

Mariokart

An autonomous Go-kart

Henry Jenkins

Department of Computer and Electrical
Engineering, University of Canterbury,
Christchurch, New Zealand

September 26, 2011

Overview

The Original Goal

- Make department go-kart drive autonomously
- Select actuators, motion and distance sensors
- Development of a navigation system
- Interface to the existing control system
- Have go-kart drive itself around university

Our Goal

- Sub-goal of drive-by-wire go-kart
- Make a robust platform for future projects

The Go-Kart



Hardware Layout

PCBs

Block diagram of PCB

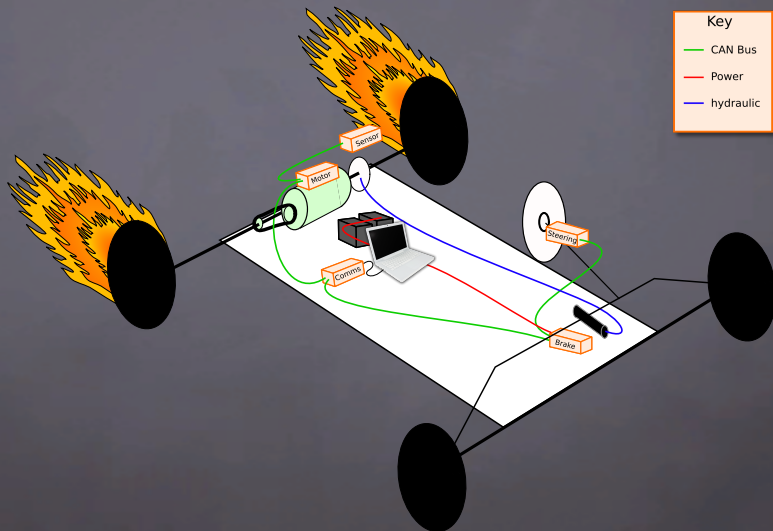
Hardware Layout

PCB Block Diagram

Block diagram of PCB

Hardware Layout

Whole kart



How it all communicates

Comms

CAN Bus

- Inter-Board Communications
- Expandable if someone wants to add more nodes

USART

- Two on each Board
- One used for debugging

SPI

- Two on each Board
- One 5v level logic

USB

- Fast communication with computer

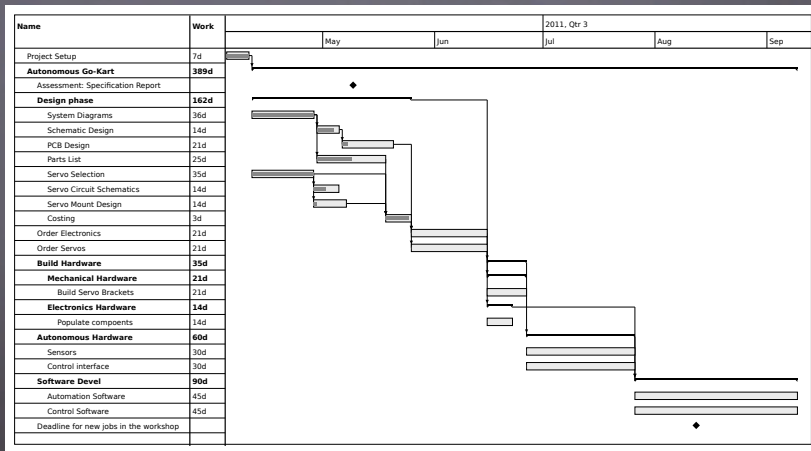
Conclusion

The end...

- All Hardware working
 - ▶ Only 3 minor mistakes on Boards
 - ▶ Nice hardware platform for future years
- Project almost stuck to time plan
 - ▶ Although we cut the goal down, we came close to achieving our stepping stone goal.
- Project well documented
 - ▶ Wiki for documentation
 - ▶ Group coding standard adhered to
- Most of all
 - ▶ I learnt a lot
 - ▶ Had a heap of fun



Project time line



Why use Atmel SAM7s

- Required Peripherals
 - CAN Controller
 - USB
- Familiarity
 - Have used SAM7s before
 - Large Library for Atmel
- Expansible
 - Spare GPIO
 - Can do some signal processing

Board Design

Dreaming about Altium

1. Select major components
 - ▶ MCU
 - ▶ Voltage regulators
 - ▶ etc..
2. Select headers and connectors
3. layout schematics
 - ▶ Use sheets to modularise!
4. Connect sheets
5. Layout schematics

Main Schematic

