Prototypage and performance of a servomechanism

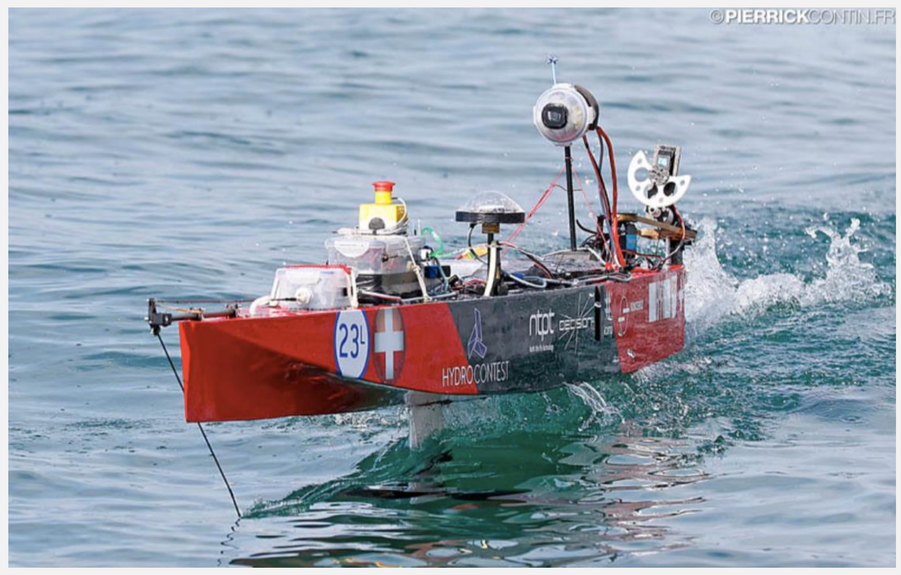
Gabriel Muret

Laboratoire d'Automatique, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
Sous la supervision du Dr Philippe Müllhaupt

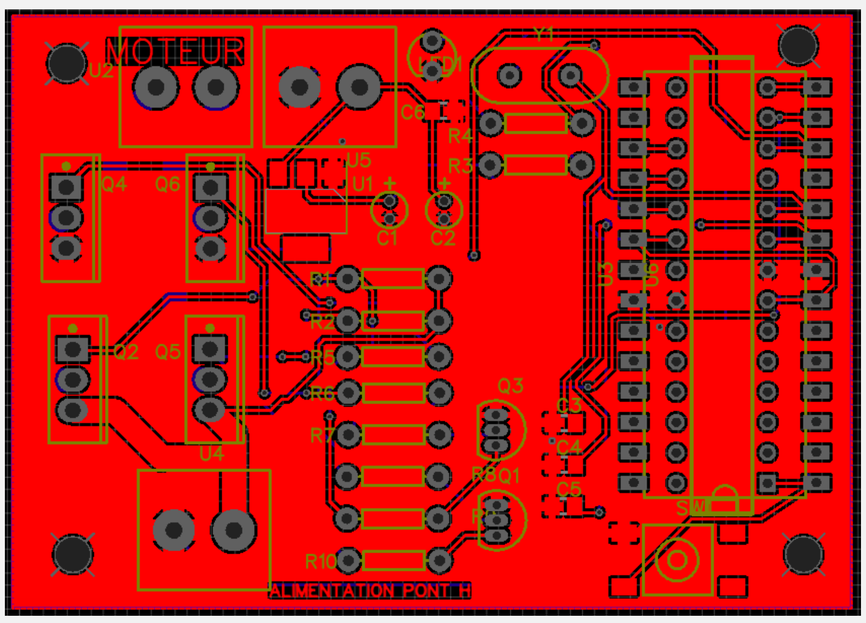
Concept

Every year, the Hydrocontest EPFL Team participates to this prestigious competition at the end of the summer. Two boats are presented each year to this contest. The purpose of this project was to design an operational PCB board that is cable of settling a voltage supply problem on board of one of the boats. Indeed, the servomechanisms require a supply voltage of 7.4V whereas the battery of the boat furnishes 36V (Contest Rules).

