

Robot Club Toulon : Electrical Presentation 2019

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

1 Electrical Presentation

Architecture of RCT robots relies on a cortex composed by an embedded computer 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.

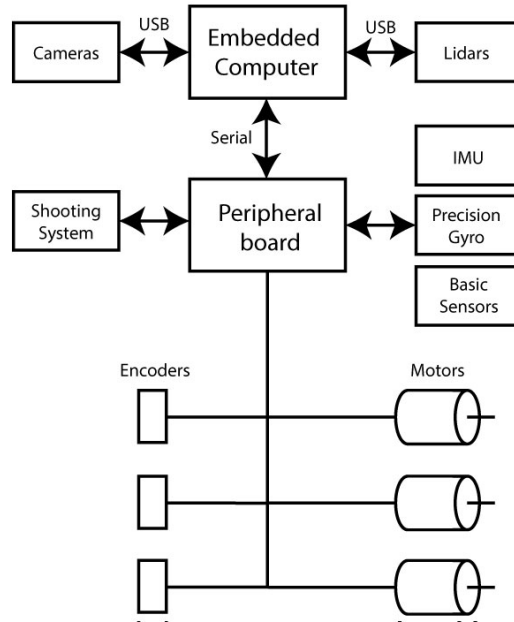


Fig. 1. RCT robots architecture description.

The embedded computer used is a *LattePanda Alpha* programmed in *C#*. This one is connect threwh a USB link to a smart camera facing an omnidirectional home-designed mirror. Two SICK TIM561 LIDARS are also connected via USB for collisions and obstacles avoidance.

The peripheral board is a home-designed PCB in 4-layers with a DSP from Microchip as main processor as shown in Fig. 3 and in Fig. 4. This board is able to drive up to six 150W motors, it manages 8 quadrature encoders and up to 20 digital or analog *I/O*. 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.

