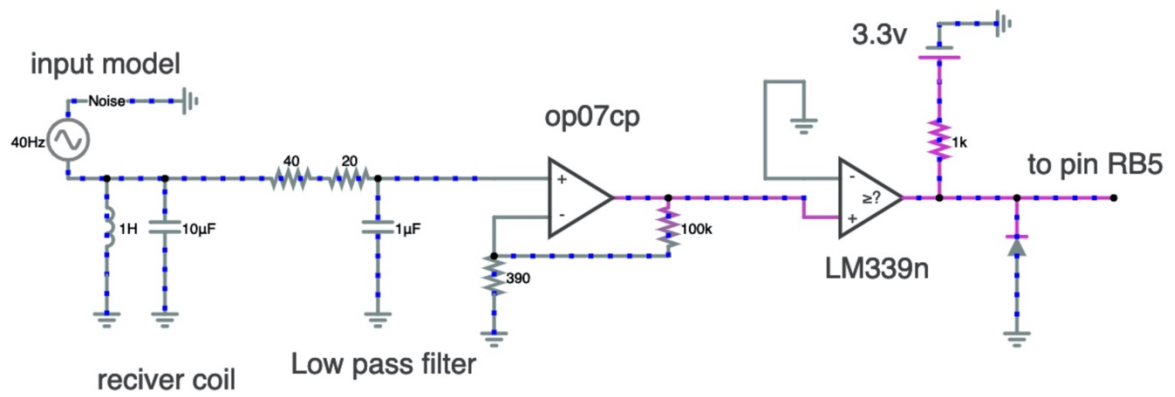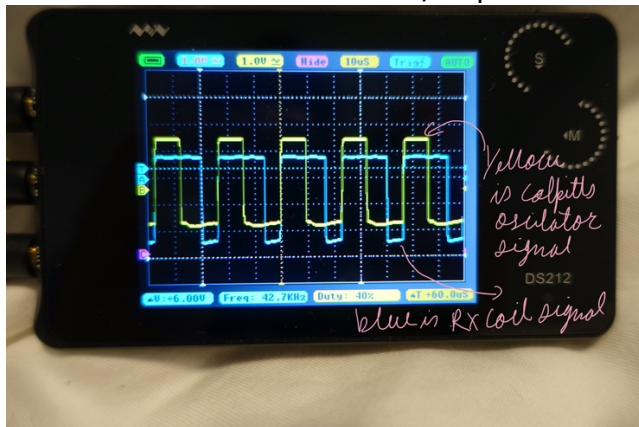
2.1 sensor coil schematic
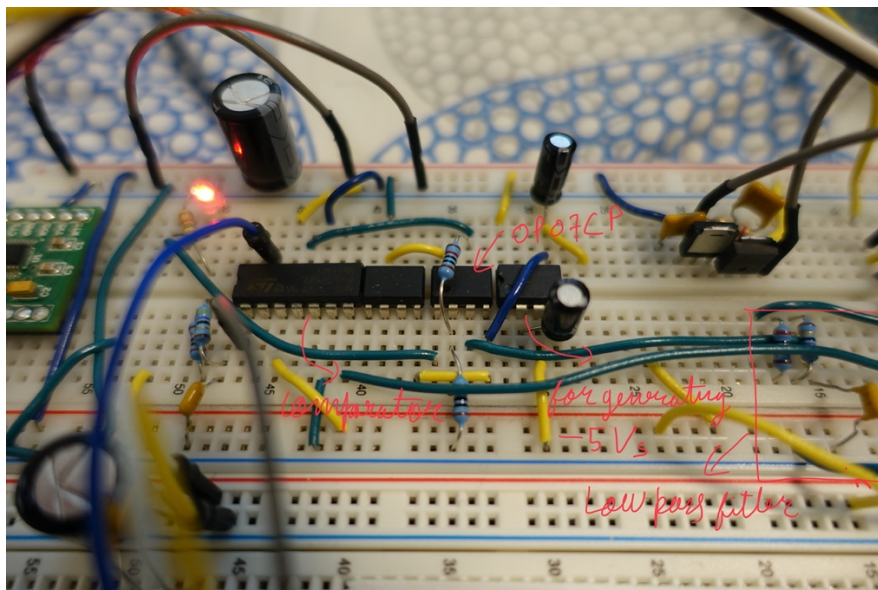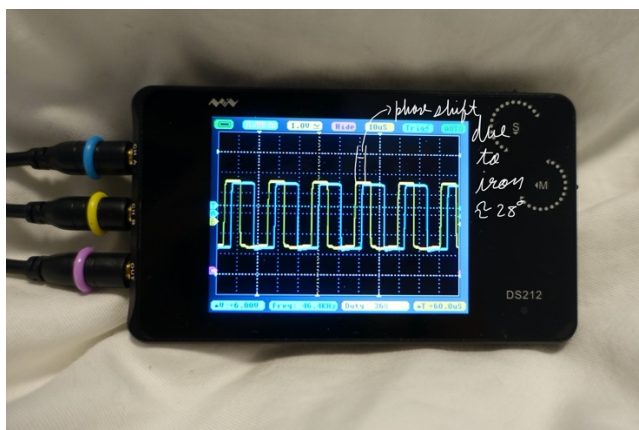

