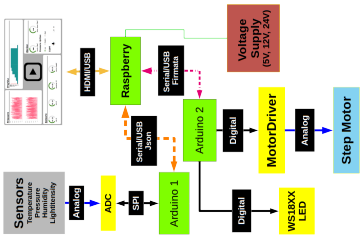
Medical Hardware GUI



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1 Frontend

- Angular ⇒ AngularClient, npm, ...
- Style ⇒ Material.IO, GraphJs, W3, SCSS
- TouchApi ⇒ HammerJs
- CommunicationApi ⇒ Socket.IO
- KeyBoard ⇒ npm-keyboard
- Deployment ⇒ Electron packager
- Integration ⇒ xTerminal
- Home Screen ⇒ NAvigation to Access to Software components
- Create Profile Screen

  1.Screen: Pop Up Window to name the Profile

  2.Screen: create single Elements and add them to Profile

  3.Screen: Add Element or save and run your Profile
- Machine Activation Screen

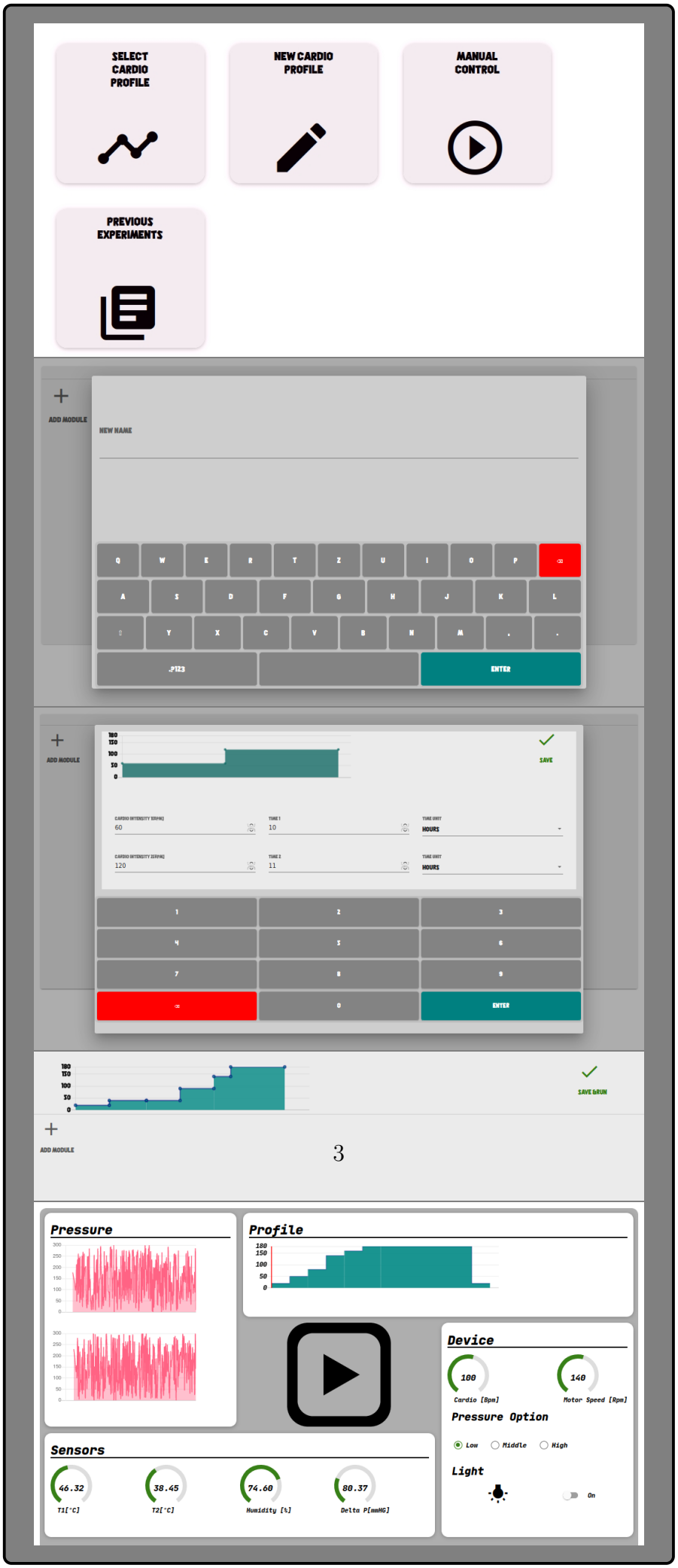
  Pressure section: realtime Values 2 sensors

  Profile section: progress with vertical red bar.

