Phase 1 Report Completed in 2018

1. Introduction
   1. Problem Statement
      1. Transportation Safety
      2. Current Technology
   2. Objective
   3. Scope
2. Intelligent Transportation Systems Summary
   1. Basics of Vehicle Autonomy
      1. Concept Overview
      2. Vehicle Autonomy Documentation
   2. Methods for Vehicle Control
      1. Camera Vision Based Systems
      2. Lidar Based System
   3. Commercial Vehicle Autonomy
   4. Advanced Vehicle Autonomy
   5. Vehicle Communication
3. Intelligent Transportation Instrumentation
   1. Introduction to Vehicle Sensors
   2. Vehicle Sensors
      1. Accelerometer
      2. Gyroscopes
      3. Tachometers/ Speed Sensing
      4. Position Sensing
   3. Vehicle Environmental Sensors
      1. Proximity Sensors
      2. Visible Spectrum Sensors
      3. GIS Mapping
   4. Communication Mediums
4. Vehicle Data Handling and Control
   1. Data Filtering
      1. Kalman Filtering
      2. Extended Kalman Filtering
   2. Vehicle Control
      1. Feedback Control
      2. ABS Control
      3. Steering Control
5. Current State Discussion
   1. Vehicle Guidance Approaches
   2. Vehicle Communication Approaches
   3. Cybersecurity

Phase 2 Report Completed in 2019

1. Introduction
   1. Problem Statement
   2. Objective
   3. Scope
2. Vehicle Autonomy Technology Review
   1. Existing and Implemented Features
   2. Unresolved Issues affecting Risk of Run-Off-Road Crashes
   3. Preview of MATC Smart Barrier
3. Midwest Smart Barrier Method
   1. Assumptions
   2. Objectives
      1. Road Lane Boundary Definition Module
      2. Vehicle Dynamic Localization Module
      3. Vehicle Path Following Module
      4. Summary
4. Lane Boundary Definition Module
   1. Mathematical Basis for Generating Trajectories
   2. Trajectory Criteria
   3. Coordinate Reference Frames
   4. Normal-Tangential Coordinates to Road Boundary
   5. Road Slicing
5. Vehicle Dynamic Localization Module
6. Vehicle Path Following Module
   1. Driver Warning System
   2. Safe Stop Scenarios
   3. Emergency Stops