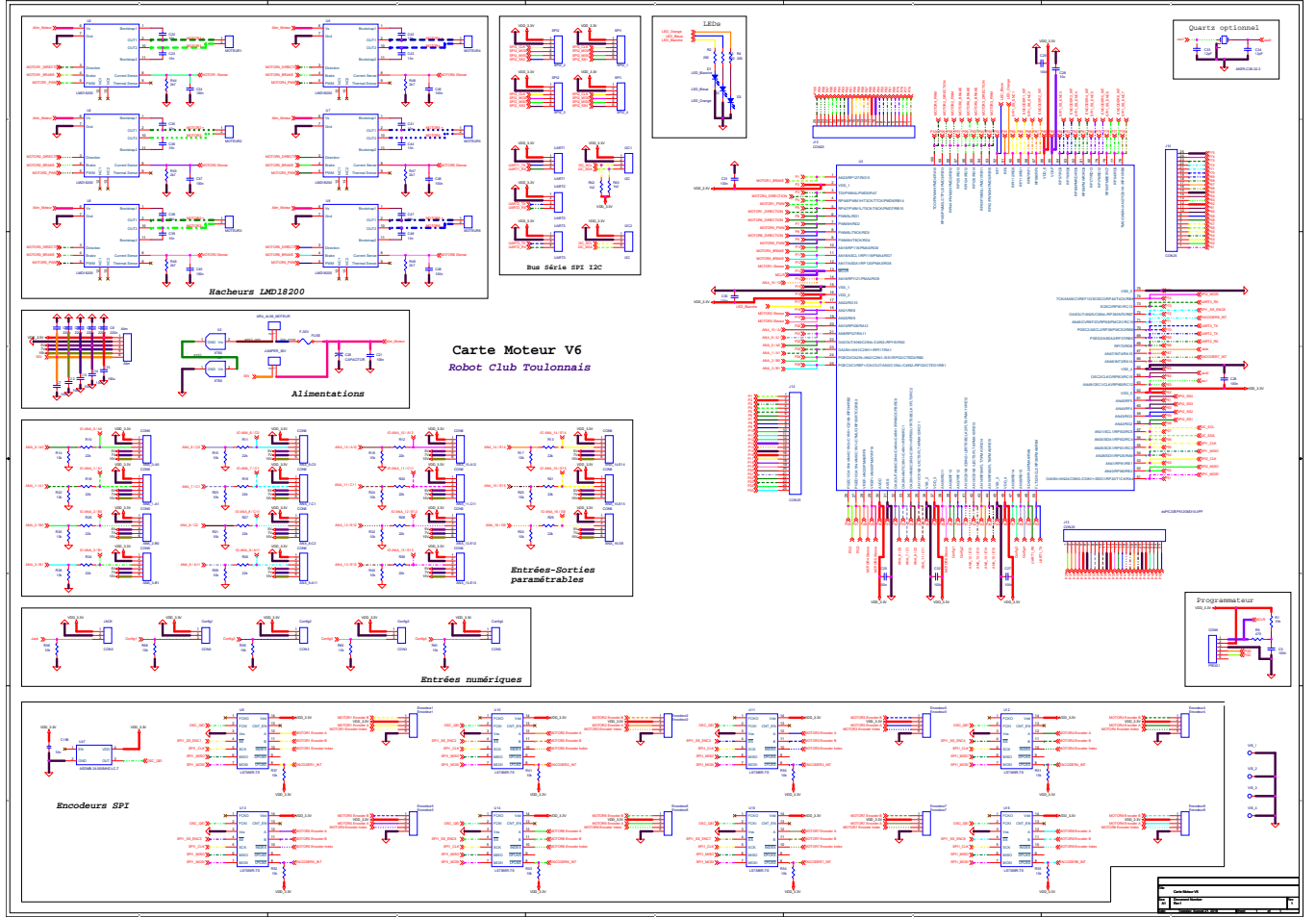


Fig. 2. Peripheral Board schematic

The power board is a secondary board used for generating different power supplies safely to the other boards. As shown on Fig. 5, 3 switched TRACO power supply having an output current up to 1A are used for generating 15V, 5V and 3.3V. 15V voltage is used by Sick industrial sensors, 5V is used by some sensors (rather old ones such GP2D12 IR sensors from Sharp, but no longer present in the robot), and 3.3V is used by the peripheral board for powering its DSP and most of the device connected to it. It is made on a 2 layers PCB as shown in Fig. 6 and Fig.7.

The coil gun board has been inspired by Cambada and Tech United design and is shown at Fig. 8. It can adjust the kicking strength using a PWM controlling an IGBT.

