Mariokart
An Autonomous Go-Kart

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Overview

The Original Goal

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

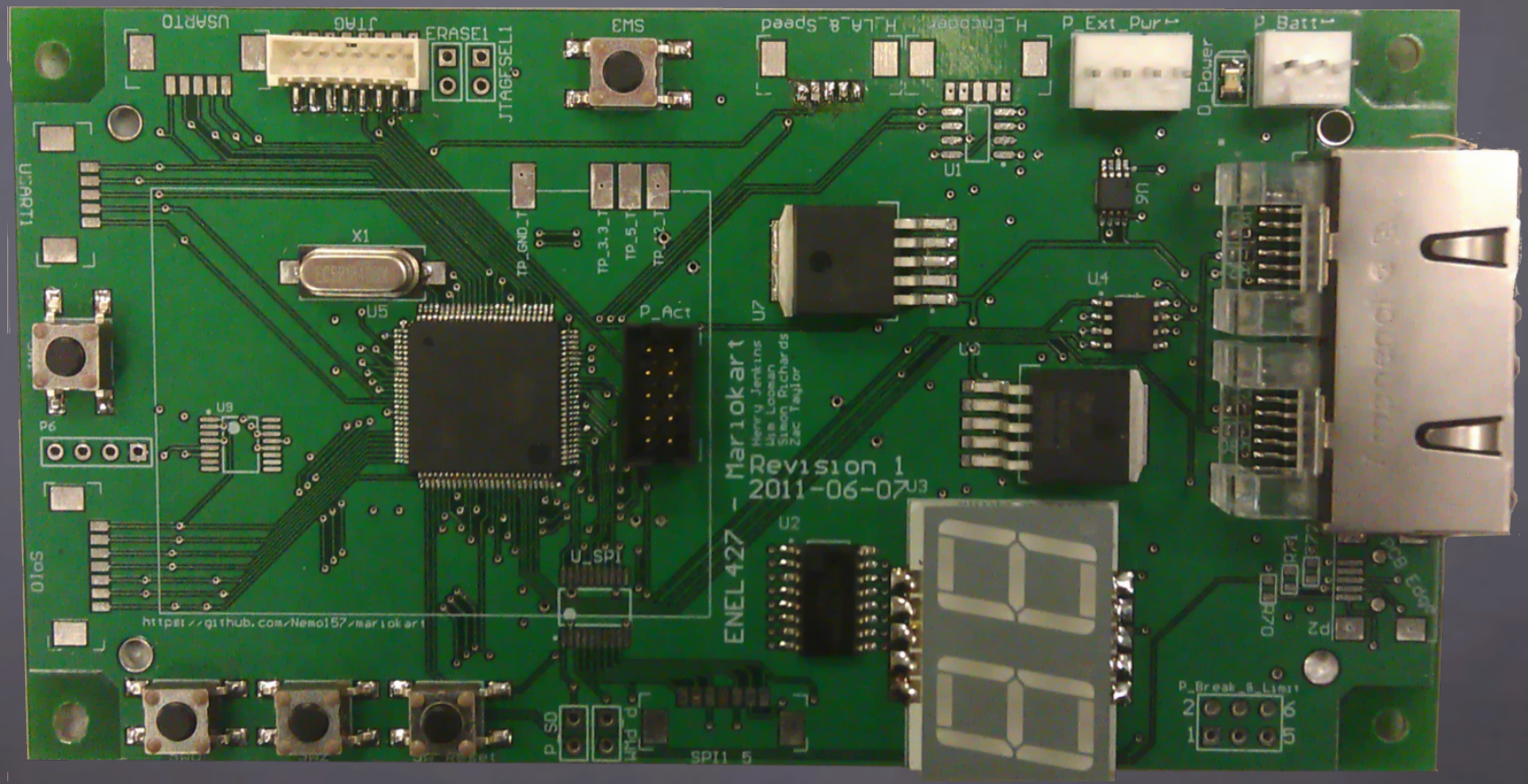
Our Goal

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

The Go-Kart

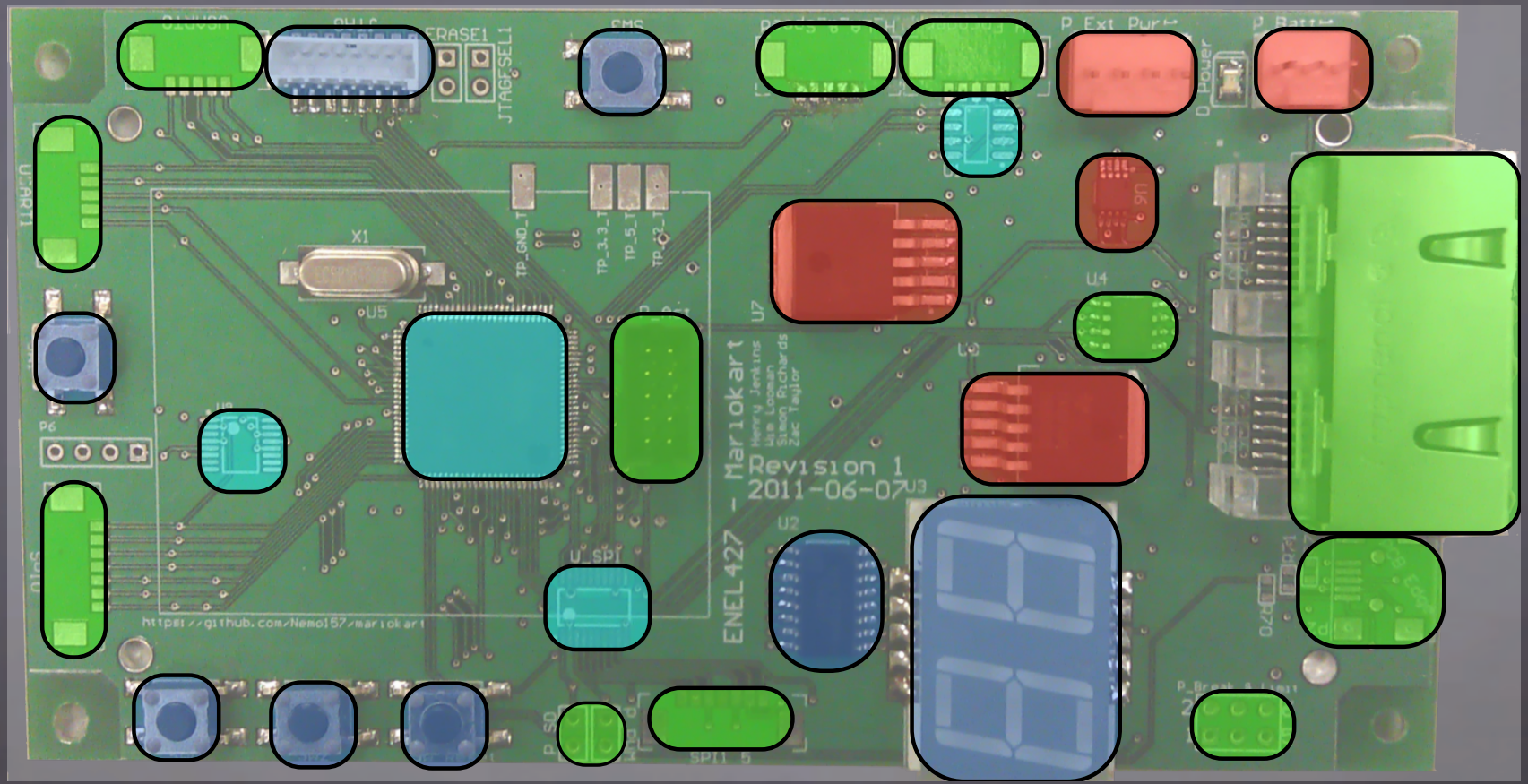
