A Review of Over 20 Years of Autonomous Vehicle Designs at Cedarville University

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A review of over 20 years of autonomous vehicle designs at Cedarville University

**Micro Baja 1997-2000**

- Mechanical contact steering and super soft suspensions
- Large rear swaying wheel with active steering based on throttle feedback

**IEEE Summit Challenge 1999 - 2000**

- Multi-vehicle descending from mother ship on tethers proved very ineffective
- Magnets connected to rotating wheel proved very effective at collecting steel balls

**Intelligent Ground Vehicle**

- 2004
- Initial Dixie Chopper Chassis was large and hard to control
- 2005
- Wheelchair design easier to control with more margin of error
  - First-Wire camera running
  - Lighting changes were difficult to handle
  - Switched to HSV rather than RGB

**2006**

- Stable pontoon hull with 2 thrusters provide differential drive
- Raspberry Pi plus laptop network provides all processing
- Sensors include Microsoft LifeCam, GPS, and digital compass
- Image processing and sensor fusion using MATLAB
- Key innovation led to good results: drivable region centroid technique
- Placed 9th out of 21 in 2005
- Placed 8th out of 28 in 2006
- Won “Biggest Bang for the Buck” award in 2014 ($1000)

**Autonomous Vehicle Challenge (AVC)**

- Follow the Leader
  - By Color
  - RGB
  - HSV

- Initial Dixie Chopper Chassis was large and hard to control
- Wheelchair design easier to control with more margin of error
  - First-Wire camera running
  - Lighting changes were difficult to handle
  - Switched to HSV rather than RGB

**Aero Design**

- Wide Array Of Sensors

- Ublox M8Q
  - 3D compass
  - GPS receiver
- IMU: MPU6050
  - Three Axis gyroscope
  - Three Axis accelerometer
- BMP180
  - Barometer
  - Relative Altitude

**Swarm Robots Senior Design 2014-2015**

- Raspberry Pi with PI camera
- Wi-Fi communication
- Servo motor locomotion
- Bump sensor for proximity
- 3D printed parts

**Autonomous Golf Cart Senior Design 2018-2019**

- Autonomous navigation using RTK from ODOT for high precision GNSS
- Continental’s VRS RTK Network
Authors,

Congratulations! You have been selected as finalists for your posters. Please be at your poster at 1:15PM for the final judging session. If your poster was in the Challenger/Discovery room it has been moved to the ballroom foyer. Other posters are in their original locations.

All authors must be present at this session to publish their final manuscript. Winner will be announced at conference closing session.

Finalists attached here.

Thanks.

Felicia