Master's Thesis Engineering Technology

2017-2018

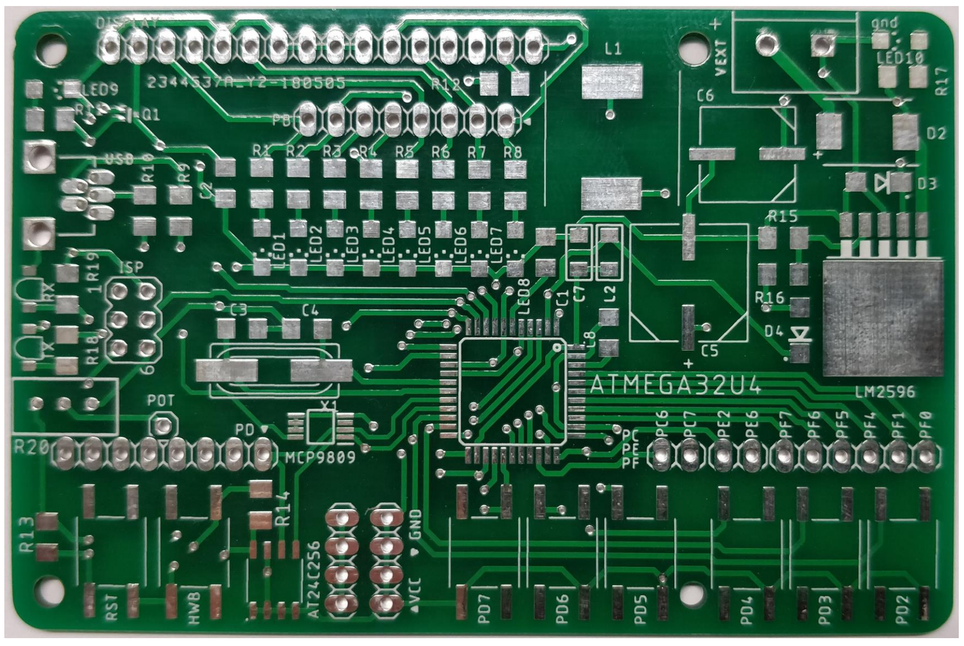
Board design and implementation for 8-bit AVR microcontrollers in an educational environment.

Gideon van Roon

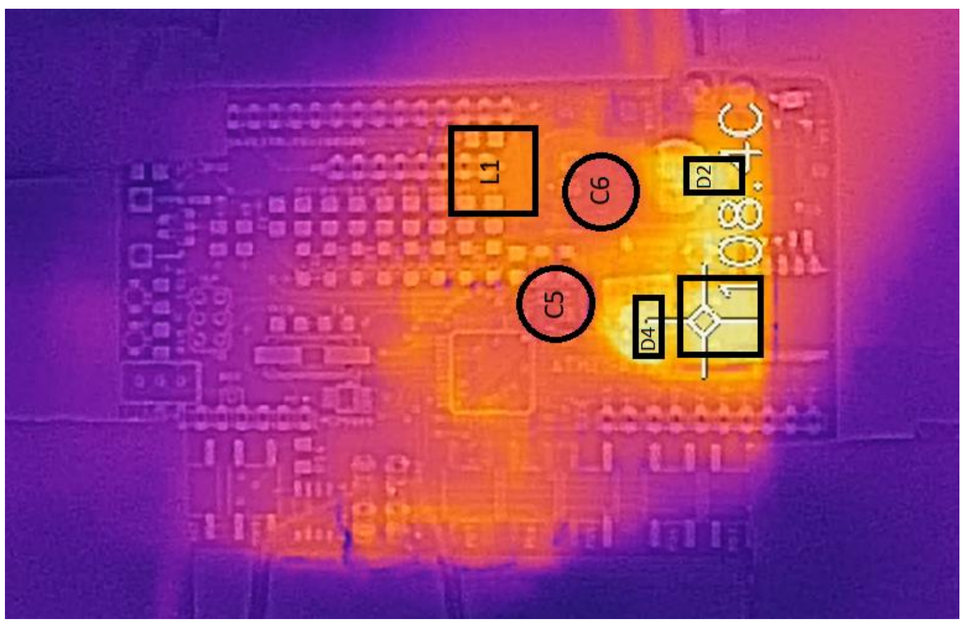
Electronics and ICT Engineering Techology

Developmentboard Features

A microcontroller board is designed to be used in the Häme University of Applied Sciences embedded system design course. The microprocessor on the board is an 8-bit AVR ATMega32U4. This controller is capable of driving and reading several onboard peripherals, such as: LED's, an external display, temperature sensor, additional memory, buttons, IR transmitter and IR receiver.



Unpopulated, Custom PCB top layer



Power supply circuit heat map. This thermal map is captured while shorting the output pins.

PCB & Power supply

All components are housed on a custom raspberry pi-sized PCB. Most components are in SMD format except for terminals.

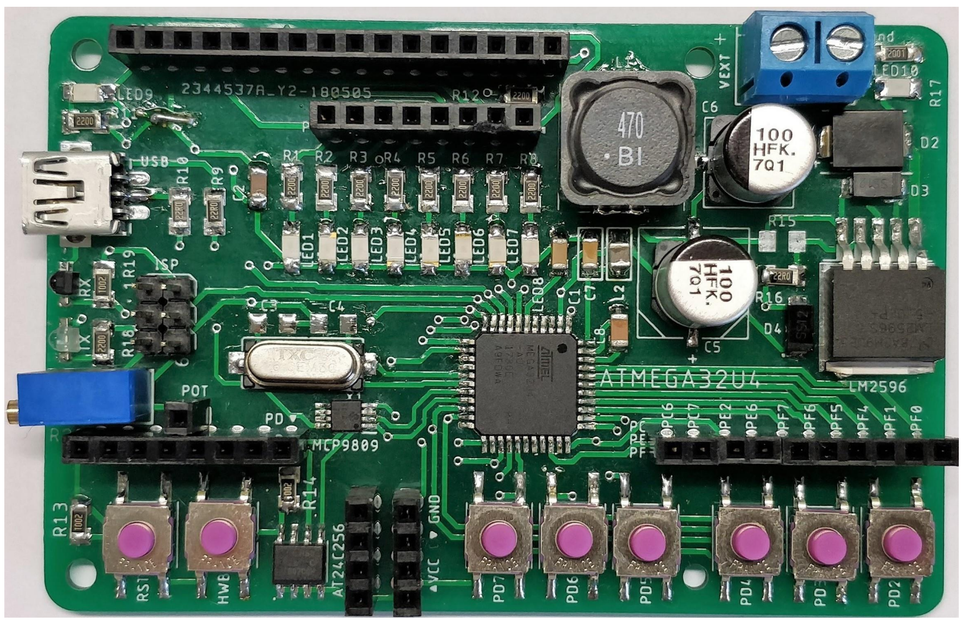
The board features an external high voltage power input on the top right for use in PLC cabinets The supply has proven to handle voltages inputs up to $40\ V$ and output $3\ A$ at $5\ V$.

Shorting the supply can be done for a decent amount of time before reaching the regulators thermal limits.

Programming & Price

Programming is done with ATMEL Studio without the need for an external programmer.

Cost is lowering when larger quantities are ordered; A single unit costs €87,62, ten units $€21,46$ and the price for one hundred units drops to €15,98.



Fully populated prototype trainingboard

Supervisors / Cosupervisors: Juha Sarkula

HAMK
HÄMEEN AMMATTIKORKEAKOULU
HÄME UNIVERSITY OF APPLIED SCIENCES

UHASSELT

KU LEUVEN