

Mechatronic Control of an Acceleration and Braking System



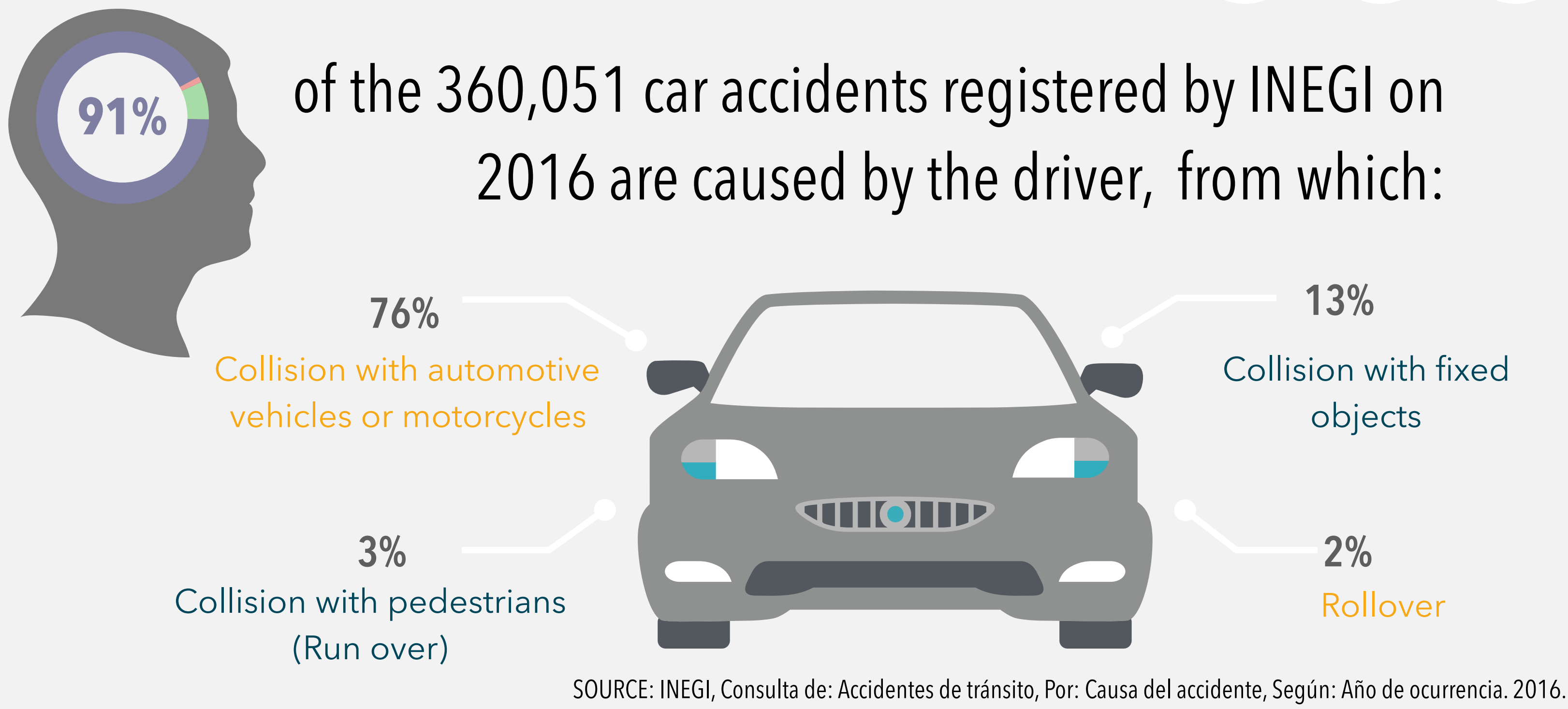
Mexico City Campus
School of Design, Engineering and Architecture
Department of Mechatronics Engineering

Advisors
Dr. Martín Rogelio Bustamante Bello
Ing. Javier Izquierdo Reyes
Ing. Luis Alberto Curiel Ramírez

