THREE-WHEELED NARROW URBAN CAR

Nestor Roqueiro
PRESENTATION

- InovaLab - Laboratório de Inovação
- Urban Vehicle
- Vehicle Prototype
- Tilting Control
- Powertrain
INOVATION LAB - TEAM

- Professors
  - DAS
    - Hector Bessa Silveira
    - Nestor Roqueiro
  - EMC
    - Amir A. Martins de Oliveira Jr.
    - Edison da Rosa
    - Lauro Cesar Nicolazzi
    - Rodrigo de Souza Vieira

- PhD Student
  - Márcio Schneider de Castro

- Master Students
  - Anton Gora Junior
  - Bruno Leonardo Schneider
  - Luis Márcio Medina do Carmo
  - Renato Ferreira Simão

- Undergraduated Students
  - Renan Alfredo Hack Wolf

- Partners:
**INOVATION LABORATORY**

- Colaboration
  - Automation and Systems Department
  - Mechanical Engineer Department

- Main objective
  - Creating inovative concepts about urban mobility, improving the urban environment.

- Concepts
  - Computer based control systems (*drive-by-wire*)
  - Hybrid powertrain
  - **Result: Inovative urban vehicle**
URBAN VEHICLE – OUR PROPOSITION

- Advantages: motorcycle x automobile

  - Motorcycle
    - Reduced mass
    - Less road occupation
    - Good relation mass/load
    - Price
    - Fast to avoid traffic jams
    - Few energy consumption

  - Automobile
    - Increased safety
    - Increased confort
Urban Vehicle

- 3 Wheels
- Tilting
- Inspiration
  - F300 Life Jet, Mercedes-Benz
- Low-polluting
- Ergonomics
- Tandem
- 2 passengers
VEHICLE PROTOTYPE

- **Especifications**
  - Overall length: 2.9 m
  - Height: 1.5 m
  - Front track: 1 m
  - Max speed: 108 km/h
  - Load capacity: 190 kg
  - Total weight: 400 kg
TILTING CONTROL

- Dynamic model development

- "Steering Tilt Control" (STC)
  - Lean control based on steering
  - Sliding mode control technique

- Input
  - Driver steering angle
  - Speed

- Measurings
  - Lean
  - Speed
  - Steering angle
HYBRID POWERTRAIN

- Use of mixed sources of energy
  - Electric generator (Ethanol)
  - Batteries
- Vehicle traction by electric motor (Serial Hybrid concept)
Motor-Generator

- Adapted to Ethanol.
- Single phase AC generator
- Rated power: 7 kW (7.2 max)
RECTIFIER

- Rectifier AC/DC

- Under development in Spain
  - Internation cooperation with Universitat Politècnica de Catalunya
**Electric Motor**

- Brushless DC
- Hub motor
- Rated power: 10 kW
- Max. Power: 30 kW
- Tension: 110 V
Next steps

- Connecting all components
- Assign Tilting Control to prototype
- New technologies to be incorporated to project
THANK YOU!