

GOAL 4 : Morpho-adaptive safety and human factors

TASK 4.1 : Virtual human models for safety

SUBTASK 4.1.1 : Modeling of disabled human movement

Post doctorate position

**Impact of innovative power steering system
on the driving experience of elderly and disabled drivers**

Elderly and disabled drivers regularly face problems with the steering task as they drive their personal vehicles. These problems range from discomfort to total inability to drive, inducing a decrease or loss of autonomy. Today, vehicles can be modified to adapt to these pathologies. These modifications should also be smart as some pathology evolves in time.

An innovative answer to these problems could be to adapt the native laws inside the existing electric power steering (EPS) systems. In fact, although today EPS systems are thought to facilitate the driving experience, they could be transformed into a genuine pathology-specific driving assistant. The existing EPS use an electronic control unit (ECU) to handle the sensors, the electric motor and algorithms that control the steering process. One way to improve these EPS could be to personalize the ECU firmware and software to the driver and, possibly, to make the ECU evolve with the evolution of the pathology. The final goal is to make the steering task easier and safer by fine-tuning of the EPS control laws. However, in order to build specific control laws adapted to a specific pathology, the steering task movement has to be perfectly measured and understood: the kinematic strategy, the muscle activity, and the forces and torques applied on the steering wheel have to be described to build functional profiles. To fulfill this goal an experimental platform was built to measure the action of steering on the target population. Measurement results have yet to be compiled to propose a biomechanical cost model of the steering action that will feed EPS algorithms. In addition, a driving simulator is under construction that will offer the condition to validate the EPS algorithm: a 3D driving simulator that will interact in real time with a programmable ECU.

The job involves the following steps :

- Complete the driver data base from experimental measurement including 3D kinematics data and dynamic measurement,
- Built a biomechanical cost model of steering action that will generate input for optimization process of power steering system algorithm,
- Contribute to development of driving simulation platform by programming real time driving simulation software.

Contacts

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Employment

Gross monthly wages : 2500 €

Duration : 12 months

Employer : CNRS France