Mechatronics Engineering Project
December 2017

IMT César Silva Bengochea A01331289
IMT Noé Decuir González A01334605
IMT Marianne Velázquez Guedea A01337753

PROBLEM STATEMENT

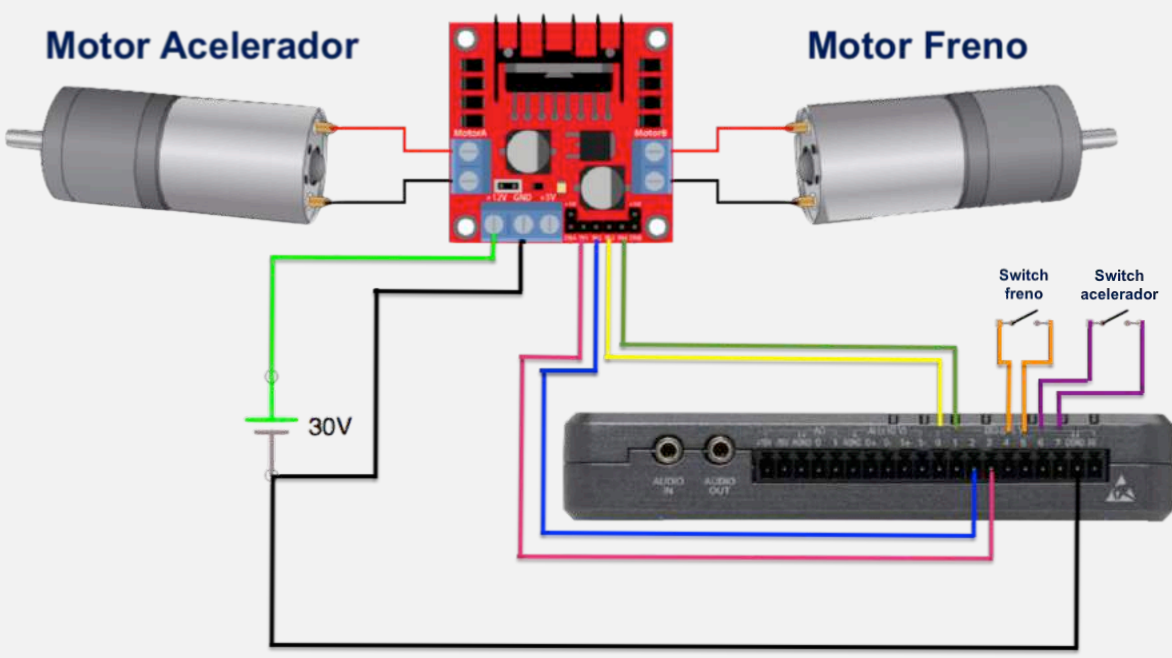


OBJECTIVES

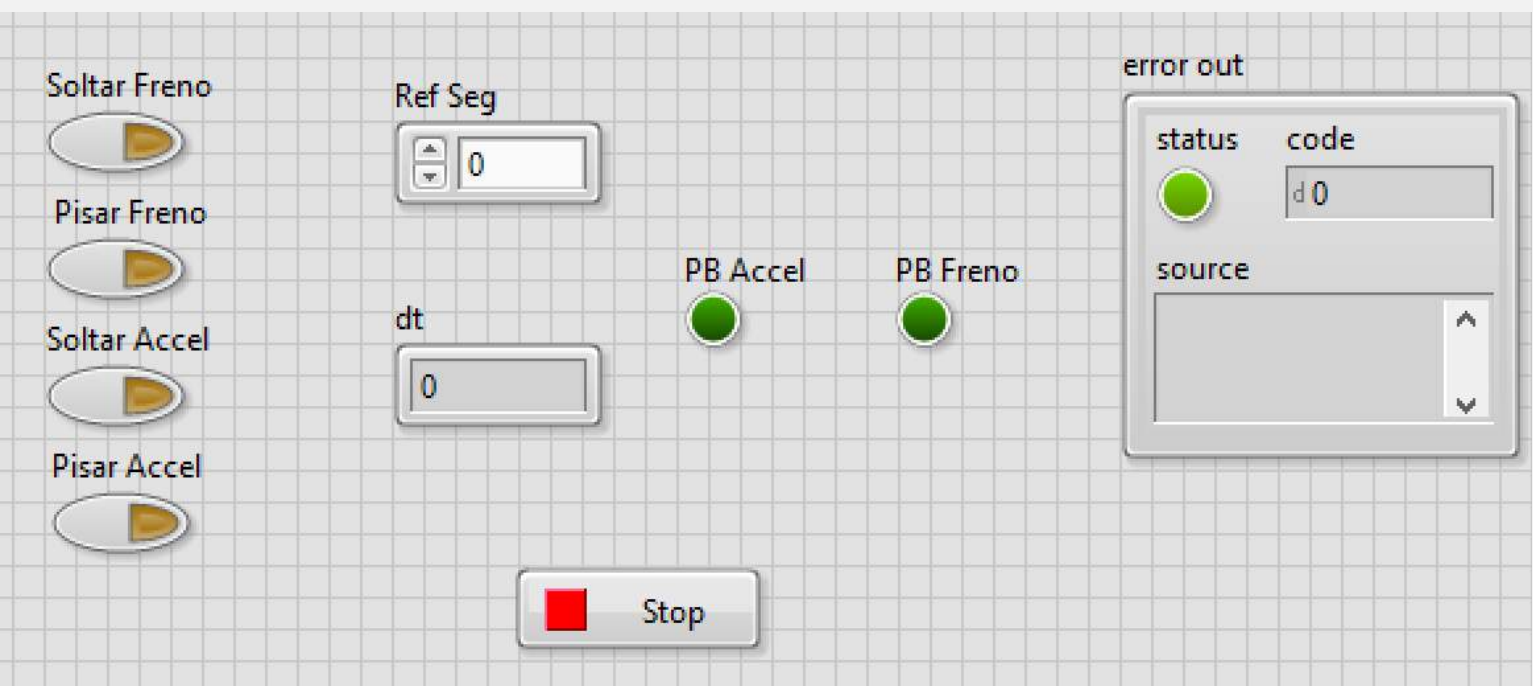
Design, construct and implement a mechatronic system capable of remotely controlling the necessary actuators for driving a vehicle (steering wheel, braking and acceleration pedals)

- Implementation of a control system for a self-driving mode within a controlled area.
- Improvement of the steering wheel mechatronic system, developed by previous teams.
- Design of power electronics for the acceleration and braking system.
- Data Dashboard implementation for the remote control of the acceleration and braking actuators.