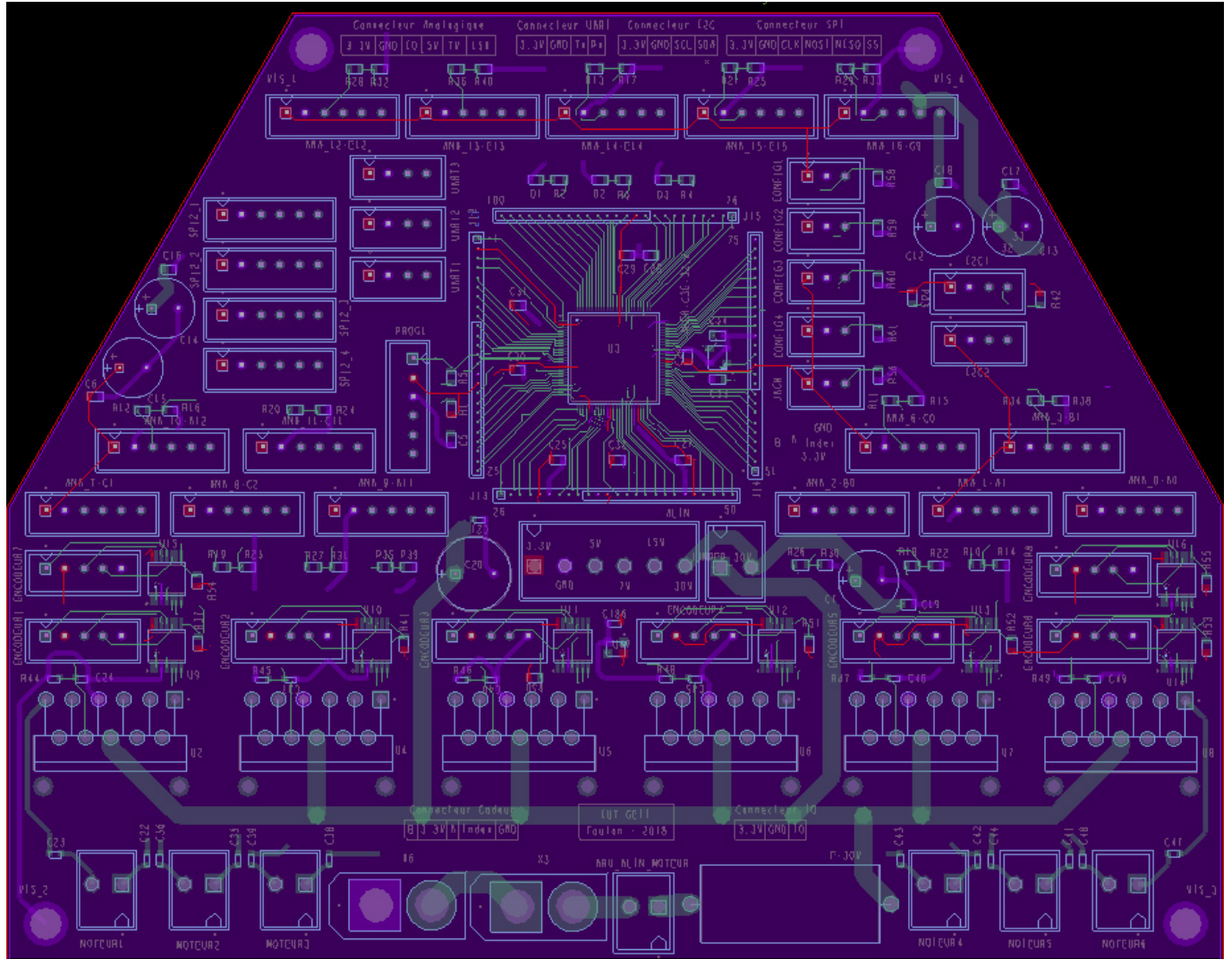


Fig. 3. Peripheral Board PCB

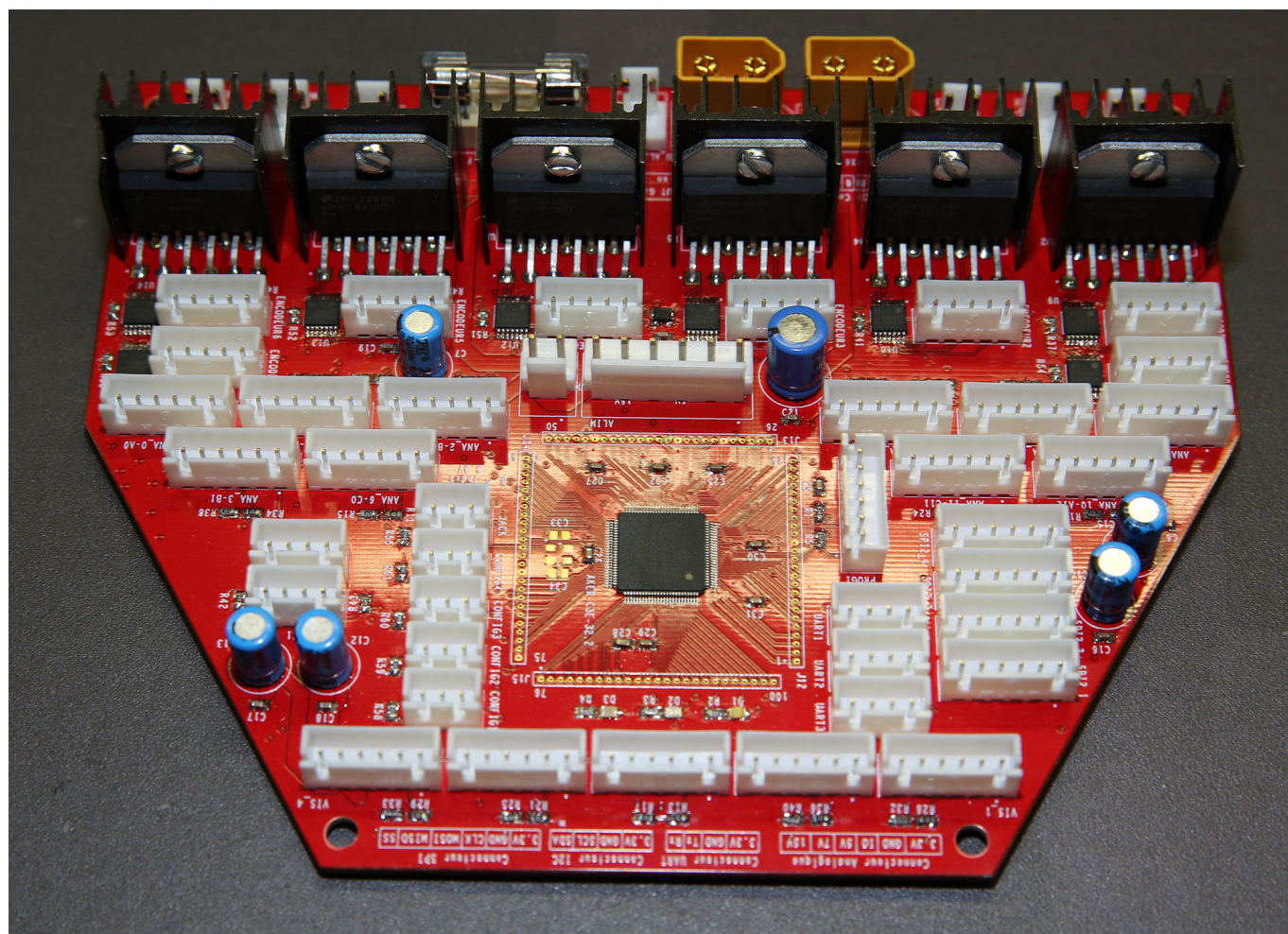


Fig. 4. Peripheral Board

