Lego Racing Team

Final presentation

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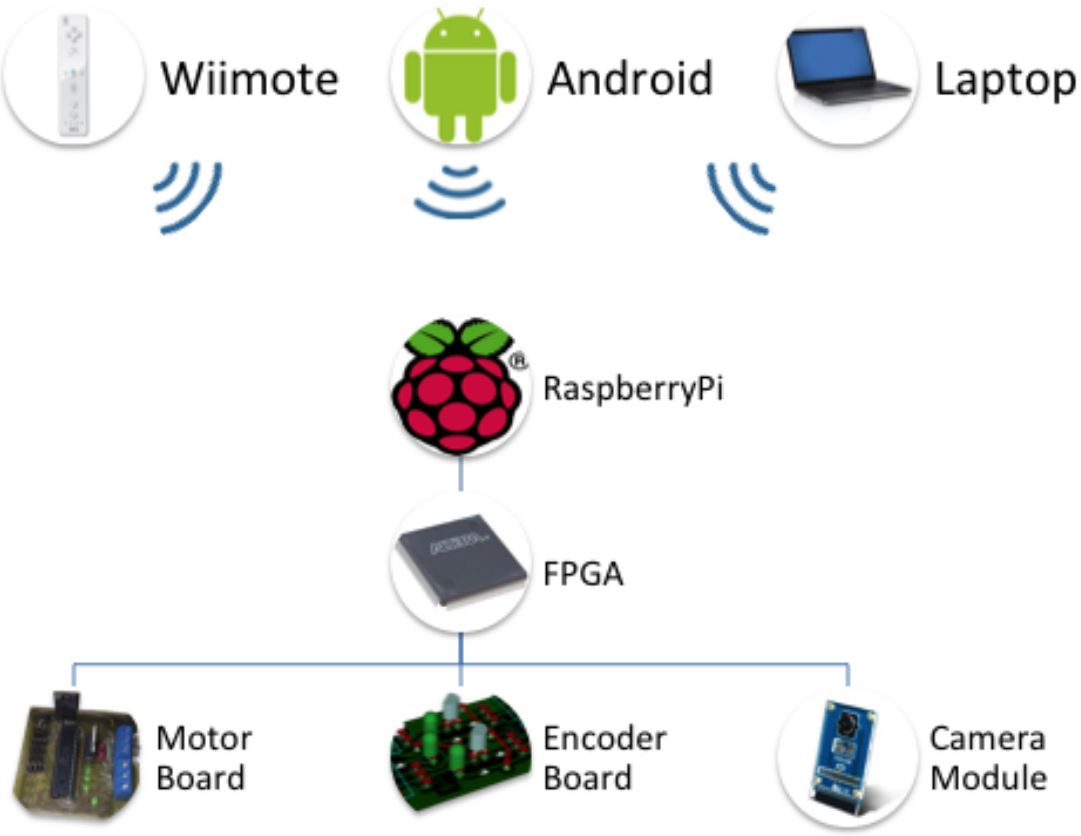
Motivation

Build a high speed capable car

- with flexible heterogenous user interfaces (Android, Wiimote, Laptop)
- assist the user (traction control, obstacle avoidance, emergency break)
- leverage the power of the FPGA where suitable

