

Brian Kliethermes, Mechanical Engineering and Agricultural Systems Management

Year in School: Junior

Hometown: Tipton, MO

Faculty Mentor: Dr. Brian Adams, Agricultural Systems Management

Funding Source: Dudley & Virgie Alexander Gift

Autonomous vehicle platooning using the Global Positioning System

Through the use of satellites in the Global Positioning System (GPS), farmers are able to use parallel tracking to perform straight passes across a field without any assistance from the operator. This technology has made farming operations more productive by making more efficient use of inputs, reducing operator fatigue, minimizing overlaps, allowing higher operating speeds, and reducing fuel usage. However, there are no current products that allow several autonomous vehicles to maneuver in unison with one another in a platoon. To travel in a platoon, these vehicles need to be able to communicate with each other and travel at a set or variable distance between vehicles. The objective of this project was to develop algorithms and demonstrate how small autonomous vehicles may be used in a platoon. This project consisted of two radio controlled vehicles, one that is the leader which was controlled manually by an operator and the follower which was converted to a fully autonomous GPS controlled vehicle. The lead vehicle had a determined trajectory while the follower vehicle was assigned a set distance to trail from laterally and longitudinally. Each vehicle was equipped with a GPS receiver and a handheld PDA. The PDA's on each vehicle ran all the necessary code to analyze the GPS signal in order to direct the autonomous follower vehicle into the correct position, speed, and steering angle in reference to the lead vehicle. The vehicles were tested on different terrains as well as their response to different maneuvers. The outcome of this research project is a fully autonomous vehicle that can follow a radio controlled lead vehicle. Various algorithms as well as prototype performance and additional design potential were analyzed and documented.