

First Practice: The Darpa Grand Challenges Vs Today's Self-driving Cars

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1 What are the differences?

- **DARPA Challenge:** DARPA (defense advanced research project agency earlier (ARPA, this agency is the one that developed the ARPANET)) challenge is a challenge in America (one desert route and one city route included) to develop military use autonomous vehicles. The vehicles competing must complete the course the shortest time possible, while obeying all traffic conventions and enduring harsh desert conditions. [1]
- **Self-Driving Cars:** Self driving cars represent an ongoing commercial effort by companies (like AIMotive or Bosch) or by Research institutions like ELTE to develop autonomous vehicles for consumer use on public roads. Also, for self-driving cars the focus is on real-world driving environments with unpredictable variables like traffic and pedestrians. The aim is not to cover a desert road or a road itself, but the replacement of the human factor in ordinary traffic. [2]

In other words, the DARPA challenge aimed primarily at developing autonomous vehicles for military use, focusing on navigation in unstructured and challenging terrains without human intervention. Meanwhile, today's Self-Driving Cars focus on consumer applications, emphasizing safety, efficiency.

2 What are the objectives?

The objectives of the DARPA challenge that I listed [1]:

- **Advancing Autonomous Technology:** The challenges greatly improved autonomous vehicle technology and helped bring it from research to real-world use.
- **Fast Testing and Development:** Testing in real situations is important for building strong autonomous systems.
- **Encouraging Innovation:** To give rewards like prize money to motivate participants to bring more innovation.

Similarities

I listed the similarities between the DARPA challenge cars and modern autonomous vehicles: [1]

1. **Autonomous Navigation:** Both focus on vehicles that can move and navigate without human help.
2. **Sensor Use:** Use sensors like LIDAR, radar, cameras, and GPS to understand the environment.
3. **Software Algorithms:** Depend on advanced programs for perception, planning, and decision-making.
4. **Technological Innovation:** Both have led to important progress in robotics, AI, and machine learning.
5. **Collaboration Across Sectors:** Involve universities, companies, and government agencies to improve technology.

Differences

I listed the differences between the DARPA challenge cars and modern autonomous vehicles: [1]

1. Environment Complexity:

- *DARPA Challenges*: Focused on driving in deserts and off-road areas with fixed obstacles.
- *Today's Cars*: Drive in busy city areas with pedestrians, traffic rules, and complicated road networks.

2. Commercial Objectives:

- *DARPA Challenges*: Focused on military use, not intended for commercial sale immediately.
- *Today's Cars*: Developed for business purposes, aiming to be sold widely to consumers.

3. Ethical and Social Considerations:

- *DARPA Challenges*: Did not pay much attention to ethical or social impacts.
- *Today's Cars*: Need to address ethical questions, concerns about job losses, and public acceptance.

3 From where we started (Darpa Grand Challenge) and where are we now?

DARPA Grand Challenge: A series of competitions (2003, 2004, 2005, 2007) organized by the Defense Advanced Research Projects Agency. The first year it was organized (2003) no competitors were able to complete the desert route. However in 2005 the Stanford team completed it in 6 hours. The challenge was discontinued after 2007, and DARPA shifted focus toward AI challenges. [3]

4 Can the Darpa grand Challenges compared with today's self-driving cars? Why?

Yes, we can compare the DARPA Grand Challenges with today's self-driving cars. The DARPA Challenges were important steps in developing autonomous vehicles, mainly for military purposes. They helped improve technology like sensors and AI algorithms. Meanwhile today's self-driving cars operate in more complex environments. Today's technology would not exist without the great innovations achieved with the DARPA challenge, so indeed comparison is important and needed.

References

- [1] HeroX Blog, "The Drive for Autonomous Vehicles: The DARPA Grand Challenge," Available at: <https://www.herox.com/blog/159-the-drive-for-autonomous-vehicles-the-darpa-grand>, Accessed on October 1, 2023.
- [2] AIMotive blog (FAQ): <https://aimotive.com/faq>
- [3] <https://www.darpa.mil/about-us/timeline/-grand-challenge-for-autonomous-vehicles>