Robot Club Toulon : Electrical Presentation 2025

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Abstract. Keywords: RoboCup Soccer, Middle-Size League, Multi-robot, Actuator Modeling

1 Electrical Presentation

1.1 Architecture

Architecture of RCT robots relies on a cortex composed by an embedded computer (*P12B-i7-10810U* programmed in C#) interfacing advanced sensors such as LIDAR and cameras for positioning, scene analysis and collision avoidance, and communicating with a peripheral board for interfacing actuators and simple sensors as shown in Fig. 1. The kicking system is a third board, independent for development and safety reasons due to high voltage and EMI emissions.
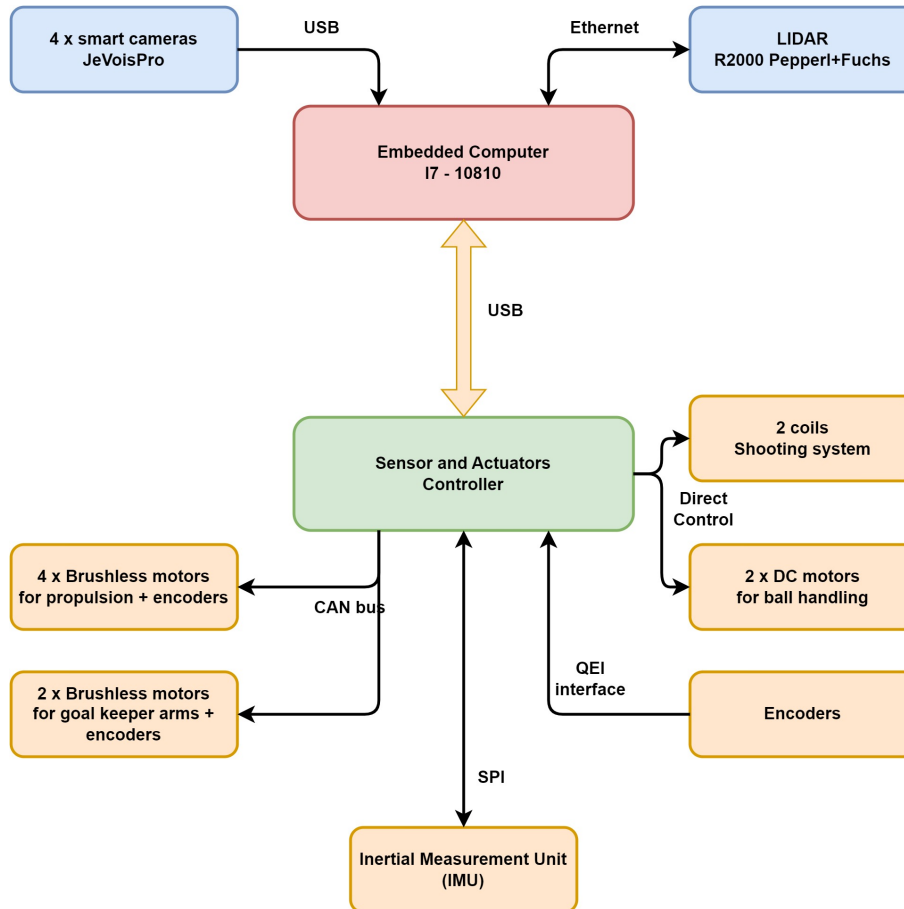

Fig. 1. RCT robots architecture description.

Collision and obstacle avoidance is based on two types of sensors : a Pepperl+Fuchs R2000 lidar and four JeVois Pro smart cameras running under YOLO7Tiny.

