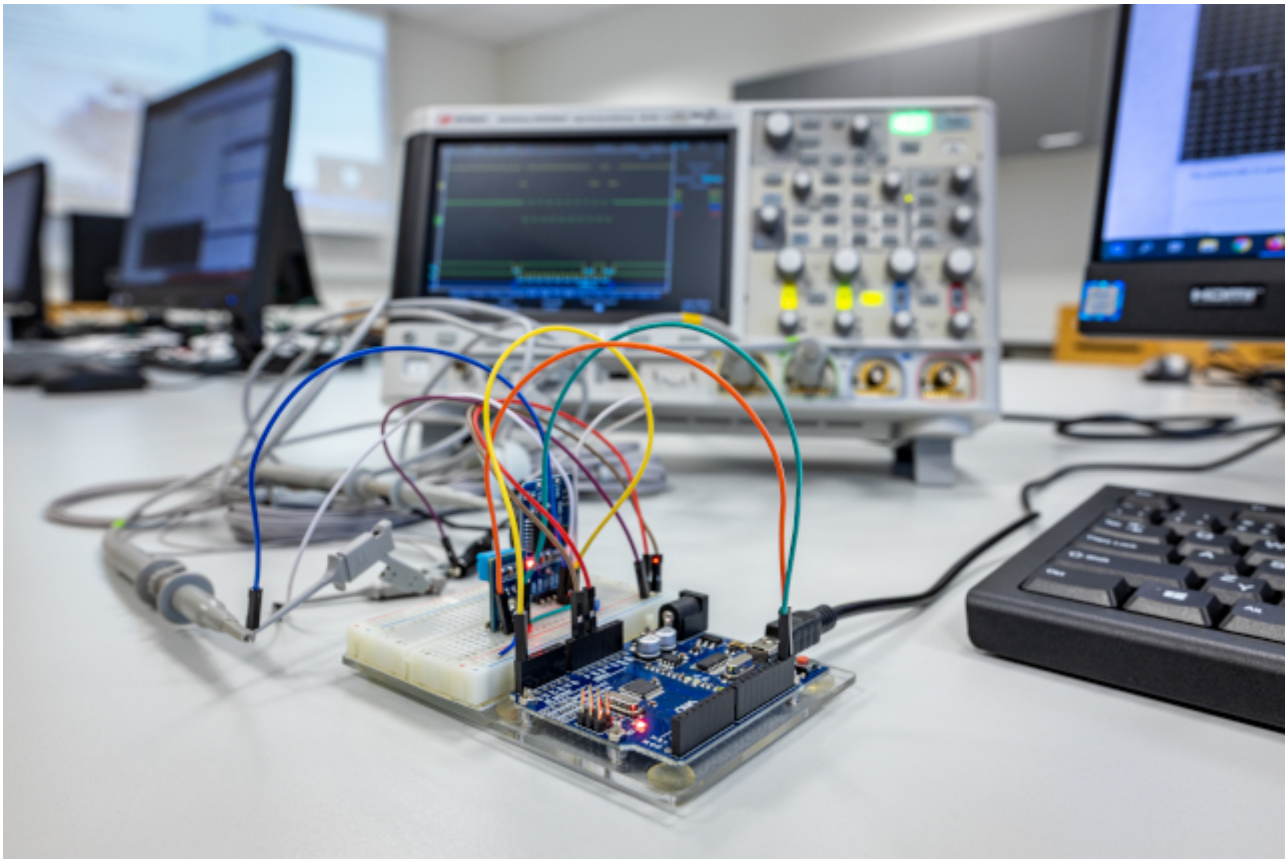
Digital electronics 2

The repository contains AVR lab exercises for bachelor course *Digital Electronics 2* at Brno University of Technology, Czechia. Arduino Uno board and some shields are used as the main programming platform.



Exercises

1. Git version-control system, AVR tools
2. Control of GPIO pins
3. Timers
4. Liquid Crystal Display (LCD)
5. Analog-to-Digital Converter (ADC)
6. Universal Asynchronous Receiver-Transmitter (UART)
7. Inter-Integrated Circuits (I2C)
8. Assembly language and project documentation

List of examples

- Basic C template, blink a LED
- Project documentation with Doxygen
- Autonomous slot car

Components

The following hardware and software components are mainly used in the lab.

- Devices:
  - ATmega328P 8-bit microcontroller: AVR Instruction Set Manual
- Boards and shields:
  - Schematics
  - Arduino Uno board
  - LCD and keypad shield with LCD and five push buttons
  - Multi-function shield with four LEDs, three push buttons, four seven-segment displays, and others
- Sensors and modules:
  - DHT12 I2C humidity and temperature sensor: data sheet
  - DS3231 I2C real time clock: data sheet
  - HC-SR04 ultrasonic sensor
  - Analog joystick PS2
  - ESP8266 Wi-Fi module: AT commands
- Analyzers:
  - 24MHz 8-channel logic analyzer: software
  - Oscilloscope Keysight Technologies DSOX3034T (350 MHz, 4 analog channels), including 16 logic timing channels DSOXT3MSO and serial protocol triggering and decode options D3000BDLA
- Development tools:
  - Visual Studio Code
  - PlatformIO
  - Atmel Studio 7 (Microchip Studio 7)
  - GCC Compilers for AVR
- Other tools:
  - SimulIDE, real time electronic circuit simulator. With PIC, AVR and Arduino simulation
  - git

References

1. How to use AVR template with PlatformIO
2. How to use AVR template on Windows
3. How to use AVR template on Linux
4. Peter Fleury, AVR-GCC libraries
5. Wykys, Tools for development of AVR microcontrollers
6. Barr Group, Embedded C Coding Standard
7. 4Geeks. How to use Gitpod