



# EXPRESS SEARCH, INC.

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21<sup>st</sup> Century Patent Research<sup>®</sup>  
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Re: Patent Landscape Search  
Autonomous Ground Vehicles  
XS-SAMPLE-LND

August 29, 2006

Dear Mr. Flag,

In accordance with your email received August 15, 2006, a Patent Landscape Search of 36 hours was conducted at the U.S. Patent and Trademark Office for Autonomous Ground Vehicles.

We searched the current patent landscape covering autonomous ground vehicles for a variety of situations. These features and characteristics are meant to give a broad coverage of the technology.

Control - methods of directing the autonomous ground vehicle, both for immediate instructions and overall mission planning:

Autonomous - All planning is conducted within the vehicle systems.

Semi-Autonomous - Avoids obstacles and responds to external conditions, but follow preplanned route or sensors embedded in path.

Remote - vehicle is controlled by another system over a wireless or radio link.

Local Intervention - A passenger or nearby operator may intervene in the operation of the vehicle.

Sensor package - Methods of determining position and vehicle situational awareness:

GPS - Vehicle position determined by GPS system (public or private).

Active FLIR - infra red used to determine location of objects in environment in conjunction with infrared projection (active technology).

Radar - used to determine location of objects in environment.

Laser - Laser range finders (i.e. SIC laser).

Sonar - Active sound used to determine location of objects in environment.

Video/object recognition - single and dual camera systems employing stereo vision, optical flow or object recognition.

Passive IR - Infrared sensors.

Environmental markers - Objects added to the environment by the controllers to indicate

specific points of interest or destinations (i.e. radio beacon).

Propulsion - methods of moving the vehicle over the ground as well as power trains. These are not meant to be mutually exclusive:

Power Transmission - Central motor drives wheels.  
Driven Wheels - Each wheel has it's own motor.  
Wheeled - Vehicle propels primarily using wheels.  
Tracked - Vehicle uses tracks.  
Ground Effects - Vehicle hovers.

Configuration - Additional elements of ground vehicle. These features focus mostly on vehicle use:

Transport - Vehicle designed to transport people.  
Cargo - Vehicle designed to transport cargo.  
Drivable - May be driven normally when not in autonomous mode.  
Armed - Autonomous control of lethal armament.

The search was conducted in accordance with the disclosure provided.

The following Examiner was consulted regarding the field of search:

Examiner Abdi in Art Unit 3621

The following classes and subclasses were searched:

Class 701 (Data Processing: Vehicles, Navigation, and Relative Location)  
Subs. 23-28  
Class 180 (Motor Vehicles)  
Subs. 167-169  
Class 348 (Television)  
Subs. 113-114, 116, 119, 61

The following IPC-8 classes and subclasses were searched:

Class A63H (TOYS, e.g. TOPS, DOLLS, HOOPS, BUILDING BLOCKS)

30/00 Remote-control arrangements specially adapted for toys, e.g. for toy vehicles

30/04 Remote-control arrangements specially adapted for toys, e.g. for toy vehicles; Electrical arrangements; using wireless transmission

Class G01S (RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF RADIO WAVES; LOCATING OR PRESENCE-DETECTING BY USE OF THE REFLECTION OR RERADIATION OF RADIO WAVES; ANALOGOUS ARRANGEMENTS USING OTHER WAVES)

Class G01C (MEASURING DISTANCES, LEVELS OR BEARINGS; SURVEYING; NAVIGATION; GYROSCOPIC INSTRUMENTS; PHOTOGRAMMETRY OR VIDEOGRAMMETRY)

22/00 Measuring distance traversed on the ground by vehicles, persons, animals, or other moving solid bodies, e.g. using odometers, using pedometers

Class G05D (SYSTEMS FOR CONTROLLING OR REGULATING NON-ELECTRIC VARIABLES)

1/00 Control of position, course, altitude, or attitude of land, water, air, or space vehicles, e.g. automatic pilot

Class B60T (VEHICLE BRAKE CONTROL SYSTEMS OR PARTS THEREOF; BRAKE CONTROL SYSTEMS OR PARTS THEREOF, IN GENERAL)

7/16 Brake-action initiating means; for automatic initiation; for initiation not subject to will of driver or passenger; operated by remote control, i.e. initiating means not mounted on vehicle

Class B26D (CUTTING; DETAILS COMMON TO MACHINES FOR SEVERING, e.g. BY CUTTING, PERFORATING, PUNCHING, STAMPING-OUT)

1/24 Cutting through work characterised by the nature or movement of the cutting member; Apparatus or machines therefor; Cutting members therefor; involving a cutting member which does not travel with the work; having a cutting member moving about an axis; with a circular cutting member, e.g. disc cutter; coaxing with another disc cutter

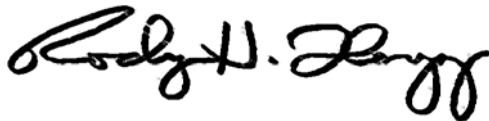
Class H04N (PICTORIAL COMMUNICATION, e.g. TELEVISION)

7/00 Television systems

9/47 Details of colour television systems; Colour synchronisation; for sequential signals

Prior art references for Autonomous Ground Vehicles are located in our index page. Copies of the cited prior art are enclosed for your further review. Each patent cited may be individually searched using key words. The family of each patent cited is also identified. Go to the side bar on our index page to access these features. Please do not hesitate to contact me with any questions regarding this search.

Best Regards,  
EXPRESS SEARCH



Rodger Flagg  
President

RHF/ar  
Enclosure: 337 Patents  
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