FINAL CIRCUIT

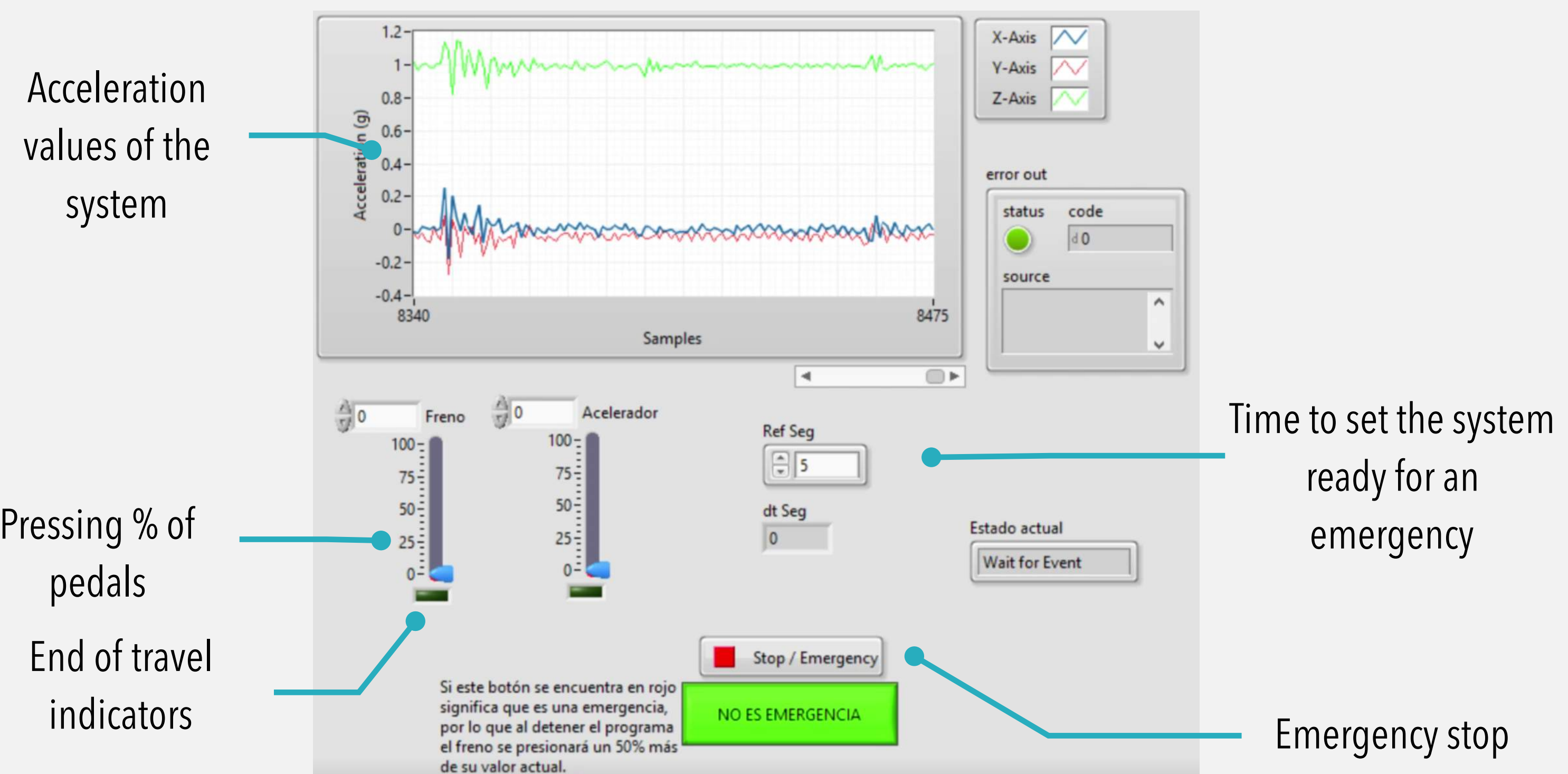


SYSTEM TESTING



Throughout these tests we could determine the time values for the total travel of the nut. Thus, we were able to determine the acceleration and braking percentage for each pedal.