2.1 closeup of the circuit

3. inductor coils

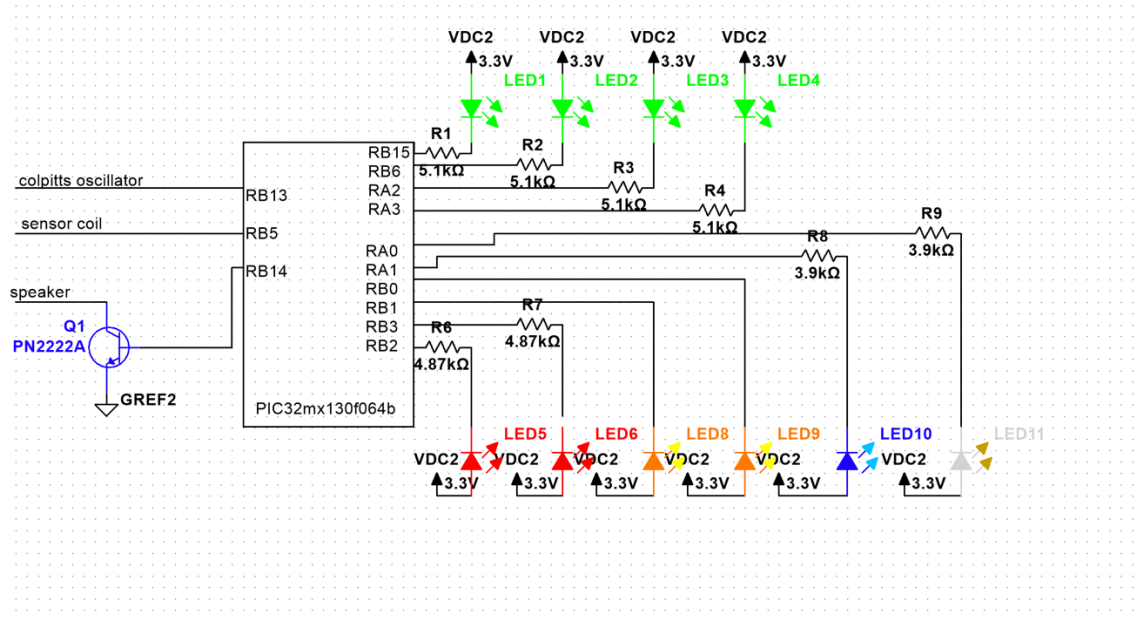3.1 receiver and transmitter coil/Colpitts oscillator coil
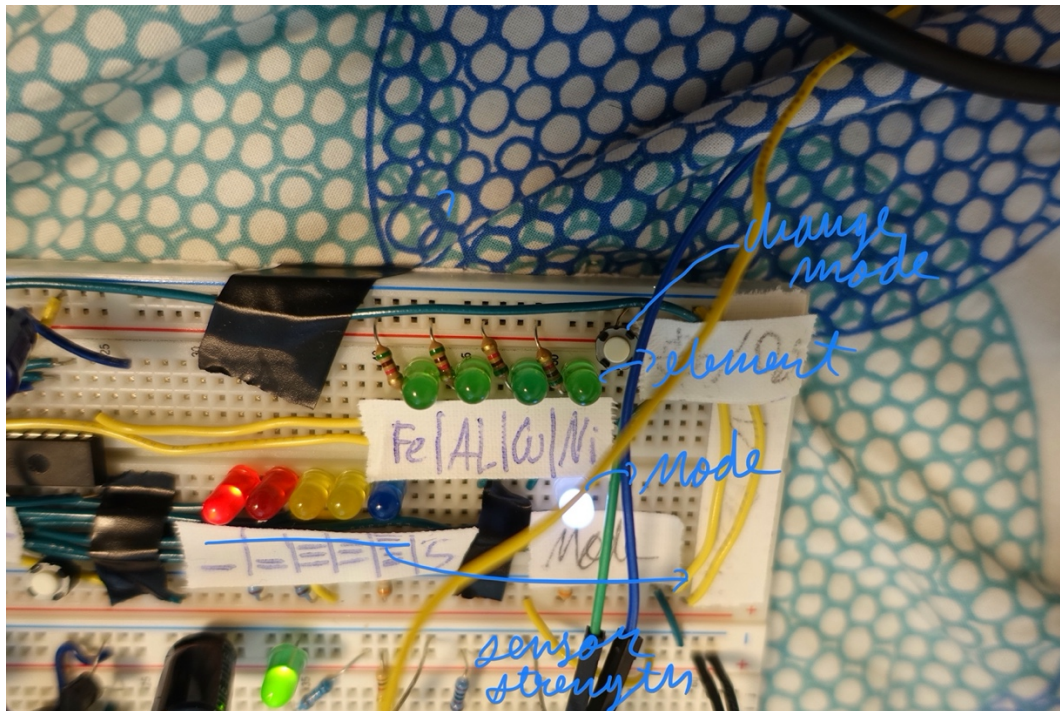

