R Gator: An Unmanned Utility Vehicle

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R Gator

- 4 modes of operation
  - Teleop
  - Waypoint Navigation
  - Direction Drive
  - Teach/Playback
- Detects and avoids obstacles autonomously.
- Live video returned to remote user from 4 cameras.
- Intuitive UI based on gaming controller.
- Built on top of a robust, commercially available platform.
Potential Uses

- Remote reconnaissance
  - 4 cameras
- Resupply
  - 748kg payload
- Base Patrol
  - Teach and replay paths
- Mobile sensor platform
  - Could add chemical, biological or nuclear sensors
- IED Detection

... many more
Even Marsupial Deployment ...
User Interface

- Two display methods – laptop or wearable (eyepiece)
- All functions controlled from video game controller
- Training requires approximately 15 minutes
Four Top Menus
Playback
Perception – Obstacle Detection

• Use multiple sensors to map environment.
  • 2 Laser scanners
  • 1 radar
  • 2 cameras
• Lasers mounted high above the ground for better view.
• Multiple sensor data and scans are combined to make local maps.
Perception System Structure

- Laser Scanner
- Color Camera
- Radar

Point Registration → Colorized Laser Points → Point Cloud Management (x,y,z,r,g,b) → Voxel Map

Classifiers:
- Ditch
- People
- Vehicles
- Vegetation
- Ground
- Density

2D Object Maps → Arbiter → Safespeed
Example Obstacle Maps

Large Positive Obstacles

Negative Obstacle

Small Negative Obstacle
New R Gator Chassis

- Based on the new John Deere XUV 855D chassis.
- 4 wheel independent suspension.
- Higher ground clearance.
- Higher maximum speed.
- Maintains highly capable UI, perception and operations.
Why discuss this at an AgRA Webinar?

• R Gator was designed for military applications as described

....but an easily controllable autonomous utility vehicle could find numerous uses on the farm

• Transport feed to animals
• Transport harvest from pickers to trucks (fruit, veg, berries)
• A platform for spraying
• Maybe even herding animals
The Technology is Transferrable

- UI and Perception technology can go on any vehicle