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Histórico – 1996: Honda P2

Honda's first public showing of a Biped Robot after a 10 year development program

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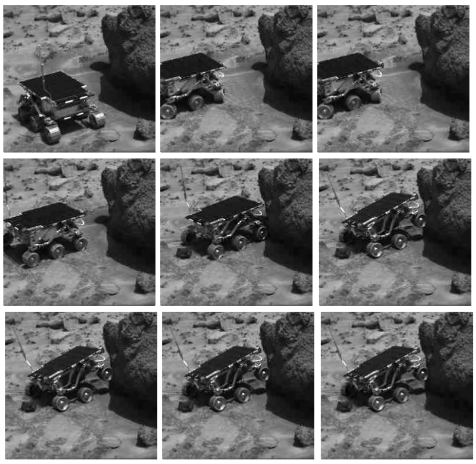
1997 Mars Rover: Soujourner / PathFinder



The rover goes a little too far and begins to climb Yogi (NASA)

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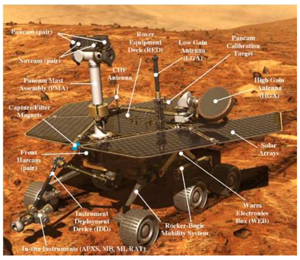
2004: Spirit and Opportunity



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Março 2011

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Histórico:

ActivRobots / MobileRobots1995 – Pioneer

iRobot 2002 – Roomba

The Roomba is a robotic vacuum cleaner made and sold by iRobot. The Roomba was introduced in 2002; several updates and new models have since been released. As of January 2008, over 2.5 million units have been sold.

Boston Dynamics 2005 – BigDog

Sony 1999-2006 - Aibo

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Mobile Robots – Wikipedia : http://en.wikipedia.org/wiki/Mobile_robots

1995 The Pioneer programmable mobile robot becomes commercially available at an affordable price, enabling a widespread increase in robotics research and university study over the next decade as mobile robotics becomes a standard part of the university curriculum.

1996-1997 NASA sends the Mars Pathfinder with its rover Sojourner to Mars. The rover explores the surface, commanded from earth. Sojourner was equipped with a hazard avoidance system. This enabled Sojourner to autonomously find it s way through unknown martian terrain.

1999 Sony introduces Aibo, a robotic dog capable of seeing, walking and interacting with its environment. The PackBot remote-controlled military mobile robot is introduced.

2001 Start of the Swarm-bots project. Swarm bots resemble insect colonies. Typically they consist of a large number of individual simple robots, that can interact with each other and together perform complex tasks.

2002 Appears Roomba, a domestic autonomous mobile robot that cleans the floor.

2004 Robosapien, a biomorphic toy robot designed by Mark Tilden is commercially available. In 'The Centibots Project' 100 autonomous robots work together to make a map of an unknown environment and search for objects within the environment.

2004 In the first DARPA Grand Challenge competition, fully autonomous vehicles compete against each other on a desert course.

2005 Boston Dynamics creates a quadruped robot intended to carry heavy loads across terrain too rough for vehicles.

2006 Sony stops making Aibo and HelpMate halts production, but a lower-cost PatrolBot customizable autonomous service robot system becomes available as mobile robots continue the struggle to become commercially viable. The US Department of Defense drops the MDARS-I project, but funds MDARS-E, an autonomous field robot. TALON-Sword, the first commercially available robot with grenade launcher and other integrated weapons options, is released. Honda's Asimo learns to run and climb stairs.

2007 History is made with the DARPA Urban Grand Challenge, with six vehicles autonomously completing a complex course involving manned vehicles and obstacles. Seekur, the first widely available, non-military outdoor service robot, pulls a 3-ton vehicle across a parking lot , drives autonomously indoors and begins learning how to navigate itself outside. Meanwhile, PatrolBot learns to follow.

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DARPA Challenge

2004 - Darpa Grand Challenge – Prêmio: US$ 1 Milhão - Sem Vencedores

First Grand Challenge, held on March 13, 2004, when only 13 teams were able to field machines for the ***142-mile course and none cleared the first mountain crossing*** (see "A New Race of Robots," by W. Wayt Gibbs; SCIENTIFIC AMERICAN, March 2004).

2005 - Darpa Grand Challenge – Prêmio: US$ 2 Milhões - Vencedor: Stanley / Stanford

Five out of 23 competing robots successfully navigated a 132-mile course through the Mojave Desert in October 2005 as part of the DARPA Grand Challenge race. **To qualify** for the $2-million prize, the driverless vehicles had to finish **in less than 10 hours**. ***Four turned in elapsed times under 7.5 hours***.