3.2 scope with no metal

3.3 scope with metal

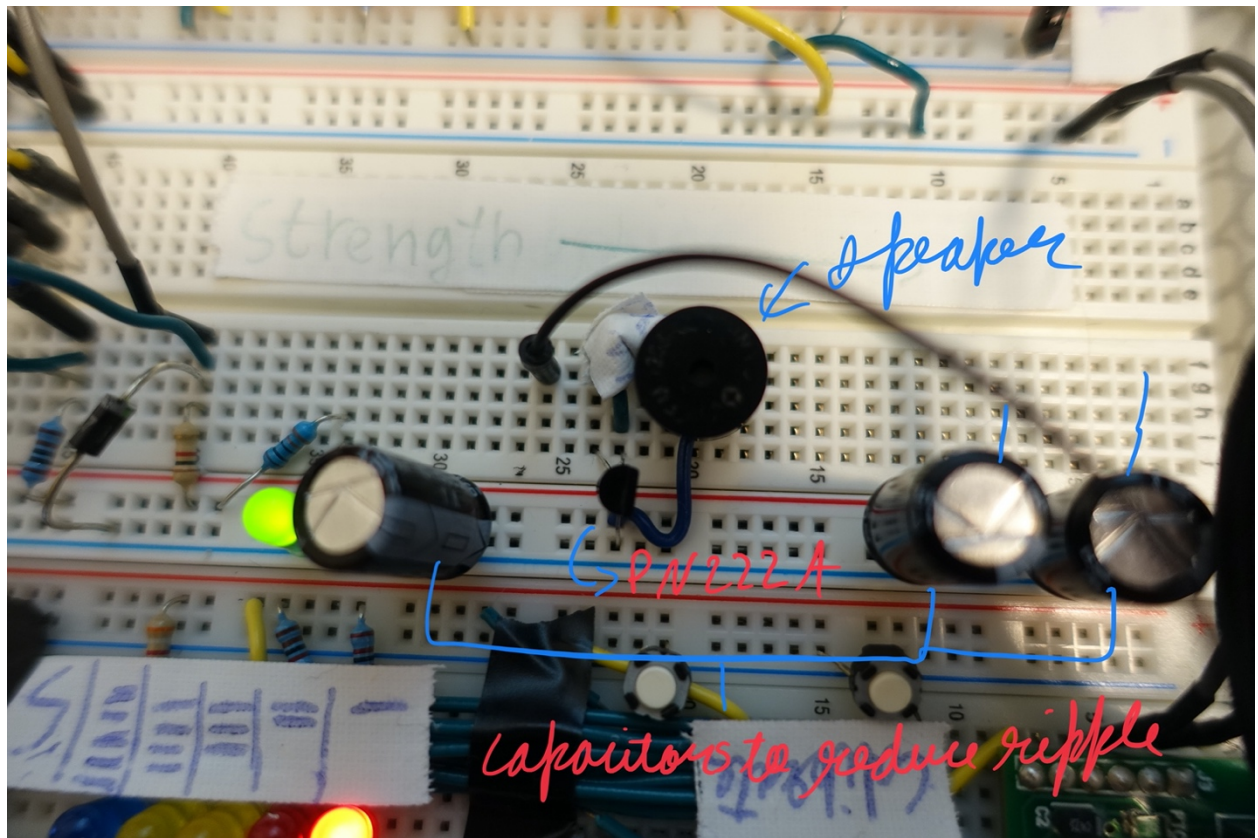# 4. Microcontroller system

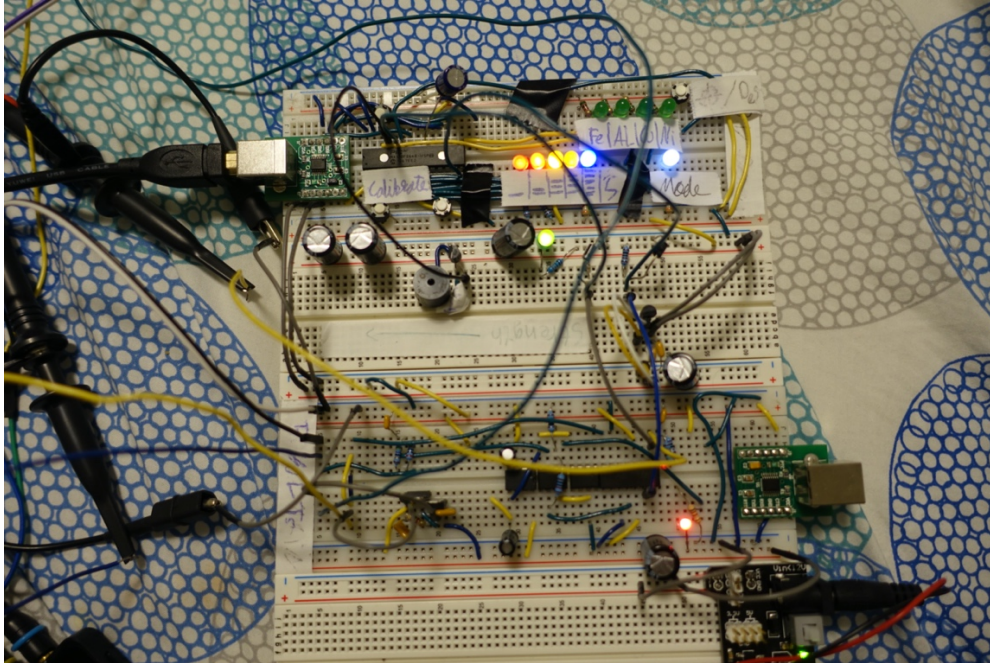

4.1 MCU circuit schematic
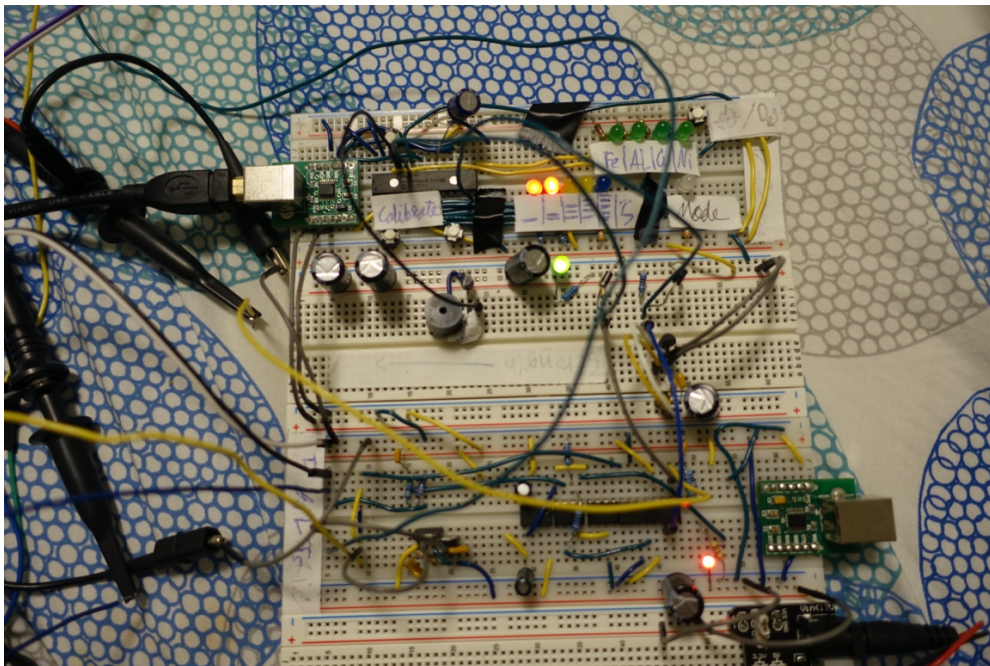

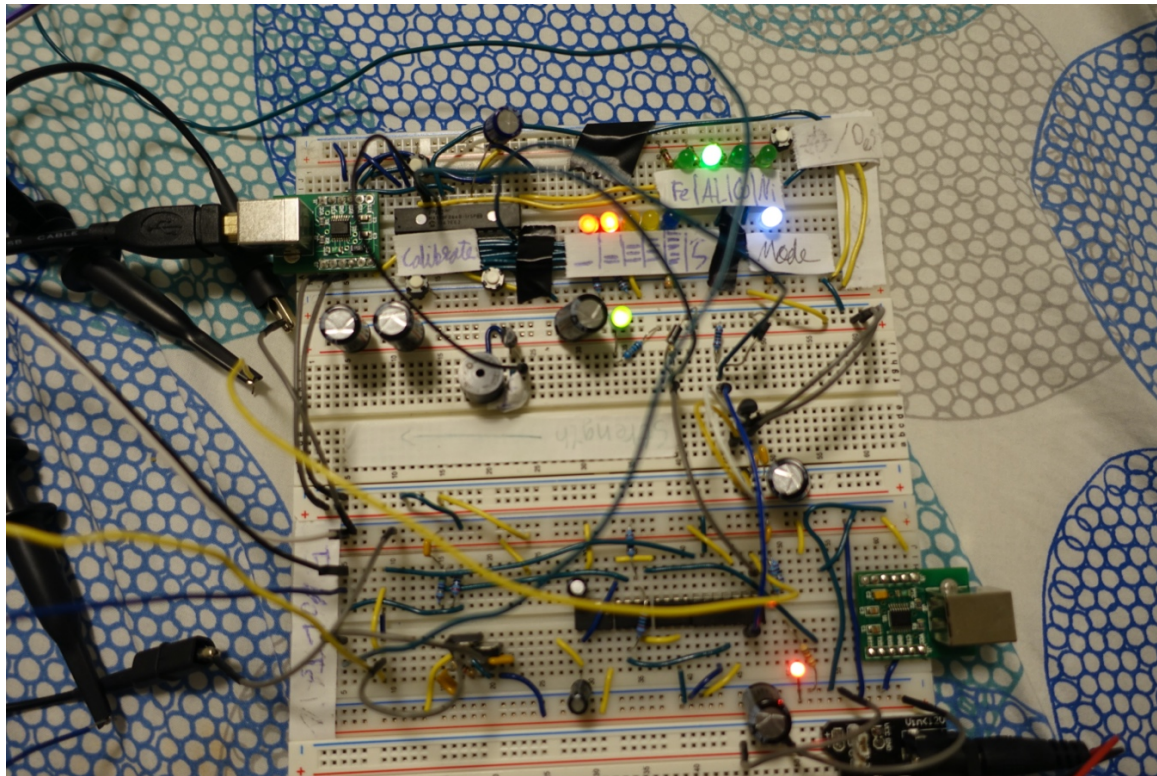4.2 LED circuit