  Device section: motor speed, cardio, frequency, pressure option, the light on/off

  Sensor section: 2x temperature, humidity, delta pressure

  Play/Pause section: start/stop the motor


SELECT CARDIO PROFILE
NEW CARDIO PROFILE
MANUAL CONTROL
PREVIOUS EXPERIMENTS
ADD MODULE
NEW NAME
ENTER
SAVE
HOURS
SAVE &RUN
Pressure
Profile
Device
Cardio [Bpm]
Motor Speed [Rpm]
Pressure Option
Low
Middle
High
Light
On
Sensors
T1[°C]
T2[°C]
Humidity [%]
Delta P[mmHG]

2 Backend

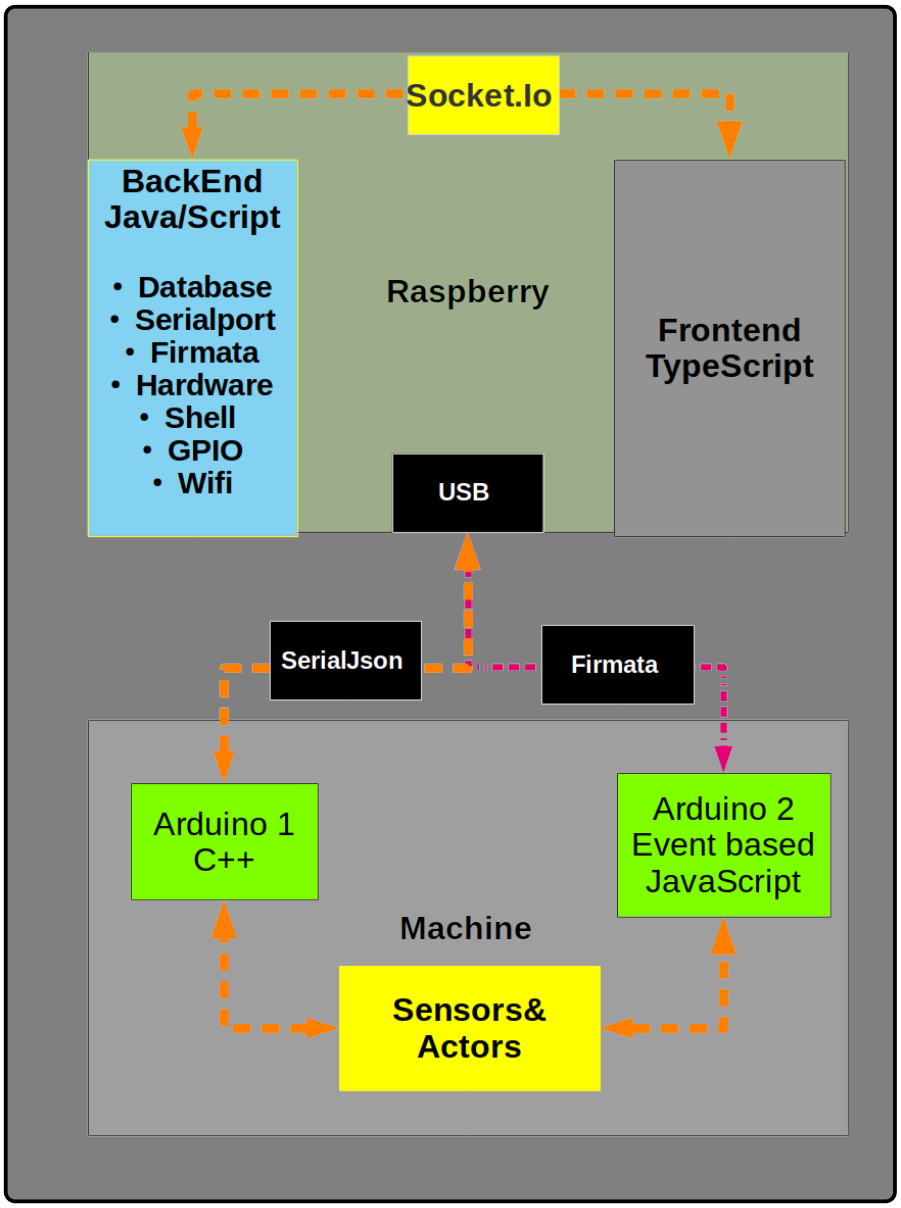
- Server ⇒ nodeJs
- Communication ⇒ Socket.IO
- DB ⇒ postgresql
- Email ⇒ nodeMailer
- Arduino 1⇒ firmata slave code using javascript to communicate
- Arduino 2⇒ C++ code sharing jsonData(Sensor values) over Serialport
- Integration ⇒ Linux Service