2007 – Darpa Urban Challenge – Prêmio: US$ 2 milhões – Vencedor: Boss / CMU

The Urban Challenge, announced in April 2006, called for autonomous vehicles to drive 97 km through an urban environment, interacting with other moving vehicles and obeying the California Driver Handbook. Interest in the event was immense, with 89 teams from around the world registering interest in competing. Competition took place on November 3, 2007.

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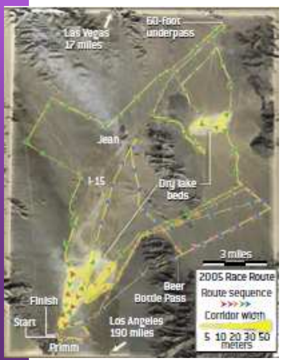
DARPA
Grand Challenge



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DARPA Grand Challenge

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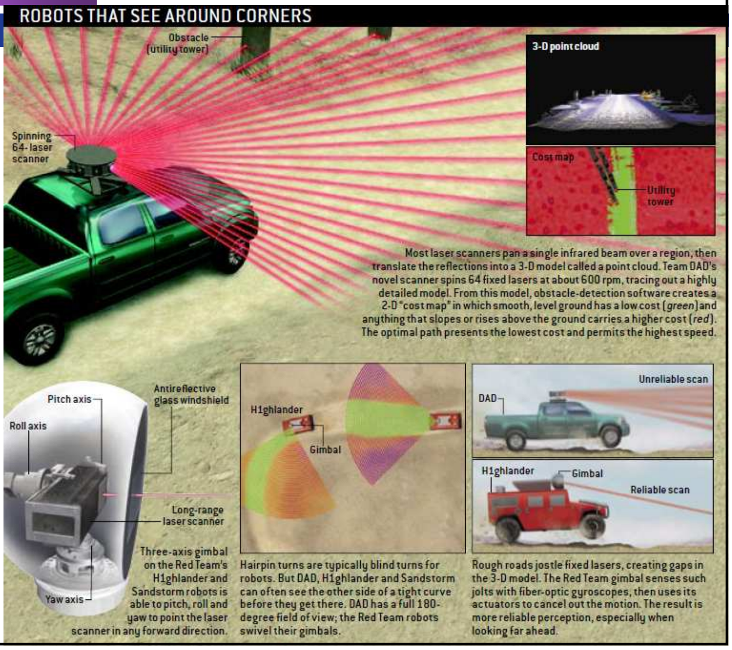
DARPA
Grand
Challenge



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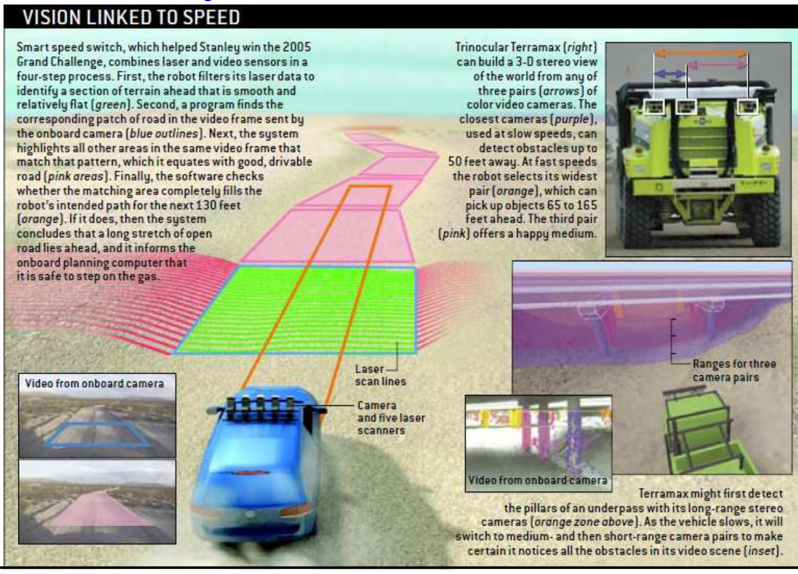
DARPA Grand Challenge