Hardware Layout

PCBs x 5



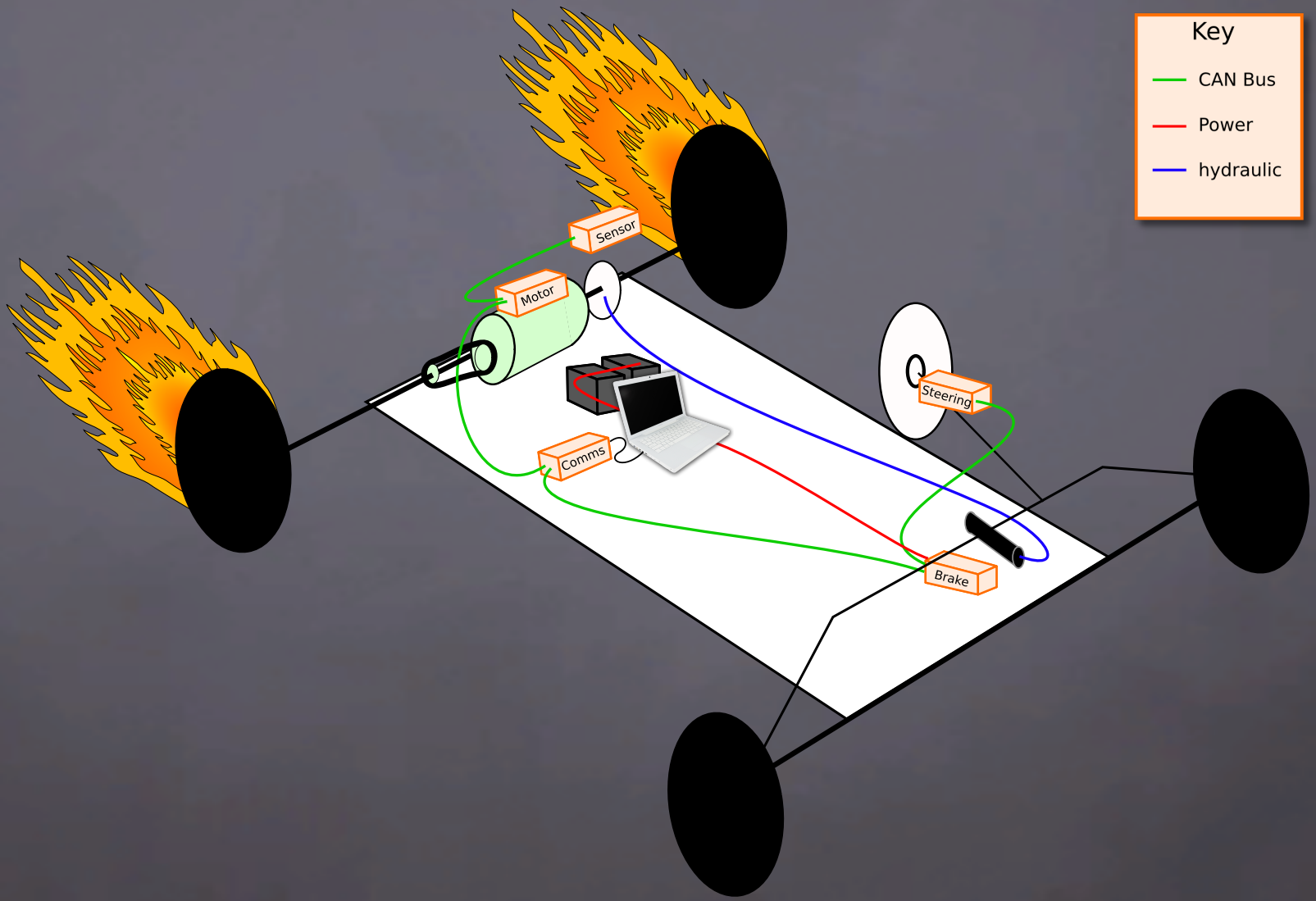
Hardware Layout

PCB Block Diagram



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

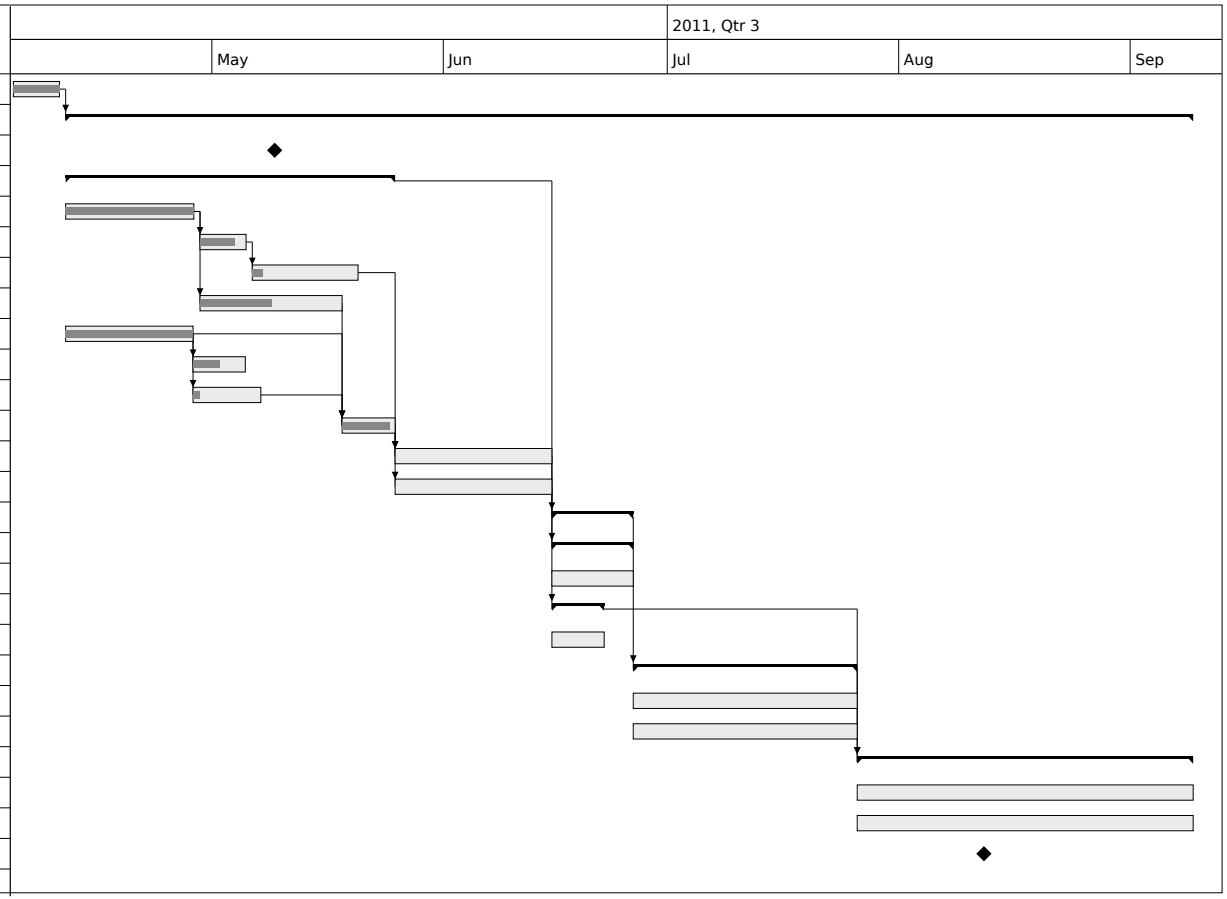
Conclusion

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

Name	Work
Project Setup	7d
Autonomous Go-Kart	**389d**
Assessment: Specification Report	
Design phase	**162d**
System Diagrams	36d
Schematic Design	14d
PCB Design	21d
Parts List	25d
Servo Selection	35d
Servo Circuit Schematics	14d
Servo Mount Design	14d
Costing	3d
Order Electronics	21d
Order Servos	21d
Build Hardware	**35d**
Mechanical Hardware	**21d**
Build Servo Brackets	21d
Electronics Hardware	**14d**
Populate compoents	14d
Autonomous Hardware	**60d**
Sensors	30d
Control interface	30d
Software Devel	**90d**
Automation Software	45d
Control Software	45d
Deadline for new jobs in the workshop	



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