FRONT PANEL



DEVELOPMENT

STEERING SYSTEM



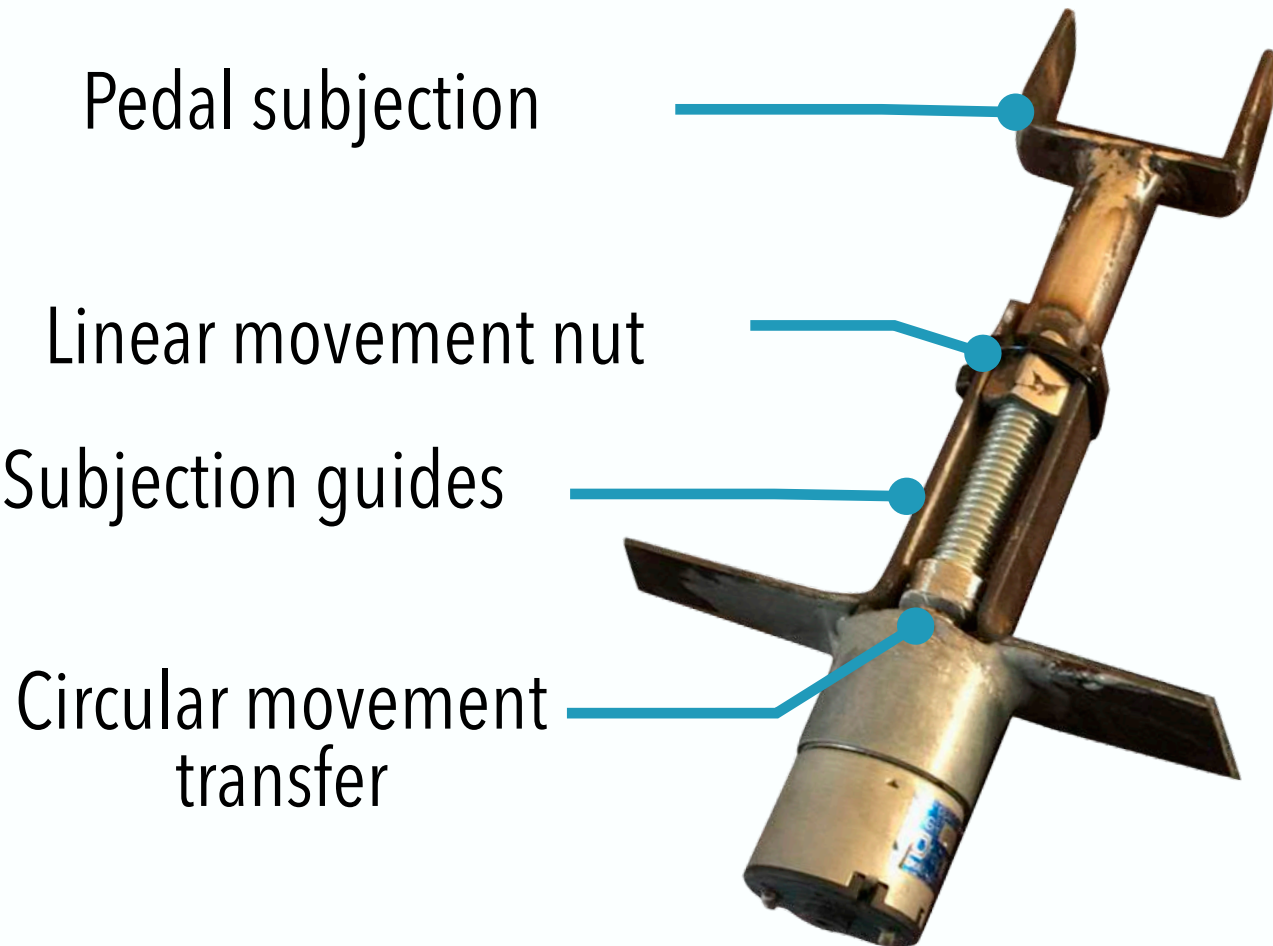