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DARPA Grand Challenge

Ganhadores – Stanley / Stanford University

Sebastian Thrun, Mike Montemerlo, Hendrik Dahlkamp, David Stavens, Andrei Aron, James Diebel, Philip Fong, John Gale, Morgan Halpenny, Gabriel Hoffmann, Kenny Lau, Celia Oakley, Mark Palatucci, Vaughan Pratt, and Pascal Stang
Stanford Artificial Intelligence Laboratory- Stanford University - Stanford, California 94305
Sven Strohband, Cedric Dupont, Lars-Erik Jendrossek, Christian Koelen, Charles Markey, Carlo Rummel, Joe van Niekerk, Eric Jensen, and Philippe Alessandrini
Volkswagen of America, Inc. - Electronics Research Laboratory - Palo Alto, California
Gary Bradski, Bob Davies, Scott Ettinger, Adrian Kaehler, and Ara Nefian
Intel Research - 2200 Mission College Boulevard
Santa Clara, California 95052
Pamela Mahoney
Mohr Davidow Ventures
Menlo Park, California 94025

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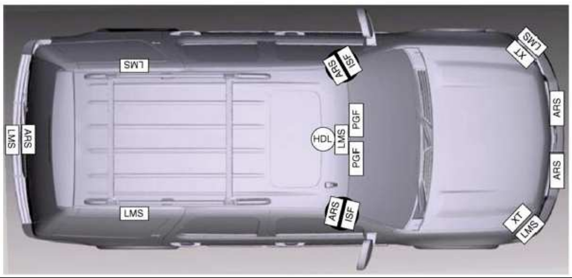
DARPA Urban Challenge
Boss, the autonomous Chevy Tahoe that won the 2007 DARPA Urban Challenge
Tartan Racing – CMU Carnegie Mellon University
Pittsburgh, Pennsylvania

Robôs Móveis Autônomos

DARPA Urban Challenge

"Boss" CMU

Sensor	Characteristics
Applanix POS-LV 220/420 GPS/IMU (APLX)	• Submeter accuracy with Omnistar VBS corrections • Tightly coupled inertial/GPS bridges GPS outages
SICK LMS 291-S05/S14 LIDAR (LMS)	• 180/90 deg × 0.9 deg FOV with 1/0.5-deg angular resolution • 80-m maximum range
Velodyne HDL-64 LIDAR (HDL)	• 360 × 26-deg FOV with 0.1-deg angular resolution • 70-m maximum range
Continental ISF 172 LIDAR (ISF)	• 12 × 3.2 deg FOV • 150-m maximum range
IBEO Alasca XT LIDAR (XT)	• 240 × 3.2 deg FOV • 300-m maximum range
Continental ARS 300 Radar (ARS)	• 60/17 deg × 3.2 deg FOV • 60-m/200-m maximum range
Point Grey Firefly (PGF)	• High-dynamic-range camera • 45-deg FOV



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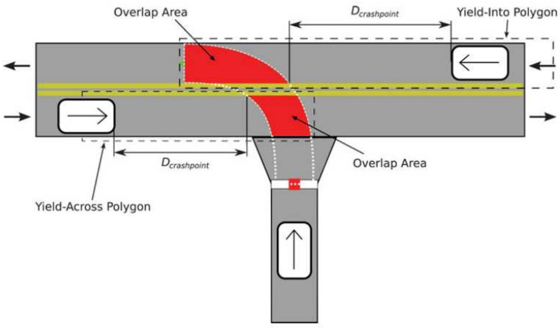
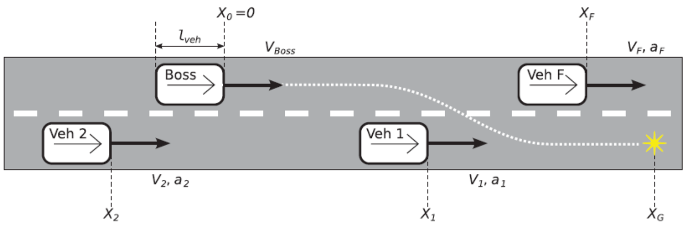
DARPA Urban Challenge

"Boss" CMU





Tipos de Robôs

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Robótica Autônoma
Tipos de Robôs

Tipos de Robôs

Percepção
Decisão
Ação

Tipo de Mobilidade
- **Base Fixa (manipuladores, braço robótico)**
- **Base Móvel: Com Restrição (grua) / Sem Restrição (veículo)**

Tipo de Mecanismo de Locomoção
- **Pernas, Rodas, Esteiras, Propulsão**

Tipo de Local de Atuação
- **Indoor (locais fechados, internos)**
- **Outdoor: Estruturados (estradas), Não Estruturados (off-road)**

Tipo de Autonomia
- **Controle e Ações Pré-Definidas**
- **Tele-Operados (tele-comandado)**
- **Semi-Autônomo (tele-operado + ações independentes)**
- **Autônomo** : sem intervenção humana durante a operação