The light boat



PCB design

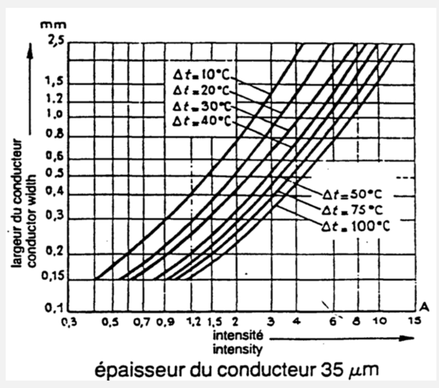


- 2 layers PCB, components mostly THM
- Microcontroller ATMEGA168-20PU
- Voltage regulator with V_{in} from 7 to 25V and V_{out} at 5V in order to supply the Atmega

Heating

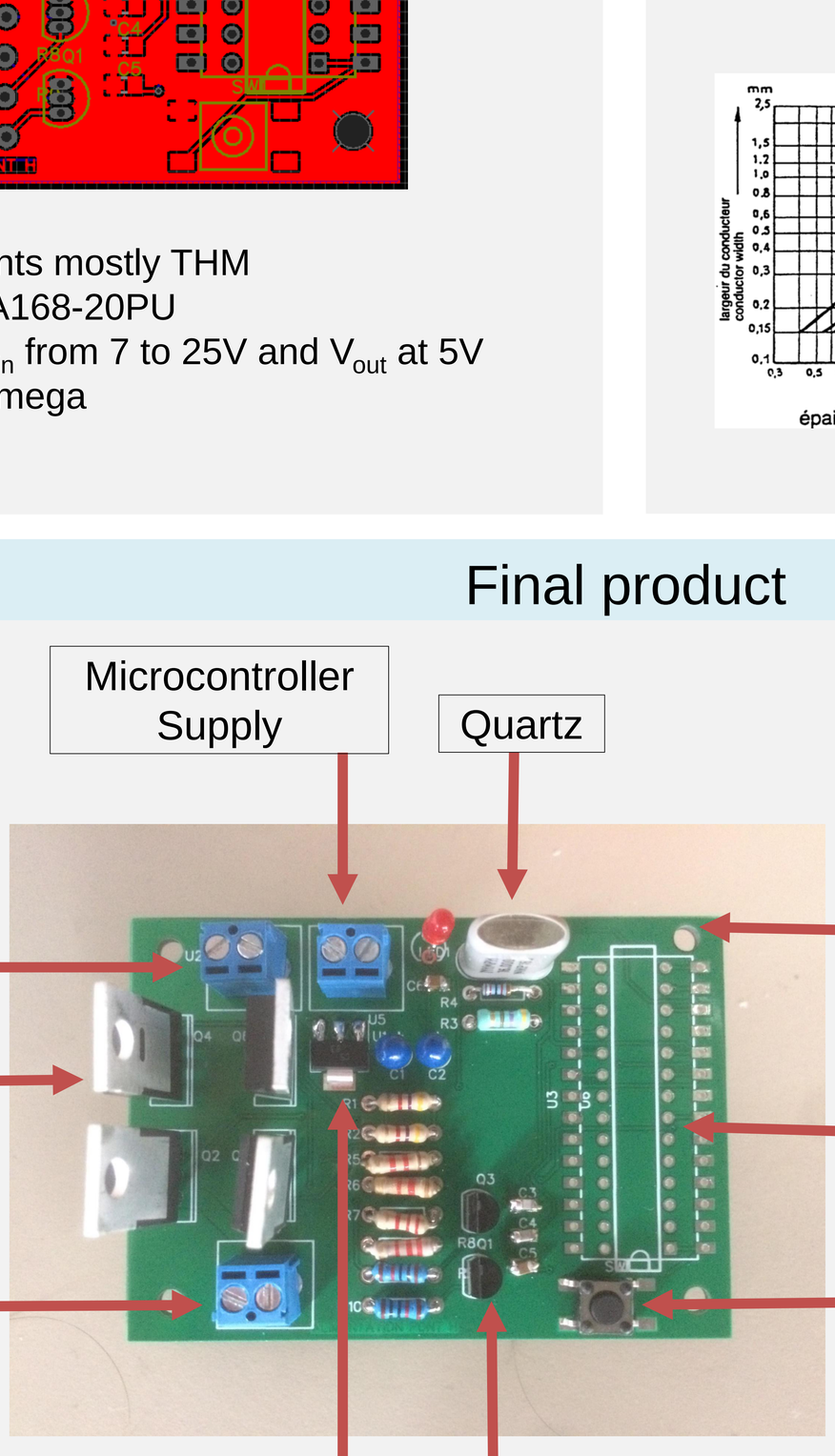
- Important current on the H-bridge
- Choice of mosfets with low R_{ds} on $\simeq$ 5.6 mΩ
  ➔ $\Delta T_{max} \simeq 5°$
- Width tracks dimensionning

Alternative possibility : Bec Converter



Can directly transform 36V into the 7.4V required by the servo

Final product



Possible improvements

- Miniaturization by using the TQFP package instead of the PDIP
- SMD components could have been used
- The PCB layout could be improved to gain space
- Performances have not yet been tested rigorously