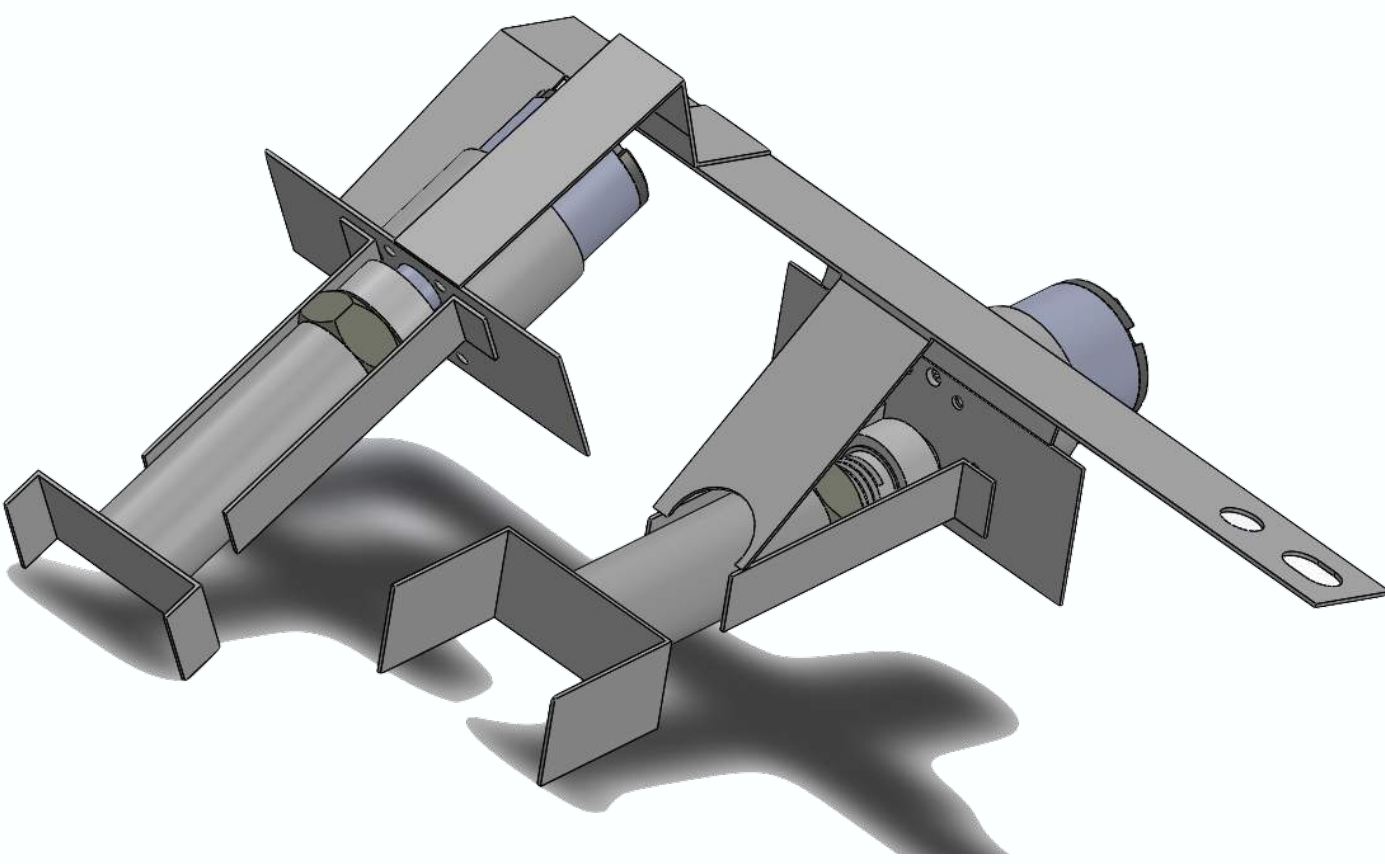
Mechanical adjustment of the past system, to correct failures

