Driver’s Trust, Control and Risk in Autonomous Vehicles

Despite the potential benefits of autonomous vehicles, serious doubts remain about whether drivers will ever choose to employ them. Drivers need to trust their autonomous vehicles to ensure their effective use. In the absence of trust, drivers will almost always prefer to control (i.e. drive) their vehicle. Trust, control and risk are particularly important in the context of autonomous vehicles. In the case of autonomous vehicles, drivers are potentially risking their lives or the lives of others. Increases in risk and potential severity of consequences translate to higher levels of trust needed to ensure a desired outcome.

Current approaches to examining trust, control and risk in autonomous vehicles are limited in several ways. First, researchers have typically examined static and symmetric models of trust between the driver and the autonomous vehicle. Second, current models of trust, control and risk are neither contextualized nor personalized.

To address these issues, we have the following objectives:

1. To understand what events or actions of one agent (driver/autonomous vehicle) determine trust in the other agent (driver/autonomous vehicle).

2. To determine how various levels of risk in a given situation alter the impact of events or actions of one agent on the trust in the other agent (driver/autonomous vehicle).

3. To understand when trust is likely to lead directly to actions of control.

To accomplish this, we will conduct a set of human-user studies where subjects drive a simulated vehicle on a challenging course. We will manipulate the perceived risk involved in a given situation by altering various characteristics of the driving course.

Results of this study will provide new insights into when and why drivers are more likely to have concerns about handing over control to their autonomous vehicle. In turn, we should be able to more effectively address the concerns of drivers regarding their autonomous vehicles.