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Titre : Algorithmes d'Estimation Intelligents pour la Mobilité Intelligente
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The development of controllers with high performance and reliability for autonomous and connected vehi-cles will require real-time measurements of many variables on each vehicle.

Examples of variables that need to be measured include: longitudinal distances, velocities and accelerations of other nearby vehicles; lateral position of the vehicle in its own lane and yaw angle; slip angle; yaw rate; steering angle; lateral acceleration; and roll angle. There are also environmental variables which need to be measured such as tire-road friction coefficient, snow cover on road, and the presence of unexpected obstacles. Measurement of all of the above variables requires significant expense. Indeed, some of the sensors above, such as slip angle and roll angle, can be extremely expensive to measure, requiring sensors that cost thousands of dol-lars. In addition, several important tasks cannot be performed due to unavailability of sensors (at any cost). Examples include positions, and accelerations of cars which are further upstream (e.g. lead car of a pla-toon). Only the position of the car immediately ahead can currently be measured. Furthermore, autonomous vehicle requires highly reliable sensors and actuators. Failure of any one sensor or actuator, due to faults, cyber-attacks or denial of service, can cause a disastrous accident. Hence reliable fault diagnostic and fault handling systems are needed. Such systems cannot be based on hardware redundancy requiring many extra copies of the same sensors.

Hence, the overall objectives of the proposal consist in developing efficient estimation algorithms to reconstruct the unmeasurable state variables, which are required for the controllers and diagnostic modules.