Blood Pressure Meter

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Chapter 1

Main Page

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Version

1.0

Attention

Device described here is student's experimental project. Do not rely on measurements taken by device like this one.

1.1 Hardware design

1.1.1 Block diagram

1.1.2 List of parts

- NUCLEO F446RE
- LCD Keypad Shield
- Honeywell Pressure Sensor ABPMANN005PG2A3
- KOGE mini pump KPM14A 3V
- KOGE electromechanical valve 3V
- Transistor N-channel BS170
- PNP transistor 2n2905
- four-way splitter, control aquarium valve, plastic tubes
- Solder breadboard, connectors
- Hand cuff

1.1.3 Photos

1.2 Operation of the device

1.3 Measurement mechanism

During blood pressure measurement by blood pressure meter cuff placed on patient's arm must be inflated till absolute closing of artery. Then valve is opened and cuff is slowly deflated (approximetely 3-5 mmHg/s). When pressure in cuff equilibrates pressure in artery blood starts flow. This pressure can be considered as systolic pressure. When pressure in cuff drop below diastolic pressure value oscillation in cuff should disappear (what isn't entirely true as described later).
In this project 180 mmHg was assumed as pressure closing artery so the cuff was pumped up to 180 mmHg. Then pump was turned off and valve was opened after 1 second delay in order to stabilize pressure sensor output.

1.4 Numerical calculations

Pressure sensor used in project has digital output so all operations on signal like filtering must be performed digitally by microcontroller. All signals showed below were computed by stm32f446re microcontroller and acquired with STM Studio. Sampling frequency of pressure signal from sensor equals 250 Hz.