Connections

- Raspberry ⇒ Arduino 1 ⇒ Firmata over USB (johnny-five)
- Raspberry ⇒ Arduino 2 ⇒ Serial over USB Baudrate: 51800
- Arduino 2(C++)⇒ ADC ⇒ SPI (spi.h)

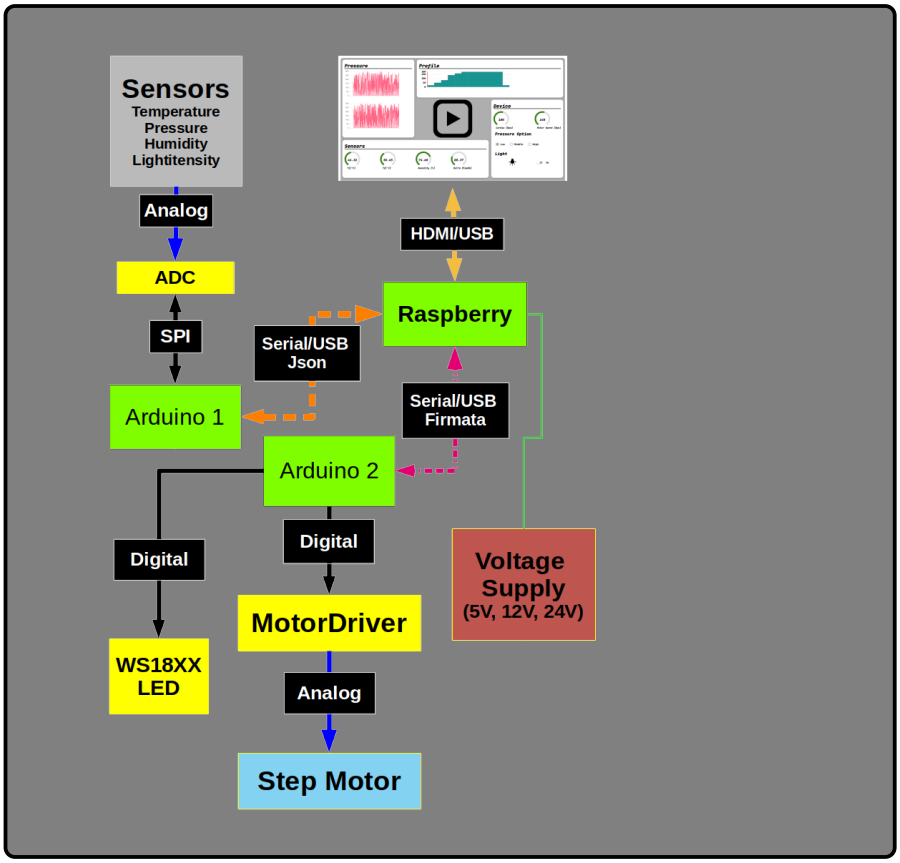
Hardware:

- Interface: 10”Touchdisplay
- Peripheral: 8 channel 32 bit ADC, 7.2 A Stepper Driver
- Sensors: 2 Temperature, 2 absolut Pressure, Humidity
- Actors: WS28XXX Led stripe, Step Motor


Socket.Io
BackEnd
Java/Script
• Database
• Serialport
• Firmata
• Hardware
• Shell
• GPIO
• Wifi
Raspberry
Frontend
TypeScript
USB
SerialJson
Firmata
Arduino 1
C++
Arduino 2
Event based
JavaScript
Machine
Sensors&
Actors

3 Electronics

- Electrical Supply (12V/60W,5V/10W)
- Electromagnetic Protection of TouchScreen: high Current of stepper motor
- grounded Supply



4 Requirements

4.1 Time Requirements

2 monthes for Software and Hardware Development 01.08-01.10.2020 were planed. At the end it took me 3 and a half monthes to finish and test it.

4.2 Software Requirements

- Realtime Communication Hardware Touchdisplay
- Database of Profiles
- Database of Logdata
- Deploy Software to bin file
- Linux run on boot
- GUI

  Company logo

  display sensor values in Realtime

  create intensity Profile and save it to database

  read Profile from Database

  run machine with time sensitive Profile

  run machine with manual control

  send logfiles to a specified email adress

4.3 Electronic Requirements

- Realtime SensorValues
- robust
- elegant
- compact
- silent motor control