In The Name of God

Health Monitoring System

Monitoring ECG Signal
Instrumentation Project

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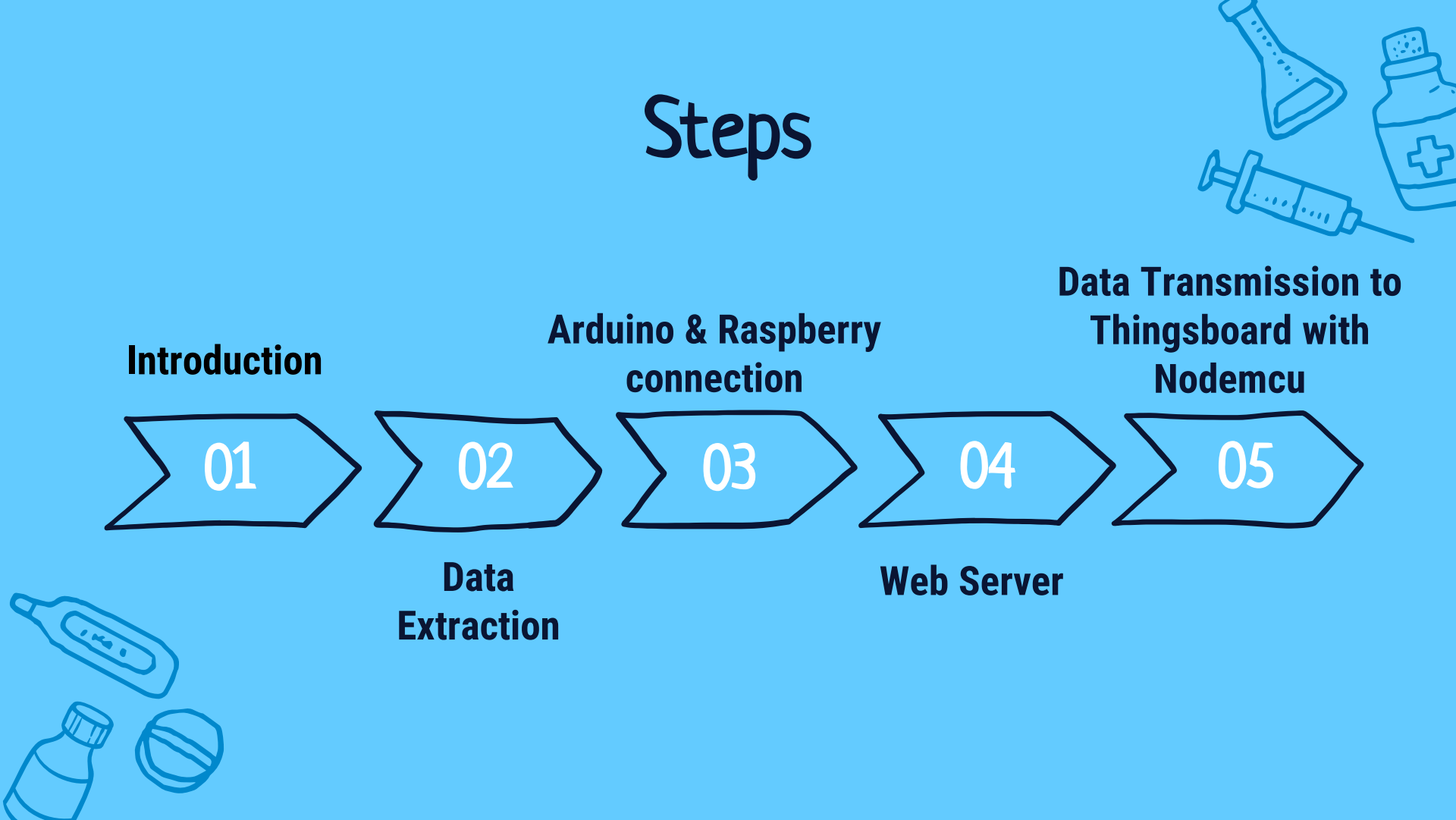
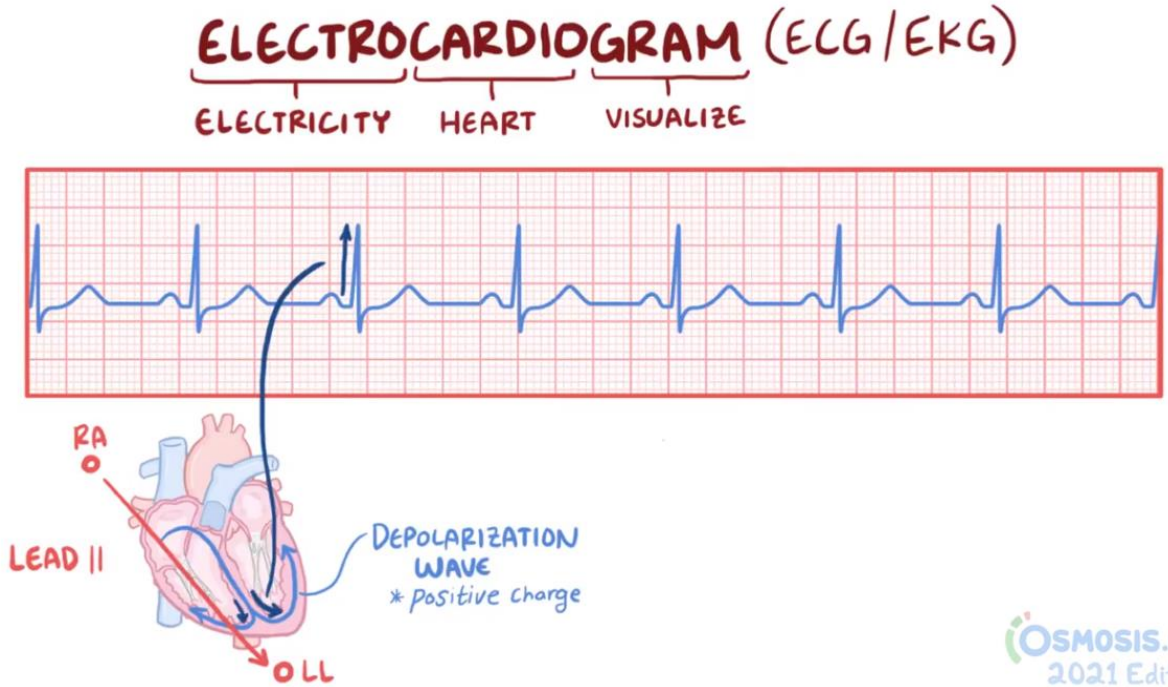
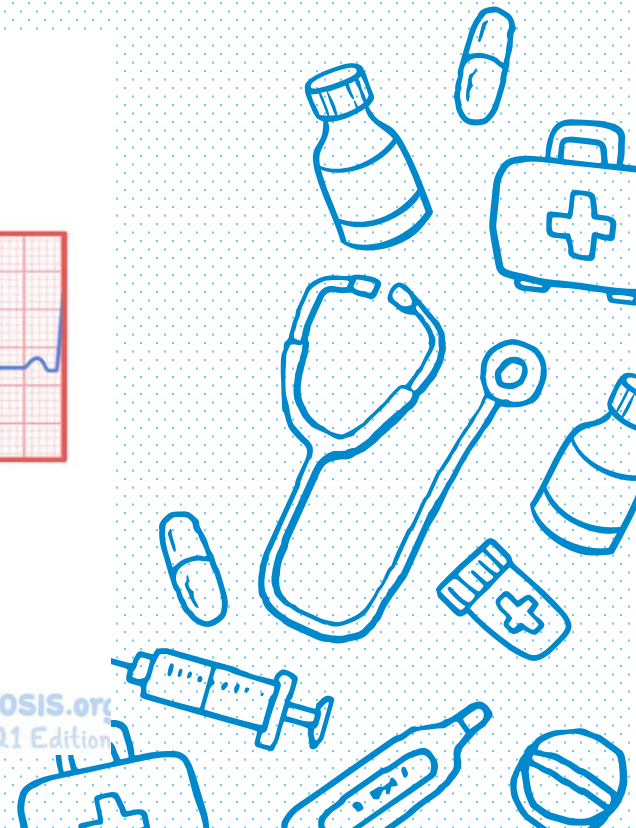
Steps