1.2 Sensors and Actuators Controller

The Sensors and Actuators Controller board is a new home-designed PCB in 4-layers with a DSP¨from Microchip as main processor This board is able to drive up to 2 150W DC motors, it manages 2 quadrature encoders and up to 20 digital or analog I/O. It is also drinving our 8 swerve drive motor controllers using CAN bus. Basic sensors such as IR proximity sensors, ultra sonic telemeters, IMU and precision gyro are connected to this board using SPI, I2C or UART buses.
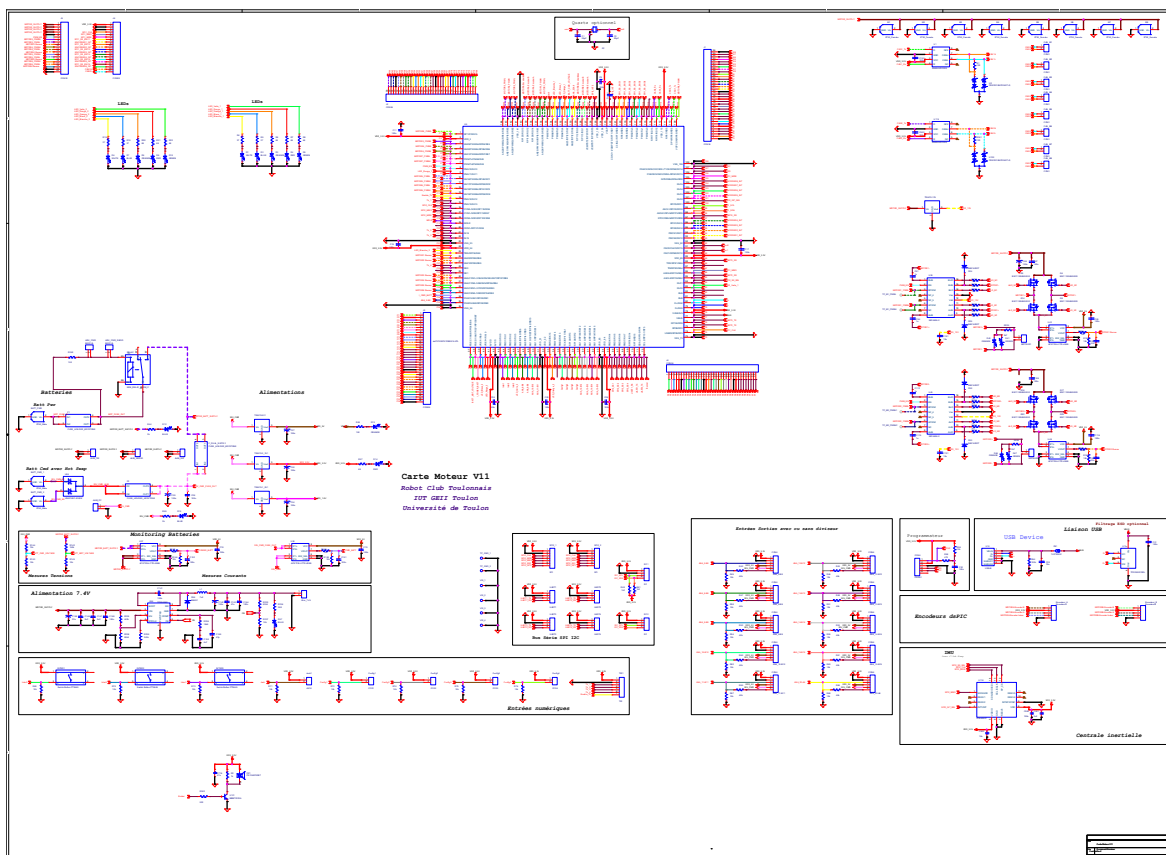