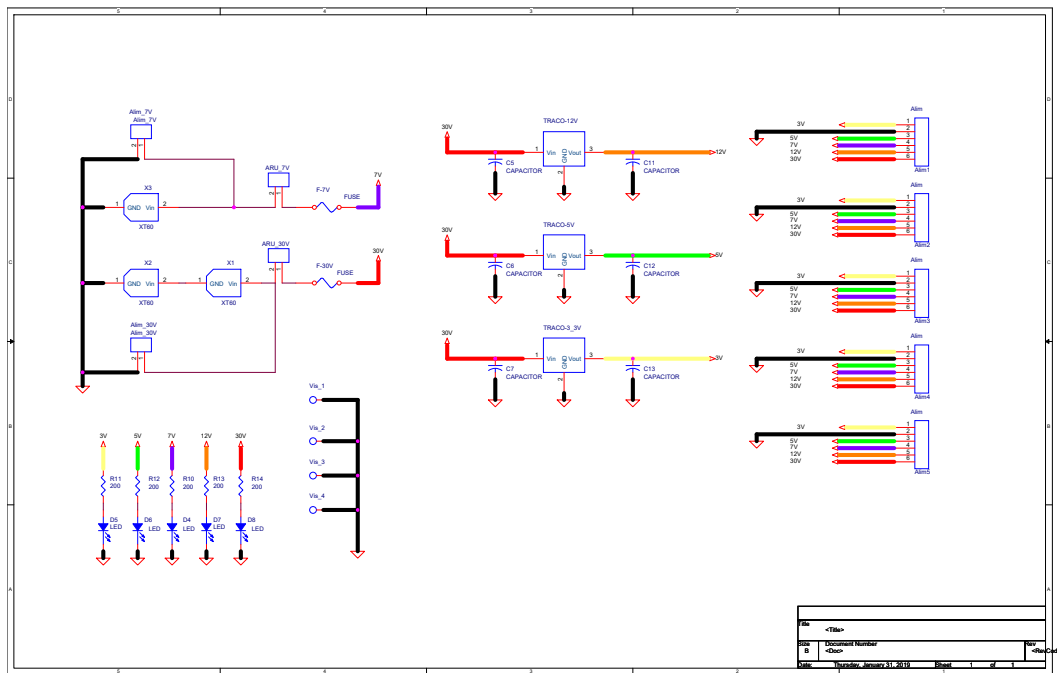


Fig. 5. Power Board schematic

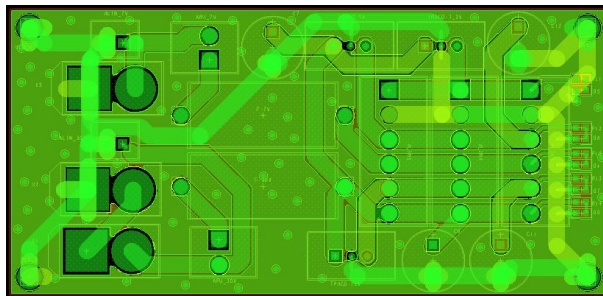


Fig. 6. Power Board PCB