Introduction
01
Data Extraction
02
Arduino & Raspberry connection
03
Web Server
04
Data Transmission to Thingsboard with Nodemcu
05

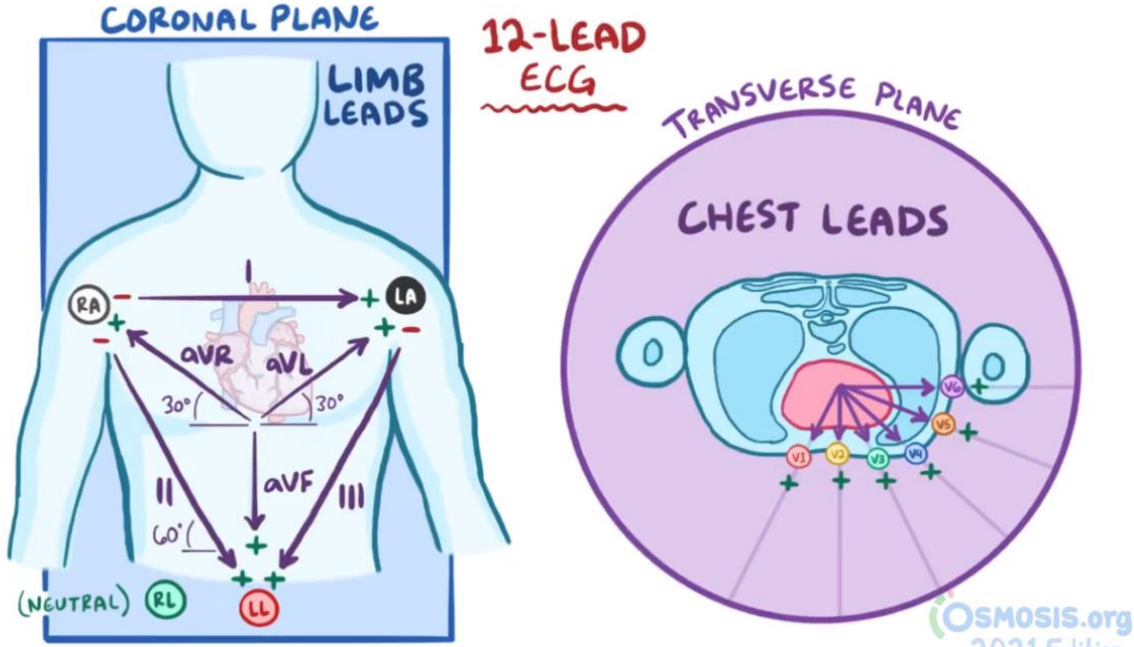
Introduction
What is ECG?

An electrocardiogram records the electrical signals in your heart.