Architecture



Hardware

Update

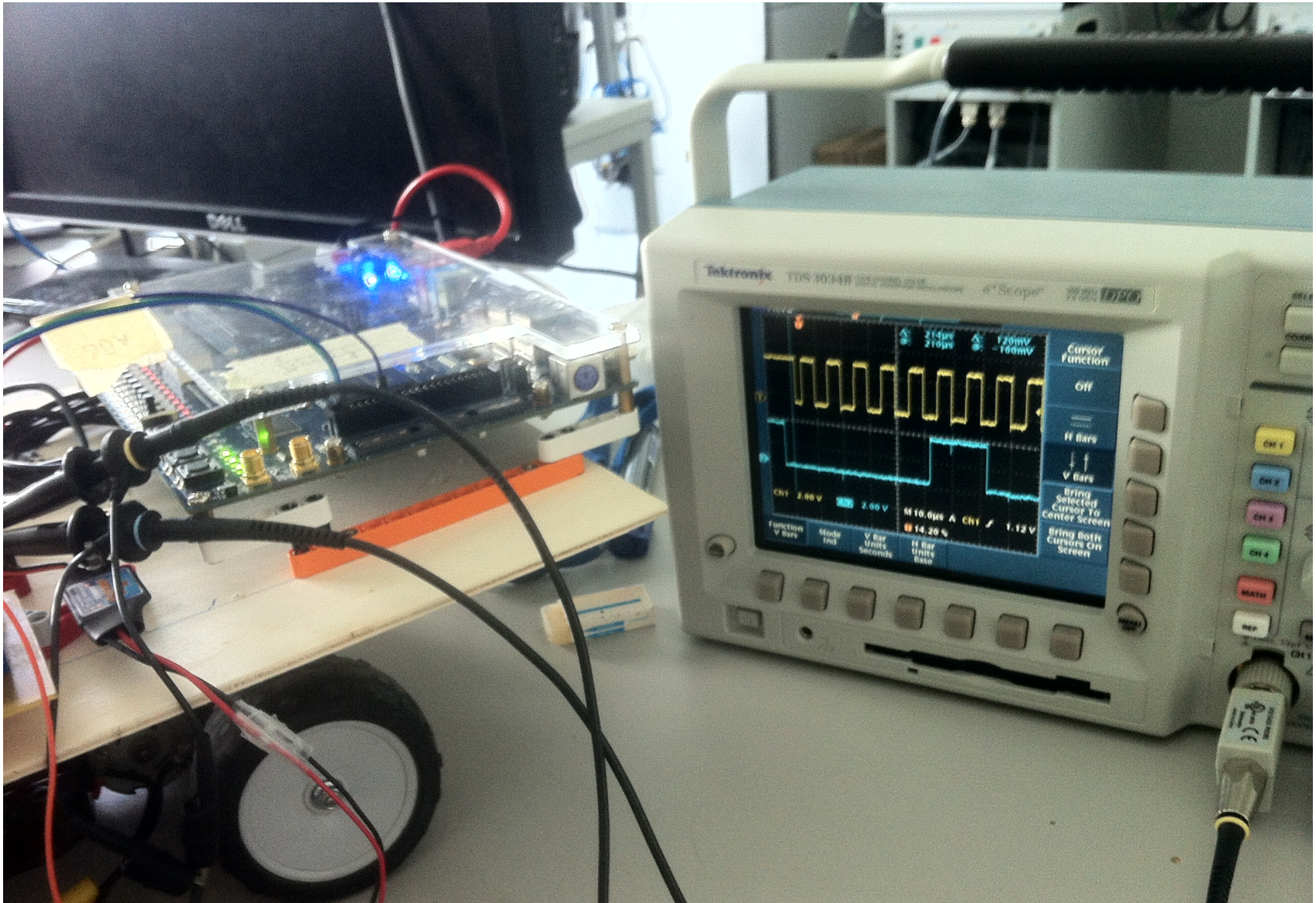
- Integrated new high power wireless access point
- Built second servo board to parallelize development on RASPI and FPGA
- Connect all components with pin-socket connectors for faster reconnection

FPGA

Update

- Implemented reading out the encoders
- Implemented I2C protocol for motor control
- Implemented SPI protocol to communicate with top-level (RASPI)
- Implemented preliminary Traction Control System (TCS)

FPGA


Tektronix
Cursor Function
Off
H Bars
V Bars
Bring Selected Cursor To Center Screen
Bring Both Cursors On Screen

Raspi

Update

- Implemented SPI interface to FPGA
- Moved some general input processing to the RASPI

Next steps

Plan

- Get the camera to work on FPGA
- Implement laser scanning algorithm on FPGA
- Implement obstacle avoidance on RASPI

Lessons learned

- Implementation on the FPGA extremely time-consuming
- Simuluated FPGA != real FPGA
- Debugging on the FPGA is tedious, memory oscilloscopes or logic analyzer are of great help
- Watch out for endianness when connecting different systems