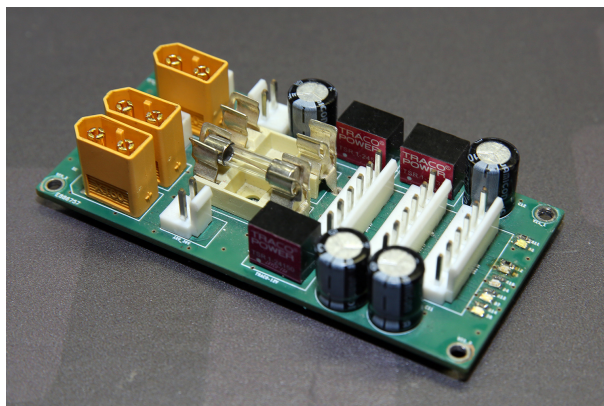


Fig. 7. Power Board PCB

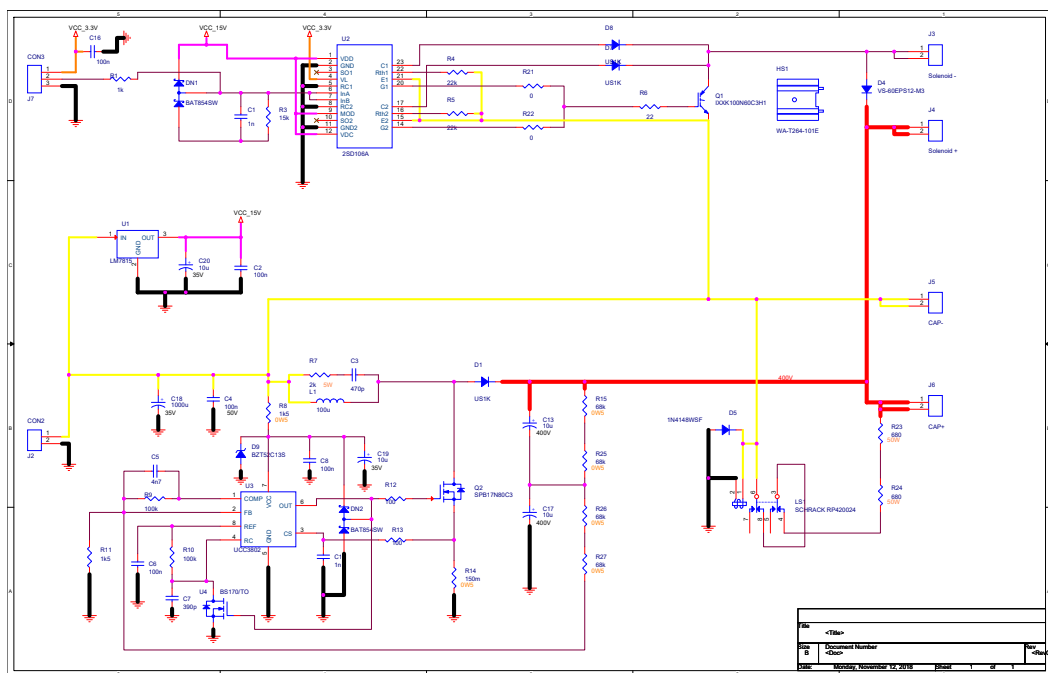


Fig. 8. Coil Gun Board schematic