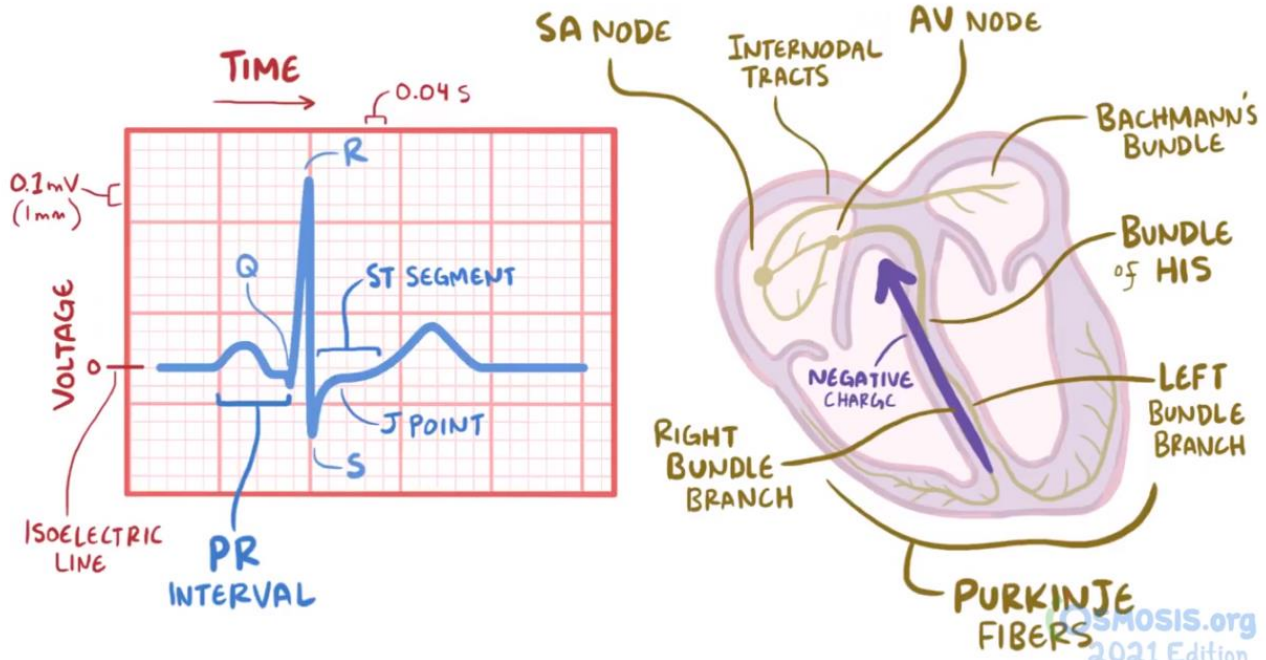




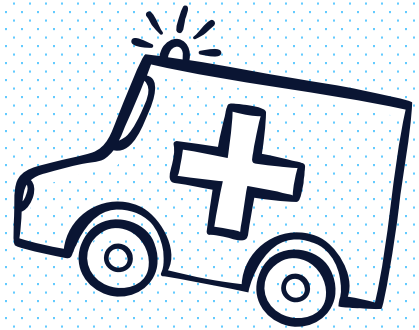
ECG
How can be measured?