4.3 speaker circuit

4.1.0 modes of operation
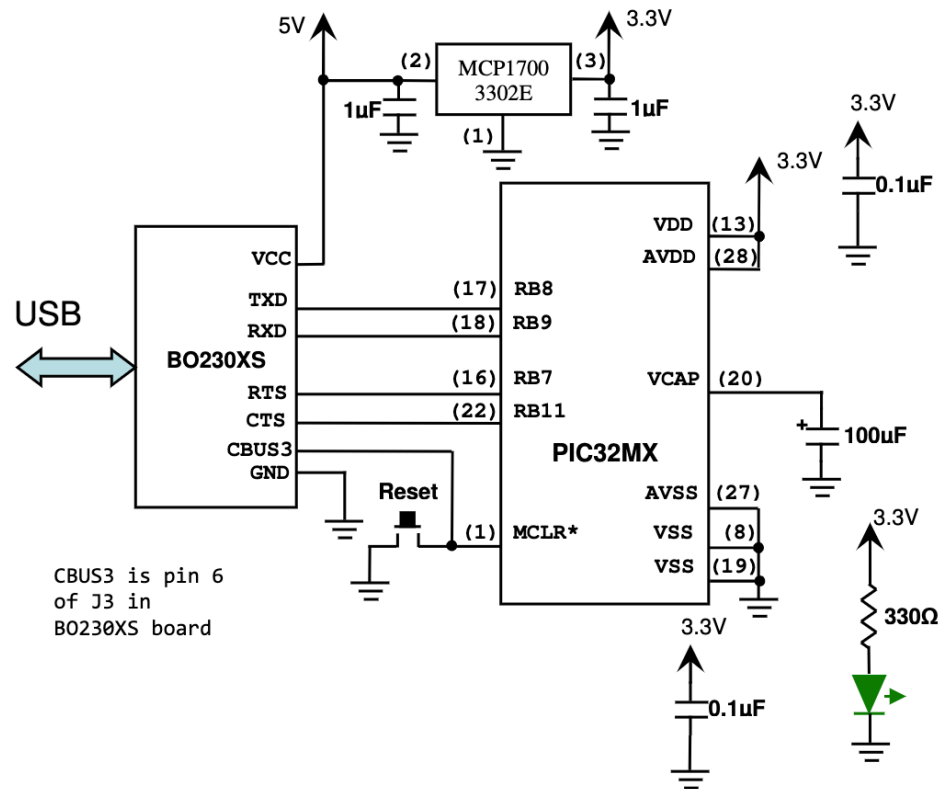

4.1.1 small metal objects detection mode

4.1.2 large metal objects detection mode with discrimination

4.1.3 Selective detection mode

5.0 PIC32 system

(from canvas ELEC 291 PIC32_system.pdf)

CBUS3 is pin 6
of J3 in
BO230XS board

6.0 Parts list

```
6.1 MCU circuit
2x red LED
2x yellow LED
1x blue LED
1x white LED
5x green LED

4x 5.1k ohm resistor
2x 3.9k hom resistor
3x push-buttons
1x buzzer
1x pn2222A transistor
4x 1000uF capacitor
2x 1uF capacitor
1x 100uF capacitor

1x BOX32
1x PIC32MX130F064B MCU
1x MCP1700
```

```
6.2 Colpitts  oscillator

1x 104G-mosfet
1x 2955G-mosfet

2x 0.33uF capacitor
1x 1k resistor

1.5 meter copper wire
```