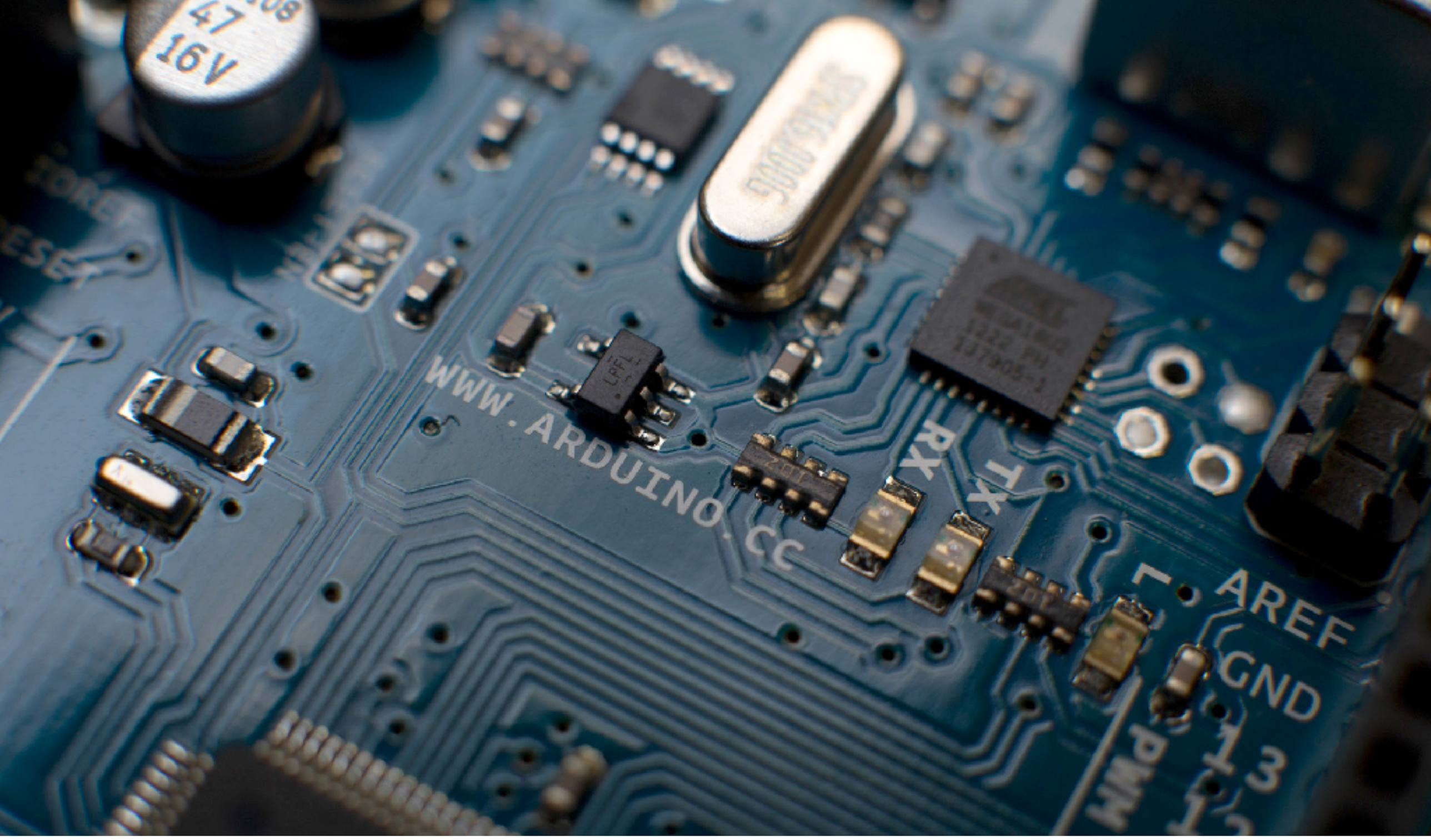

Robotic and interactive systems

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Objectives

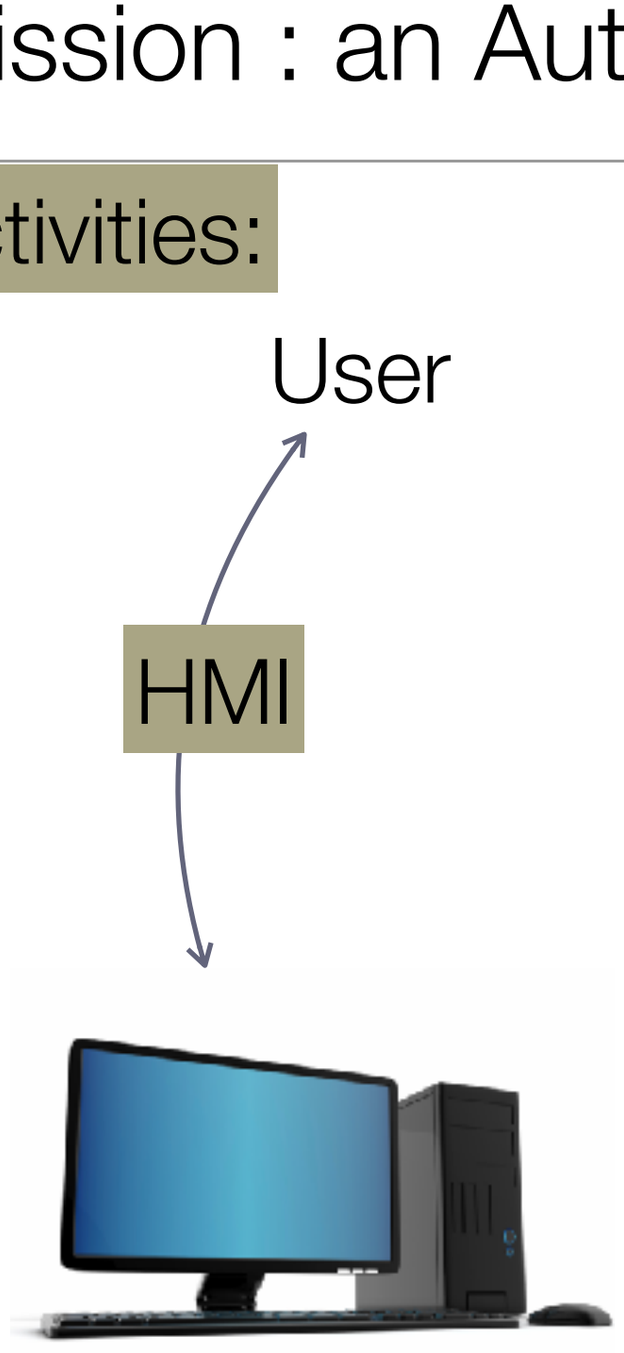
- Developing conception skills through a project only specified at **high level**
- Improving initiative and creative skills: there is **no expected solution**
- Implementating and integrating knowledge learned this year (Human Machine Interface, Industrial Informatics, control theory…)