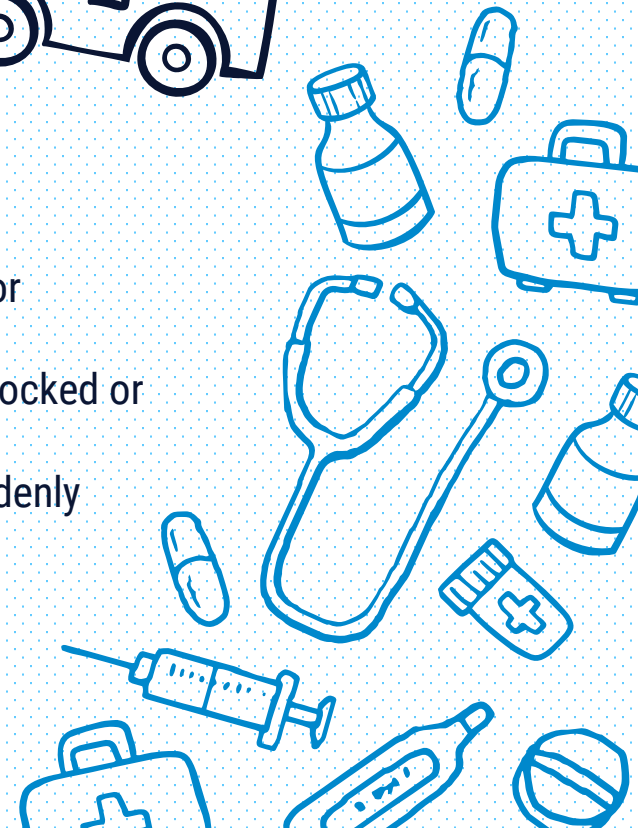


ECG
The Main Pick



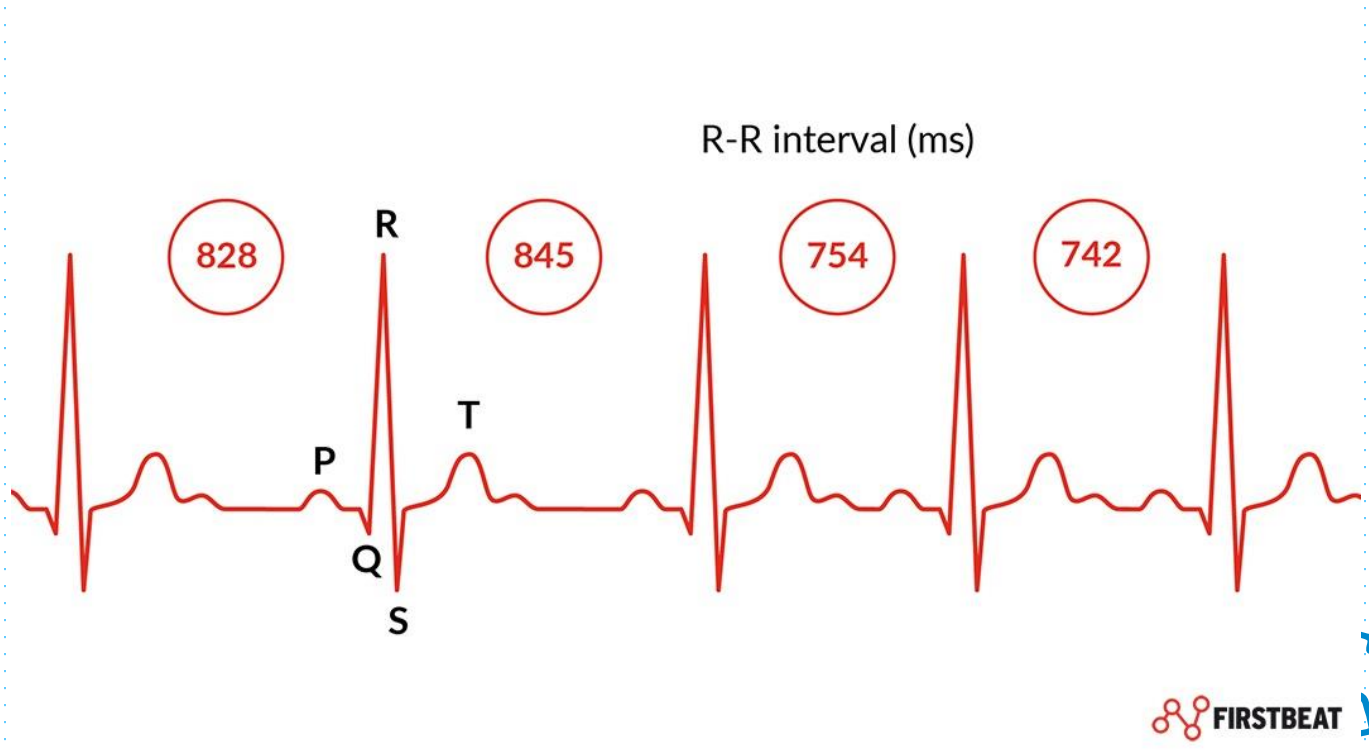
ECG Disease Detection

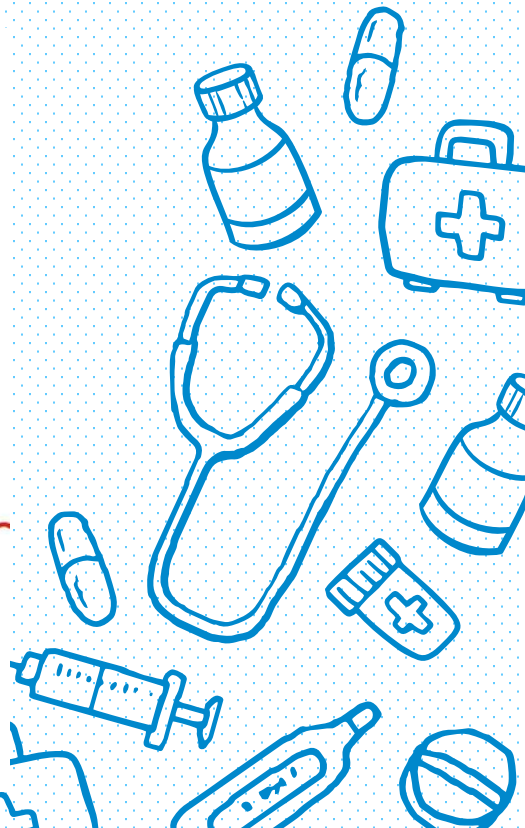




- Arrhythmias – where the heart beats too slowly, too quickly, or irregularly
- Coronary heart disease – where the heart's blood supply is blocked or interrupted by a build-up of fatty substances
- Heart attacks – where the supply of blood to the heart is suddenly blocked

ECG
Features :Heartbeat /HRV





ECG Noises

Noise in ECG data

High-Frequency Noise: Power line Noise, White Gaussian Noise, Eletcromyogram/Motion Noise

Low-Frequency Noise: Baseline drift, Electrode contact loss

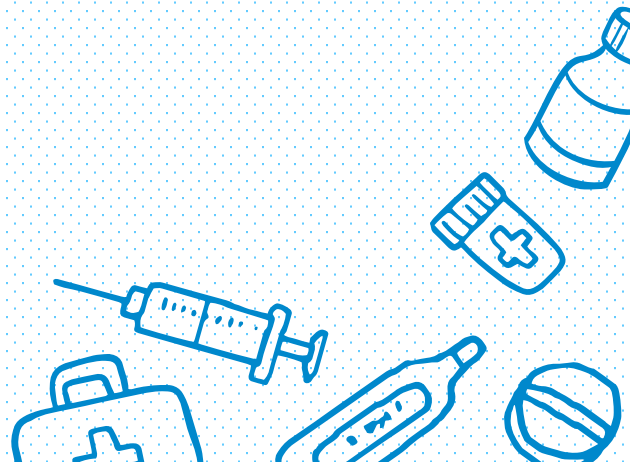
Denoising techniques

IIR Notch Filters

FIR Filters

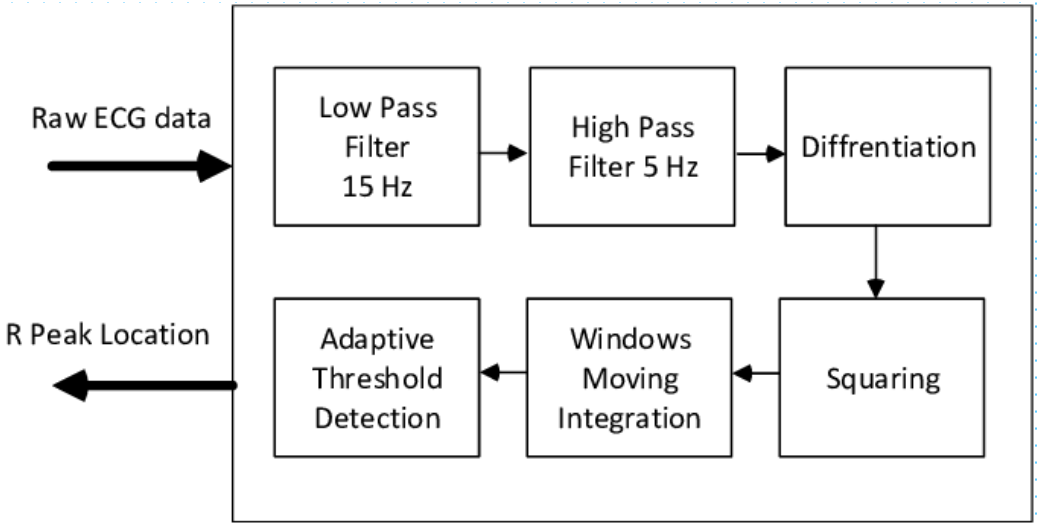
Data Extraction

- **Data Base** : www.archive.physionet.org
- **Data Information** :
  ECG Signal
  MIT-BIH Normal Sinus Rhythm Database(nsrdb)
  No. of samples : 600
  Sampling Frequency : 128

