Intelligent Speed Adaptation

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Situation

Conforming to laws and regulations is vital to road safety. As the European Commission stated in 2012, "The main causes of fatal accidents are speeding, driving under the influence of alcohol, and non-use of a seat belt." [1].

Identification of Key Problems

1. Accidents Leading to Casualties
   Even with the continuous advances in the automotive industry, serious consequences of speeding are still occurring in alarming numbers. Unsafe driving leads to accidents, which bring with them severe injuries and even deaths.

2. Damage of Infrastructure
   The costs of repairing roads can be overwhelming: As stated by the NHSTA, "The repair of transport systems costs the society more than US $30 billion a year" [2].

3. Exceeding Speed Limits of Radar Systems
   Some drivers could be unaware of the speed limit of a zone and unintentionally exceed the limit. If speed radars are in the area, the radars will capture the plate and the driver has to pay heavy fines.

Main Solutions

Intelligent Speed Adaptation (ISA) is a system that ensures vehicles do not exceed a safe or set speed limit. There are two main types of ISA systems: passive and active systems. Passive systems can further be classified into two types: The first type being the open ISA system, which only warns the driver that the speed limit is being exceeded by producing an alerting sound or displaying a warning message. The second type is the half-open ISA system, which increases the resistance on the accelerator pedal when the speed limit is exceeded. Turning to active version, these systems mechanically adjust the fuel injection to the engine allowing the vehicle to slow down when the allowable speed is exceeded [4]. This type of ISA system can be overridden in an emergency.

ISA Mechanism

Step 1: Location of the car is obtained from GPS
Step 2: Speed limit of zone is obtained from database
Step 3: Compare speed of the vehicle with zone’s speed
   If Car’s speed $>$ Speed Limit
     a. Display a warning sign on the dashboard
     b. Increase the resistance on the gas pedal
     c. Decrease the gas injection to the engine

Evaluation

The system is designed to work in different ways depending on how intervening or permissive the user wants it to be. For people who dislike the intervention of the system in their car, they could simply make use of the open passive ISA system, which only warns the driver about exceeding speed limit using audio and visual warning on the dashboard.

Regarding the ease and costs of implementation, the components of the ISA is relatively simple to implement in vehicles because they are similar to the ones used in the current speed control systems such as cruise-control and distance radar.

References