TOPIC	A Collision Avoidance System with Fuzzy Danger Level Detection
ORGANIZERS	Student Leadership Council and Faculty of ACIT Institute and TECHLAV Center
AREA	Data Analytics, Autonomous Vehicles, Driving Assistance Systems
SPEAKER	Zihao Wang
DATE	Friday July 28, 2017
TIME	3:00 – 4:00 P.M. (EST)
VENUE	Fort IRC 410, North Carolina A&T State University
FEES	No Charge

SYNOPSIS

In the United States, traffic accidents is the cause of around 37,000 fatalities and 230.6 billion dollars' in economic loss every year. Most of these accidents are due to human errors. Therefore, driver assistance systems have the potential to reduce the risk of accidents as the system will take over the control of the vehicle in dangerous scenarios and prevent potential crashes. A suitable option for reducing the number of accidents would be collision avoidance, which is an essential component in advanced driving assistance systems as it ensures the safety of the vehicle in near crash or crash scenarios.

The majority of research on collision avoidance systems is focused on situation assessment (SA) to estimate the danger of the scenario and reaction of drivers. Some of the researchers have applied model-based algorithms that estimates how the driver would react to avoid a collision by assessment of the threat. By using the SA algorithm, it estimates the driver's behavior and then interacts with a collision avoidance system to initiate earlier brake interventions when there is a threat.

Dangerous events are very complex and the level of danger cannot easily be mathematically analyzed. In this study, a collision avoidance system for lane change events is proposed, which plans the trajectory based on the level of danger. A SA model as the Fuzzy Danger Level Detection was introduced to determine the danger level of the maneuver, and provide biases for the trajectory planning. To better capture the real-world factors, which may cause an accident, the fuzzy system was designed based on naturalistic near-crash driving data, which is a public data set collected by the Virginia Tech Transportation Institute. In addition, a fault belonging classifier is introduced to determine the responsible driver in a near crash event. This system is evaluated on simulated naturalistic near crash events and the results demonstrate good performance of the proposed system.

ABOUT THE SPEAKER

Zihao Wang is a first-year master student in the Electrical Engineering department at North Carolina A&T State University. He is currently a graduate assistance at the ACIT Institute working on situation assessment for the autonomous ground vehicles. He received a Bachelor degree in Electrical Engineering from both North Carolina A&T State University and Henan Polytechnic University in May 2016.