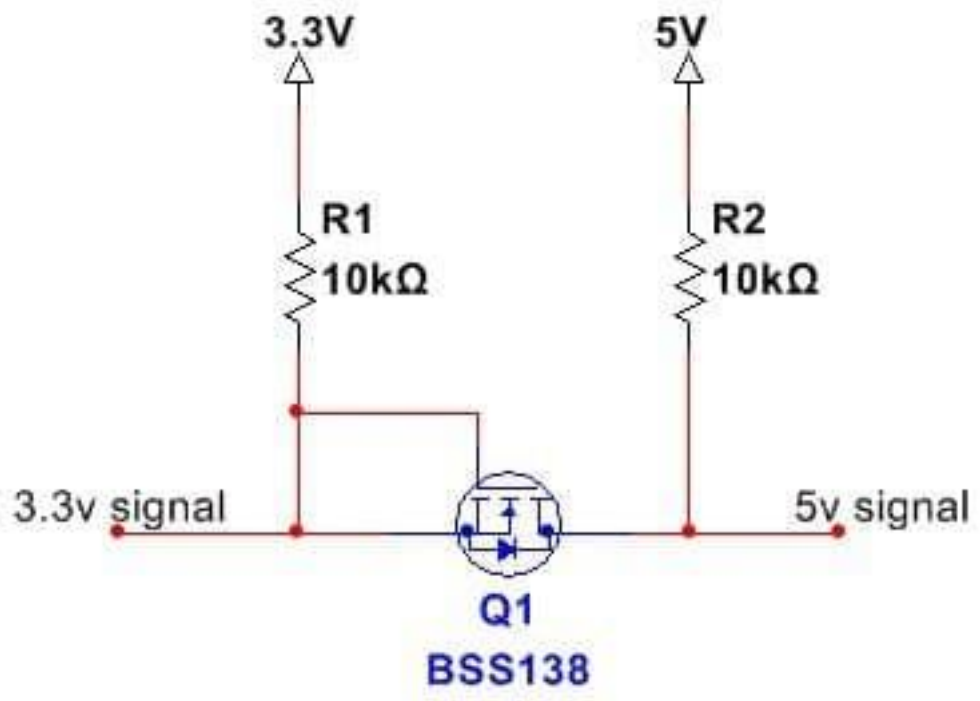


Processing

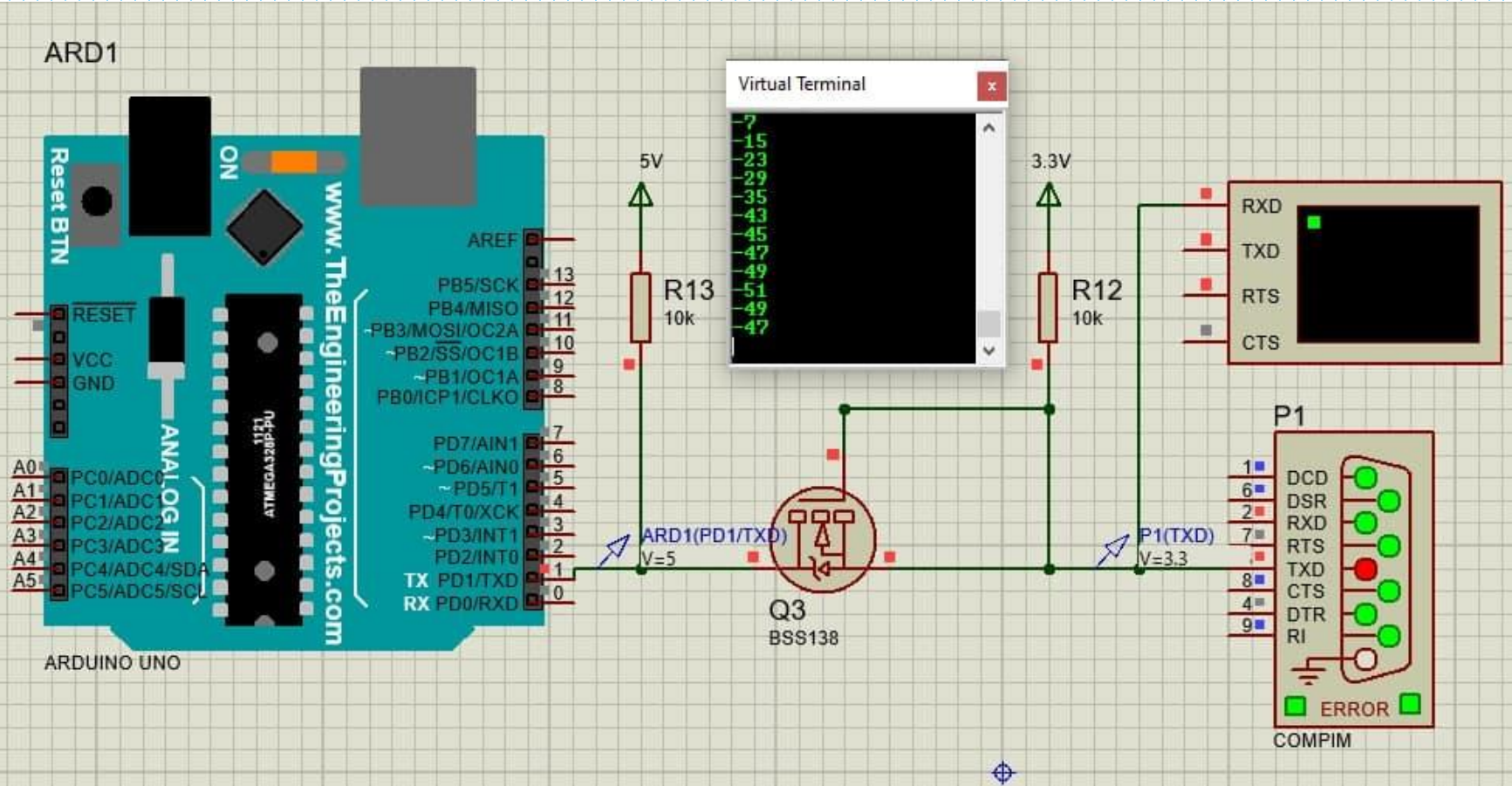
Pan-tompkins algorithm



Circuites

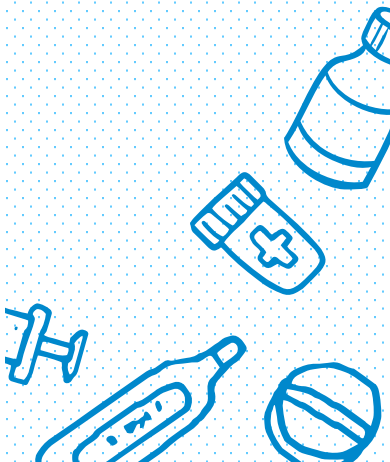


Proteous Environment

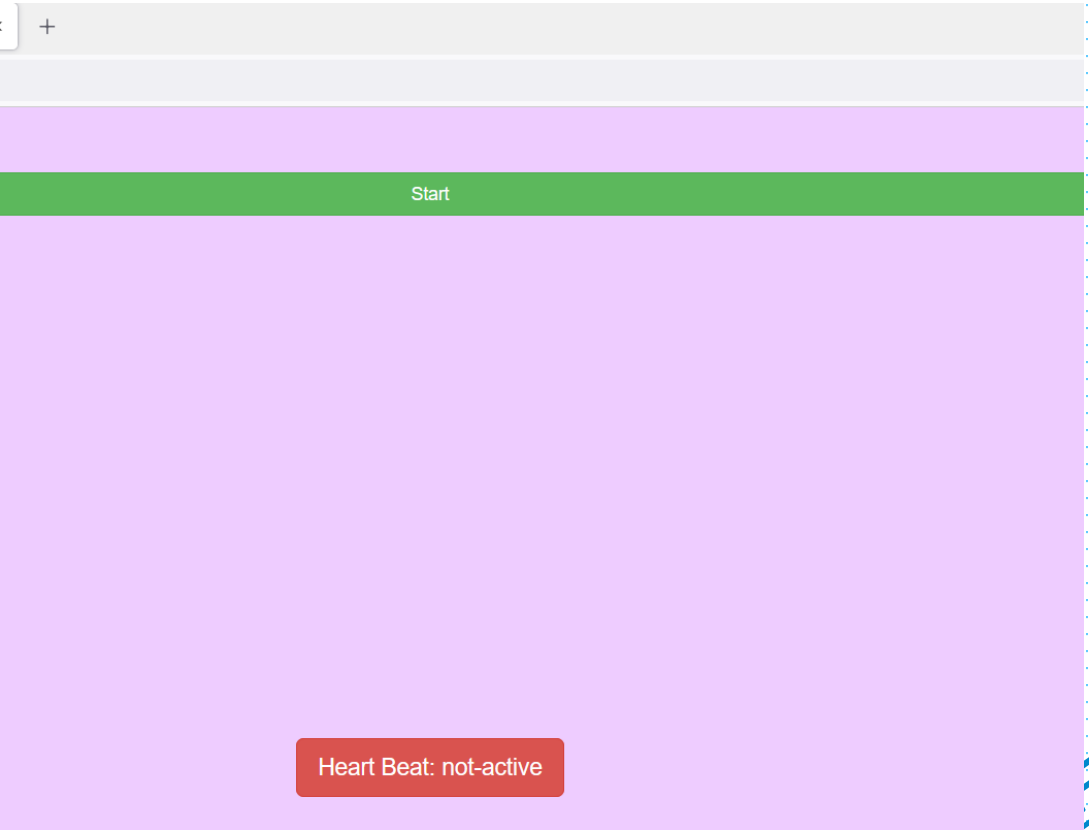


Raspberry

```python
import time
import serial
import requests

ser = serial.Serial(port='/dev/ttyS2', baudrate=9600, timeout=1)

while 1:
    x=ser.readline()
    x = x.decode('ascii')
    if x == '':
        continue
    x = x.strip('\r\n')

    try:
        eq = x.find('=')
        num = int(x[eq+1:])
    except:
        continue
    #print(num)

    requests.get('http://127.0.0.1/send?heart={}&ecg={}'.format(3, num))

