Autonomous Ground Vehicles (AGV)

Team Dynamics
- Bryan Castillo
- Tiffany Hargett
- Will McGinness
- Michael Penny
- Daniel Records
“An autonomous vehicle is one that is capable of automatic navigation. It is self-acting and self-regulating, therefore it is able to operate in and react to its environment without outside control.”

Video #1
http://www.youtube.com/watch?v=GdEa6EhCp9g&feature=related

Video #2
http://www.youtube.com/watch?v=-nYhKD8leAg&feature=related
Topics Overview

History of AGV’s
- Bryan Castillo

Importance
- Daniel Records

Current Types of Vehicles
- Will McGinness

Future Use
- Mike Penny
History of AGV

- Norman Bel Geddes’s Futurama exhibit sponsored by General Motors at the 1939 World Fair
- US military DARPA Grand Challenge
- General Motors, Volkswagen, Audi, BMW, Volvo, and Google
- Nevada is 1st jurisdiction in world for driverless vehicles
Importance: Safety

- **Military**
  - UGV – Unmanned Ground Vehicle
    - Teleoperated UGV are most popular
    - Allows remote operation of vehicle to keep operator out of harms way
  - Army MULE and ARV
  - Bomb Squads

- **Industrial**
  - Worker Injury

Importance: Safety (cont’d)

• Civilian
  – Traveling by car most deadly form of travel worldwide
  – 90% of accidents caused by human error; in 75% human error is the ONLY cause
  – Mercedes-Benz crash avoidance
    • Lane Change warnings
  – Autonomous vehicles and traffic flow
  – Reduced number of human-controlled high-risk maneuvers

Importance: Money

- in-patient costs
- out-patient costs
- rehabilitation costs
- nursing costs
- post-treatment costs
- aid costs
- support costs

- police costs
- legal costs
- insurance costs
- replacement costs
- death benefit

- length of time unfit to work
- duration of in-patient treatment
- duration of rehabilitation treatment
- duration of nursing period
- reduction in earning capacity

Direct reproduction costs
Indirect reproduction costs

Reproduction costs

Resource losses

- Market Price Approach
- Productive Value Approach

Economic costs of traffic accidents

1. Difficult to price human life, but one study found that a 15% reduction in traffic fatalities would result in a $22,000,000,000 human cost savings
Importance: Efficiency

• In 2001, average driver waited 26 hours in traffic over 1 year period
• Remove possibility of human error
  – Higher speeds possible
  – Seamless transitions
  – Law breaking eliminated
• Increase ability to carpool
  – 1 car can drop multiple people off at different places
• Parking
Current Uses of AGV’s

• iRobot home robots
  – Vacuuming
  – Floor washing
  – Pool cleaning
  – Gutter cleaning

• Lawn mowing robots
  – Mowing area set with wires
Current Uses Continued

• Warehouse robots
  – Given location of the inventory
  – Gap, Staples, Zappos
  – Recharge themselves
  – A networked, learning system

• Bomb squad robots
  – Remotely examine potential threats
  – Disarm or detonate
Current Uses Continued

- Combines/Harvesters
  - GPS guided
  - Log useful data
  - Still require operator

- Robocup
  - International soccer competition
  - Fully autonomous
  - Advance and practice autonomous vehicle theory and application
Future Uses

• Automotive
  – Designated “robot” lanes
  – Complete traffic systems
  – Driverless semi-trucks
• Agricultural
  – Completely automated combines
  – Mobile vine trimming robot

Future Uses, cont.

- **Industrial**
  - Automated forklifts
- **Military**
  - Autonomous border patrol vehicles
  - “Pack animals”— Big Dog
- **Transportation**
  - Monorail systems

Final Thought...

http://www.youtube.com/watch?v=pxZUL2z4rQQ&feature=related
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