- Addressing challenges of **low-level hardware** commonly used in robotic
- Improving **autonomy** (finding and understanding components documentation)
- Introducing and facing problems formally addressed in latter years
- **Team Work !! Team Work !! Team Work !!**

Mission : an Autonomous Cartographer

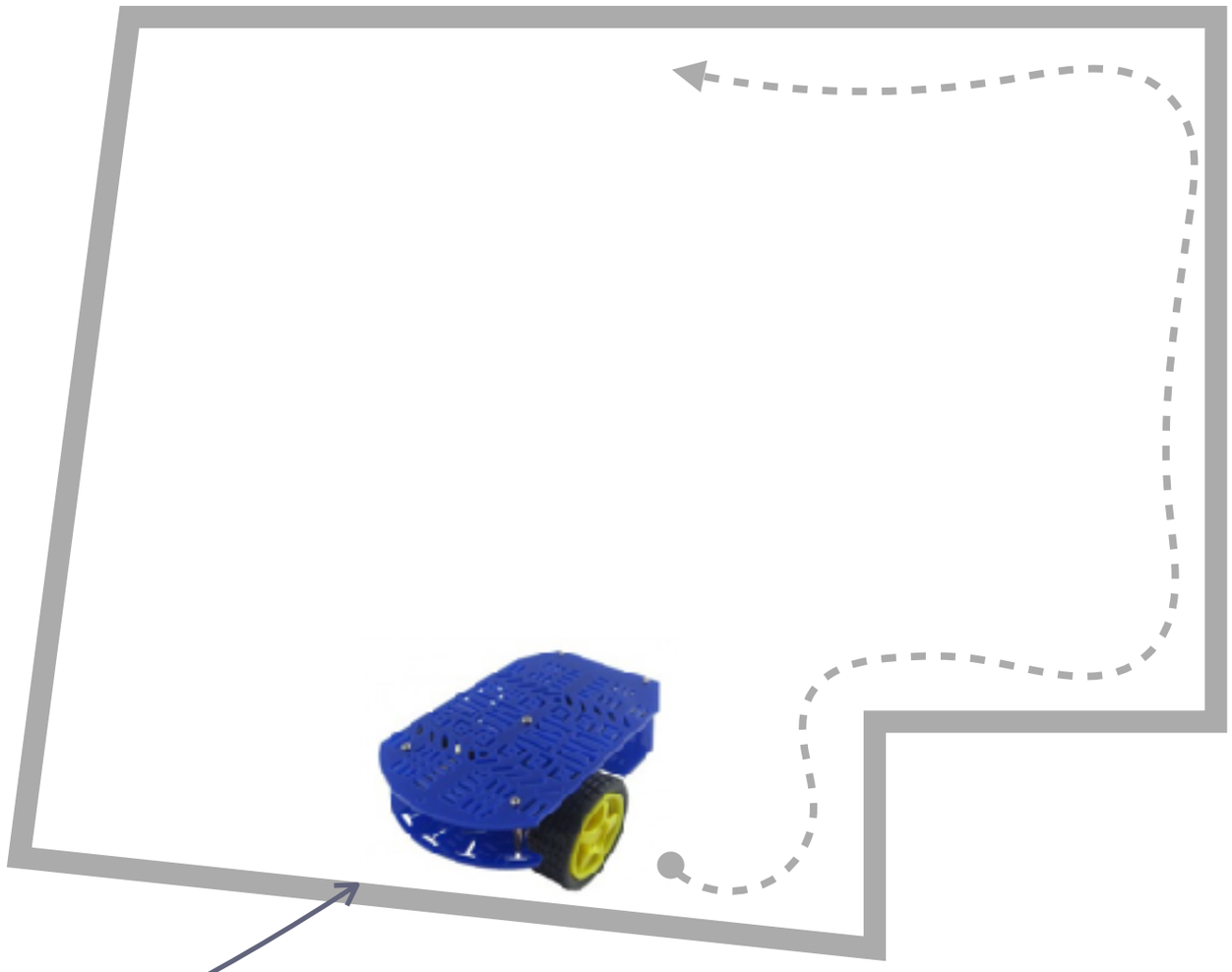
Activities:

User

HMI



Decision



Sensor/actuator control

Mobile platform implementation

Specification: an Autonomous Cartographer

HMI

- Draw the map in real-time
- Interact with the robot
- Start/Stop autonomous cartography
- Manual control of the robot (forward order, rotate, …)
- Display current robot state
- *Optional : Trajectory planning,…(anything you want to test!)*

Specification: an Autonomous Cartographer

Decision

- Read and understand the robot state
- Update the map
- Decide where to go next
- Generate orders to go there (e.g. : forward 30cm, rotate left 90°,…)

Spécification : Réalisation d'un robot mobile autonome de cartographie

Sensor/actuator control

- **SAFETY FIRST**, implement anti-collision (may supersede high level orders)
- Interpret high level order (forward 30cm => activate all motors during 15s, …)
- Publish robot state

Spécification : Réalisation d'un robot mobile autonome de cartographie

Sensor/actuator control

- **SAFETY FIRST**, implement anti-collision (may supersede high level orders)
- Interpret high level order (forward 30cm => activate all motors during 15s, …)
- Publish robot state

Try not to burn the hardware

- Never feed the motors direction from the microcontroller board
- Arduino DUE => pins work with 3.3V

Hardware

Mobile Platform:

- **Robot 4WD1 Aluminium Lynxmotion, with encoder (should be already assembled)**

- **Motor driver Sabertooth R/C 2 X 12A 6V-24V Dimension Engineering**

- **Arduino DUE (32 bits)**

Sensors:

- **Sharp GP2Y0A21YK0F IR Range Sensor**
- **HC-SR04 Ultra01+ Ultrasonic Range Finder**
- **motors encoders**

Communication:

- **XBEE module**
- **ou module bluetooth HM-10**

Accès à la salle de manipulation

- Créneaux réservés à l'AIP

- Accès libre :

  Disponibilité de la salle affichée à l'AIP ou sur internet http://aip-primeca.ups-tlse.fr

  Se présenter à Cyril Briand ou Francine Fugier. S'inscrire sur le registre et noter le créneau de présence

  Respecter les lieux: fermer les portes en partant, ranger les tables et chaises, ranger le matériel

- Le matériel reste à l'AIP

Evaluation

- 25/05/2022: defence
- Oral presentation + code and documentation delivery
  - 15 mn presentation + 5 mn questions
  - must include a demonstration of the robot (prepare a backup video in case of last minute malfunction)
- Evaluation criteria :
  - How far you get in the project
  - Presentation quality
  - Quality of the conception and implementation (modularity, evolutivity, repeatability, documentation, how it has been validated,…)
  - Documentation: a report both detailing how to use your robot and your code **AND** explaining and justifying your conception

Where to start?

- Assemble a team
- Assign roles in the team
- Start refining the specification
- Find documentation and specification of the hardware
- Understand hardware capabilities and limitations