ACCIDENT EVENTS IN AUTOMATED VEHICLES

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We are all aware of the increasing penetration of purely automated vehicles into the coming panoply of ground transportation. Much of the test and evaluation procedures of these respective vehicles have occurred on unidirectional, multi-lane highways and freeways where the central computational problem is relatively simple longitudinal and lateral control. In essence, these controls over what Gibson and Crooks labelled the 'field of safe travel,' can be affected by a suite of on-board sensors that measure a combination of range (d) and closure velocity (v). These combinatorial kinematics and kinetics can then provide satisficed solutions to the question of relative location in order to avoid collision in either of the two dimensions. However, single direction freeway driving is only one (and arguably quite a small element) of the overall driving challenge. Even here, issues such as over-taking are often finessed by the recovery of direct control of the driver who then re-establishes automated control when conditions revert to a stable enough level. Vehicle collisions can range from inadvertent acceleration (the Volvo example), to complex decision-making situations in which the embedded model of the world in automation proved insufficient to the challenge. We use this cadre of accounts to compare and contrast driver-centered design principles with semi-automated and fully autonomous vehicle conceptions. We also consider the affective dimension of driving and the cultural and sociological context in which the vehicle is embedded to discuss opportunities, constraints and limitations on coming automated cars.

Key Words: Automated Vehicle, Collisions, Driver-Centered Design