- Welding of a new gear train
- Alignment between the motor axis and its gear train
- Alignment between the motor gear train and the steering wheel



ACCELERATION AND BRAKING SYSTEM

2. Physical model

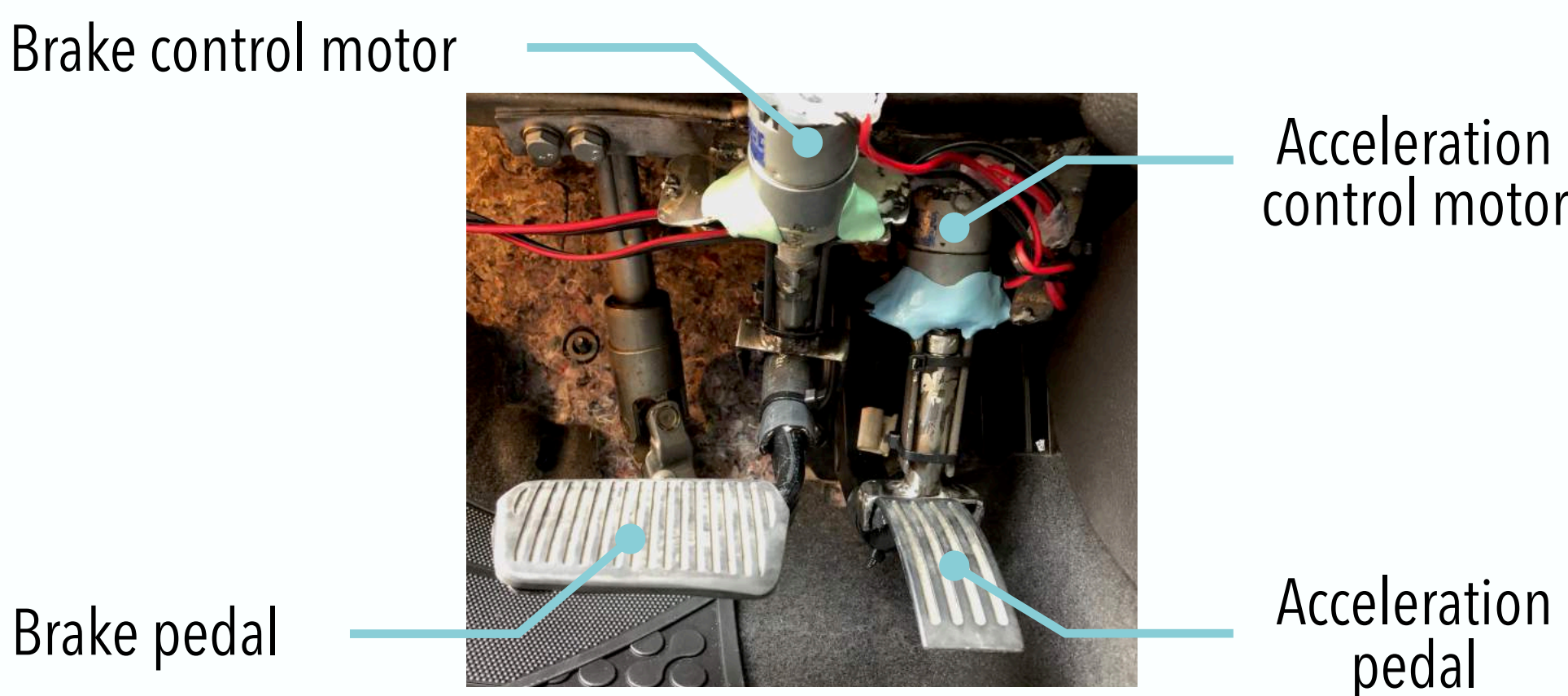


1. Proposal selection

Propuesta	Factibilidad	Tiempo de Diseño	Costo	Tiempo de desarrollo	Facilidad de instalación	Seguridad	Simultaneidad de uso
Riel	o	Δ-	o	Δ+	Δ	X	Δ
Brazos	X	Δ-	Δ-	Δ	Δ+	Δ+	X
Pistón Invertido	o	Δ+	o	o	X	Δ+	Δ+

o	Acceptable (0%)
Δ+	Change required, nearly acceptable.
Δ	Change required, acceptable.
Δ-	Change required, nearly unacceptable.
X	Not acceptable

3. Implementation



CONCLUSIONS

The objectives set were accomplished. We were able to create and implement an autonomous acceleration and braking system that could be remotely controlled.

The use of mechanical linear actuators (motor and bolt) allowed us to have a precise position control of the actuator at all time, which was very effective for the acceleration pedal.

We propose that for future works, a hydraulic piston or an ACME bolt is used for the braking pedal, to increase the force and reduce the braking time.