```



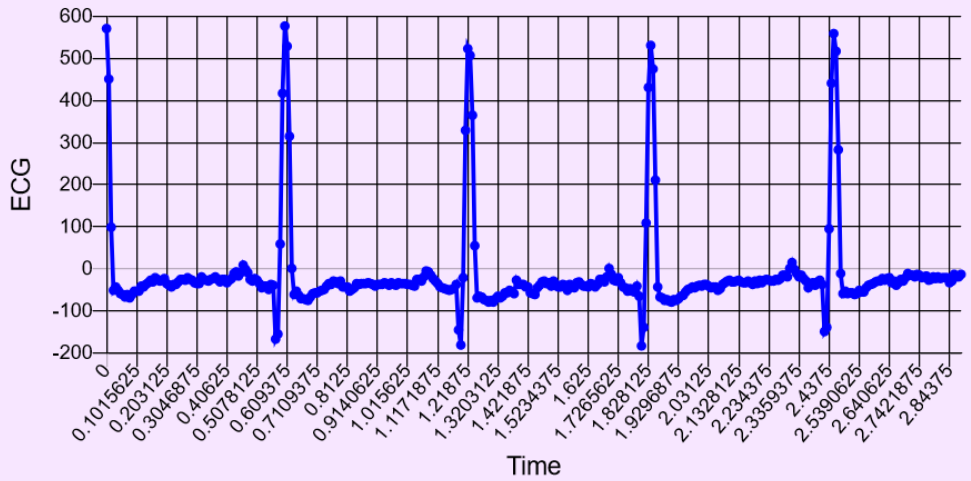
Webserver Before Starting



Webserver

192.168.43.12/ui

Start



Heart Beat: 98

sampled_data | Arduino 1.8.13

File Edit Sketch Tools Help

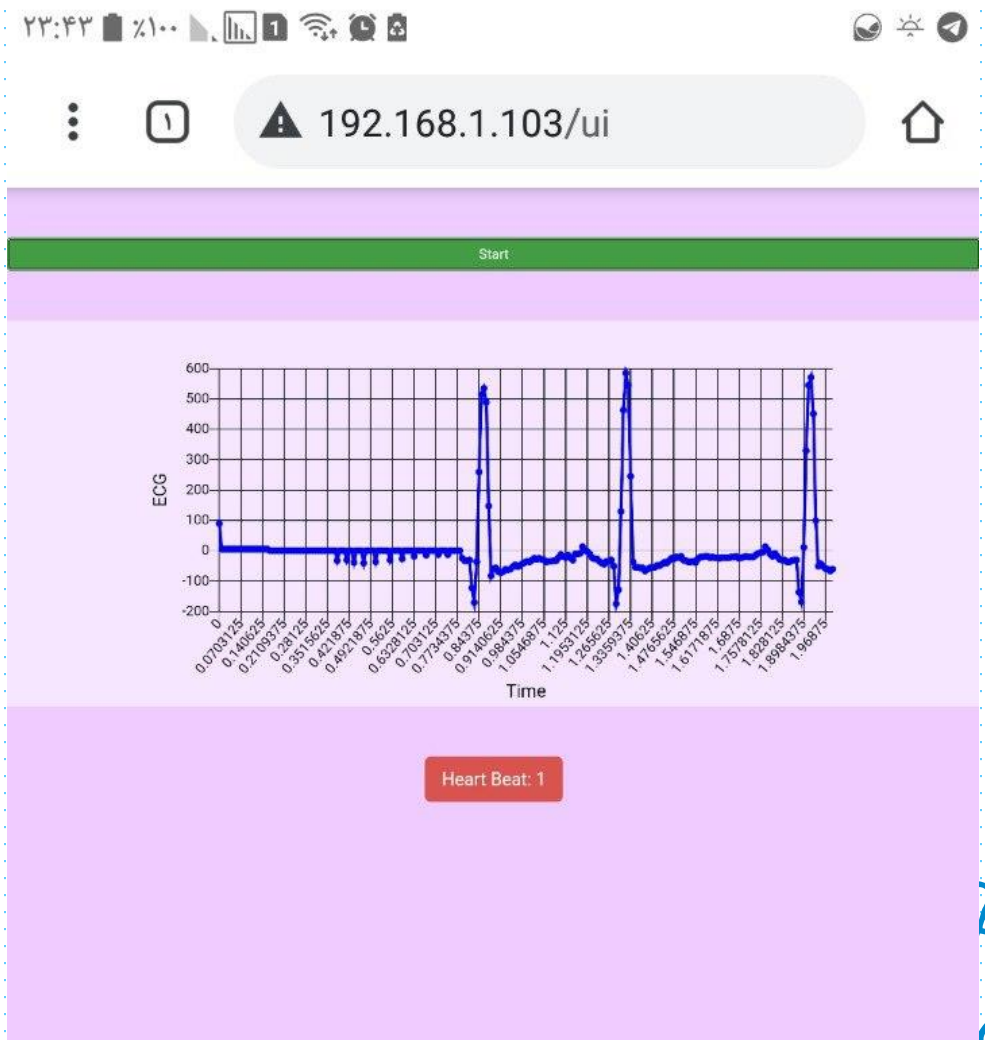
sampled_data

```
//float data[1280] = {-37, -39, -39, -41, -27, -21, -27, -21, -27, -27, -31, -27, -25, -27, -37, -33, -25, -29, -23, -25, -33, -25, -31, -29, -33, -29, -27, -31, -31, -3
int i = 0;
const int datasize = 600;
int data[datasize] = {-33, -31, -39, -41, -37, -31, -27, -19, -15, -13, -13, -25, -25, -25, -23, -25, -33, -23, -29, -23, -27, -27, -25, -35, -29, -25, -29, -29, -27, -3

void setup() {
  Serial.begin(9600);

}

void loop() {

  char buffer [15];

  sprintf (buffer, "data=%d", data[i++]);

  Serial.println(buffer);
  if(i>= datasize)
    i = 0;

  delay(100);

}
```

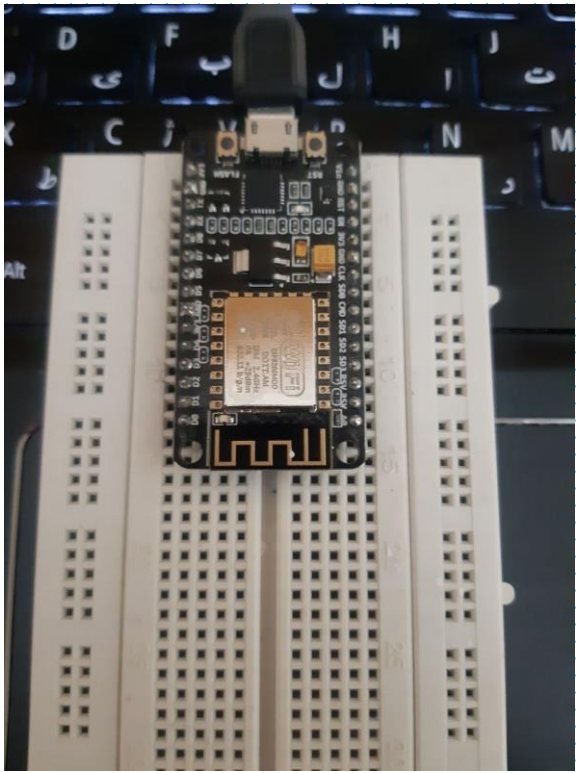
Done compiling.

```
"B:\\Arduino\\hardware\\tools\\avr/bin/avr-gcc-ar" rcs "C:\\Users\\maral\\AppData\\Local\\Temp\\arduino_build_901568\\core\\core.a" "C:\\Users\\maral\\AppData\\Local\\Temp\
"B:\\Arduino\\hardware\\tools\\avr/bin/avr-gcc-ar" rcs "C:\\Users\\maral\\AppData\\Local\\Temp\\arduino_build_901568\\core\\core.a" "C:\\Users\\maral\\AppData\\Local\\Temp\
Archiving built core (caching) in: C:\Users\maral\AppData\Local\Temp\arduino_cache_549023\core\core_arduino_avr_uno_71f1c74518d18c55e877003a61b70c8c.a
Linking everything together...
"B:\\Arduino\\hardware\\tools\\avr/bin/avr-gcc" -w -Os -g -flto -fuse-linker-plugin -Wl,--gc-sections -mmcu=atmega328p -o "C:\\Users\\maral\\AppData\\Local\\Temp\\arduino_bu
"B:\\Arduino\\hardware\\tools\\avr/bin/avr-objcopy" -O ihex -j .eeprom --set-section-flags=.eeprom=alloc,load --no-change-warnings --change-section-lma .eeprom=0 "C:\\Users\
"B:\\Arduino\\hardware\\tools\\avr/bin/avr-objcopy" -O ihex -R .eeprom "C:\\Users\\maral\\AppData\\Local\\Temp\\arduino_build_901568/sampled_data.ino.elf" "C:\\Users\\maral\
"B:\\Arduino\\hardware\\tools\\avr/bin/avr-size" -A "C:\\Users\\maral\\AppData\\Local\\Temp\\arduino_build_901568/sampled_data.ino.elf"
```