Fig. 2. Sensors and Actuators Controller Schematic

1.3 Kicking system

The kicking system board has been inspired by Cambada and Tech United designs, but as been fully re-designed for improving safety using optocoupling and a separate power supply. Its schematic is presented at Fig. 5. It can adjust the kicking strength using a PWM controlling an IGBT. Kicking spped can vary from 0 to $75km/h$.
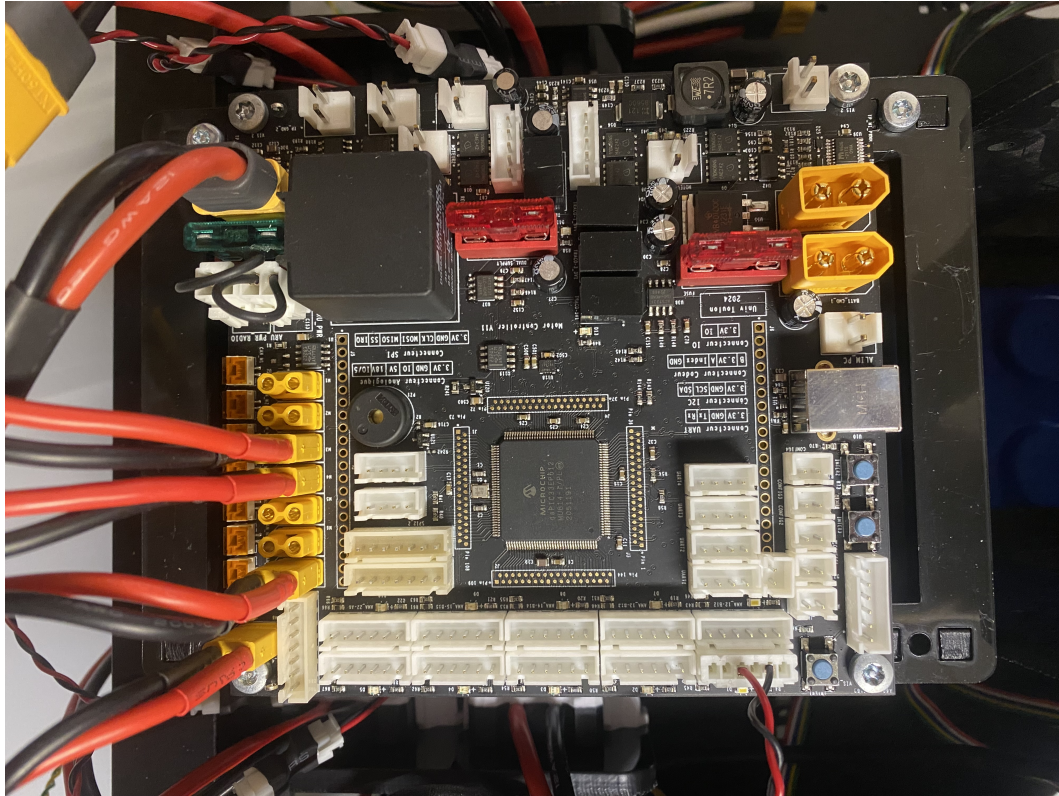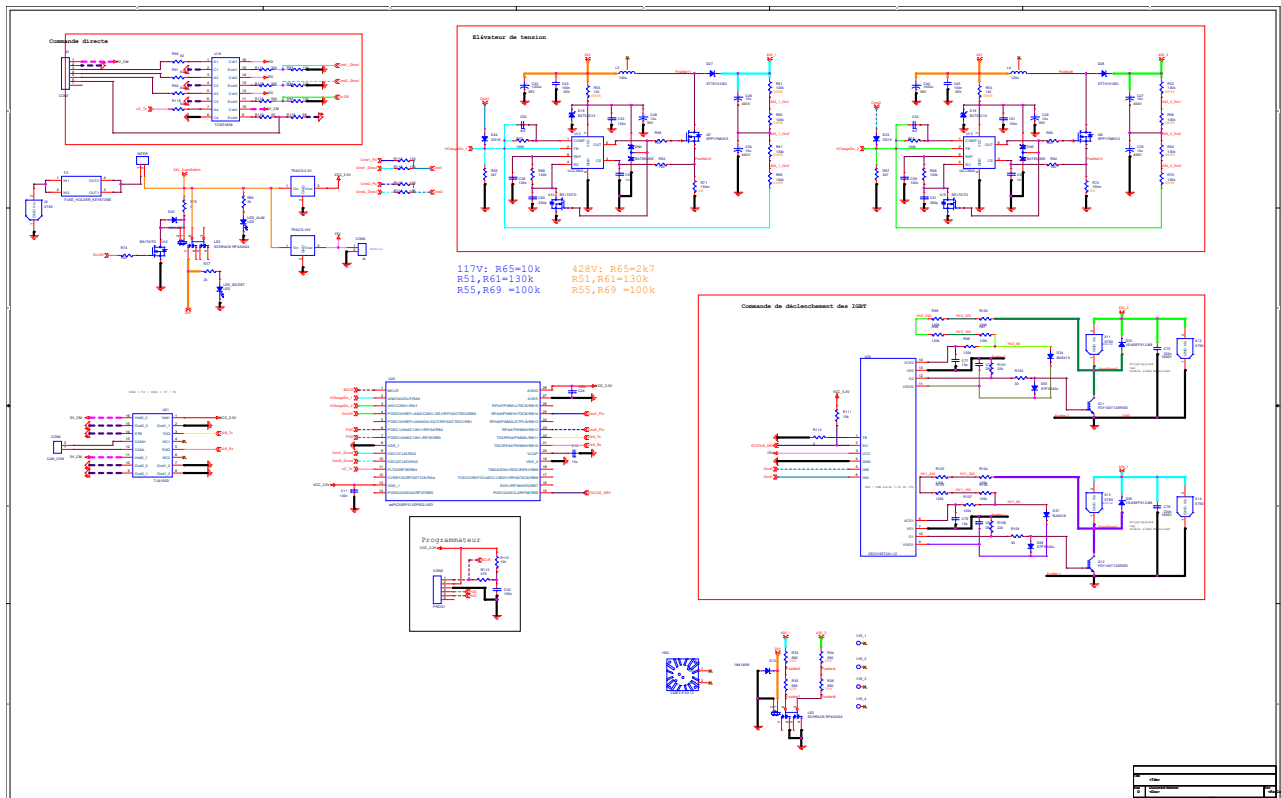
Fig. 3. Sensors and Actuators controller Board

Fig. 4. Kicking system schematic

Fig. 5. Kicking system schematic