Mobile



Thingsboard



192.168.43.12:8080/dashboards/70540140-e6fd-11eb-8da4-9

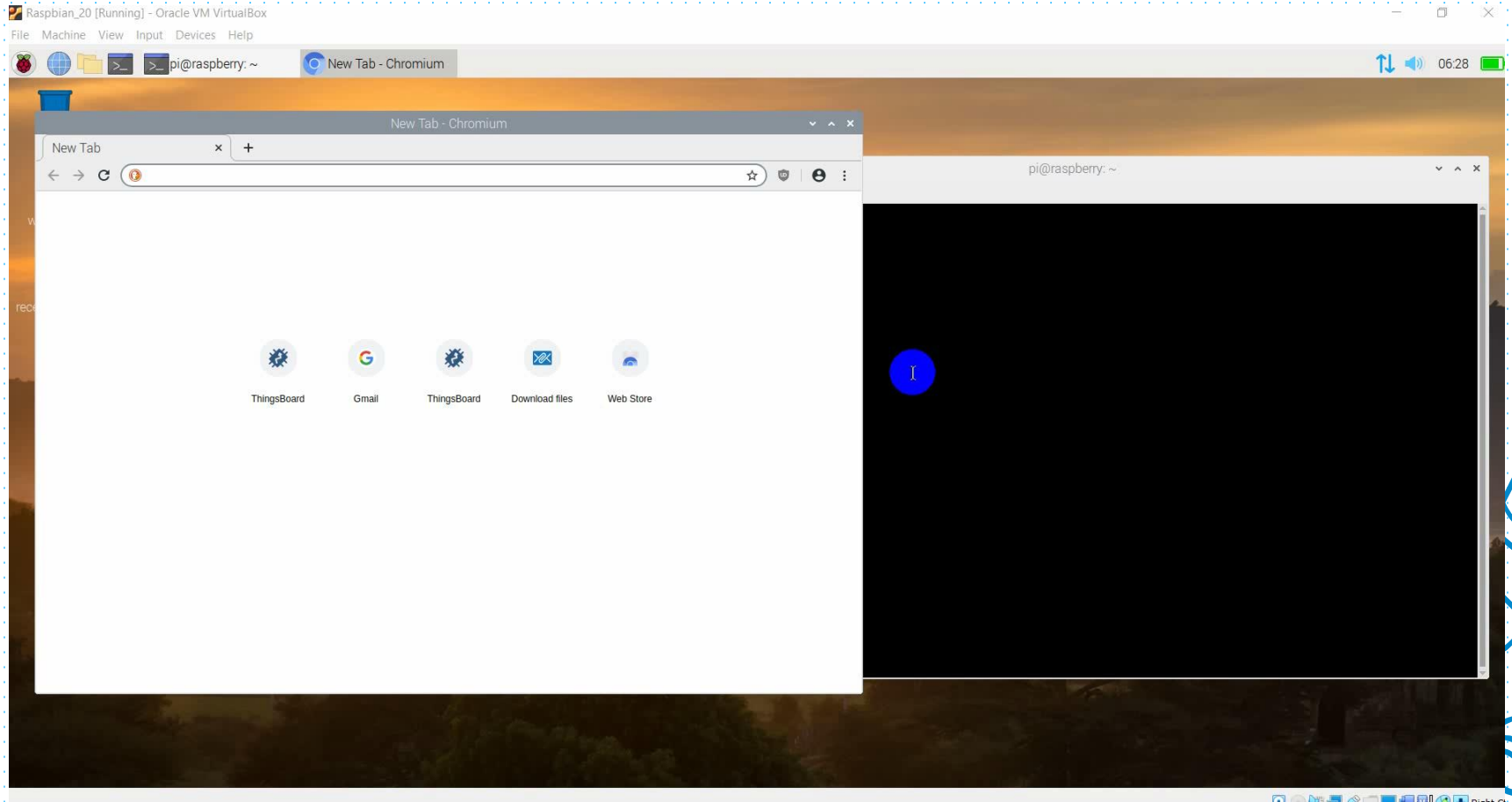
ecg signal

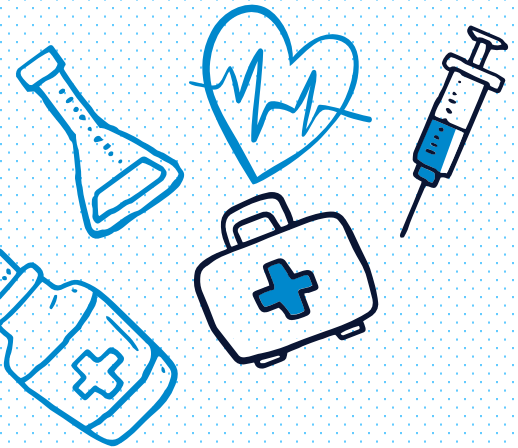
MARAL

New Timeseries Line Chart

300
250
200
150
100
50
0
-50
-100

Thingsboard





Thanks