

Assignment-1

Due date: October 21, 2016

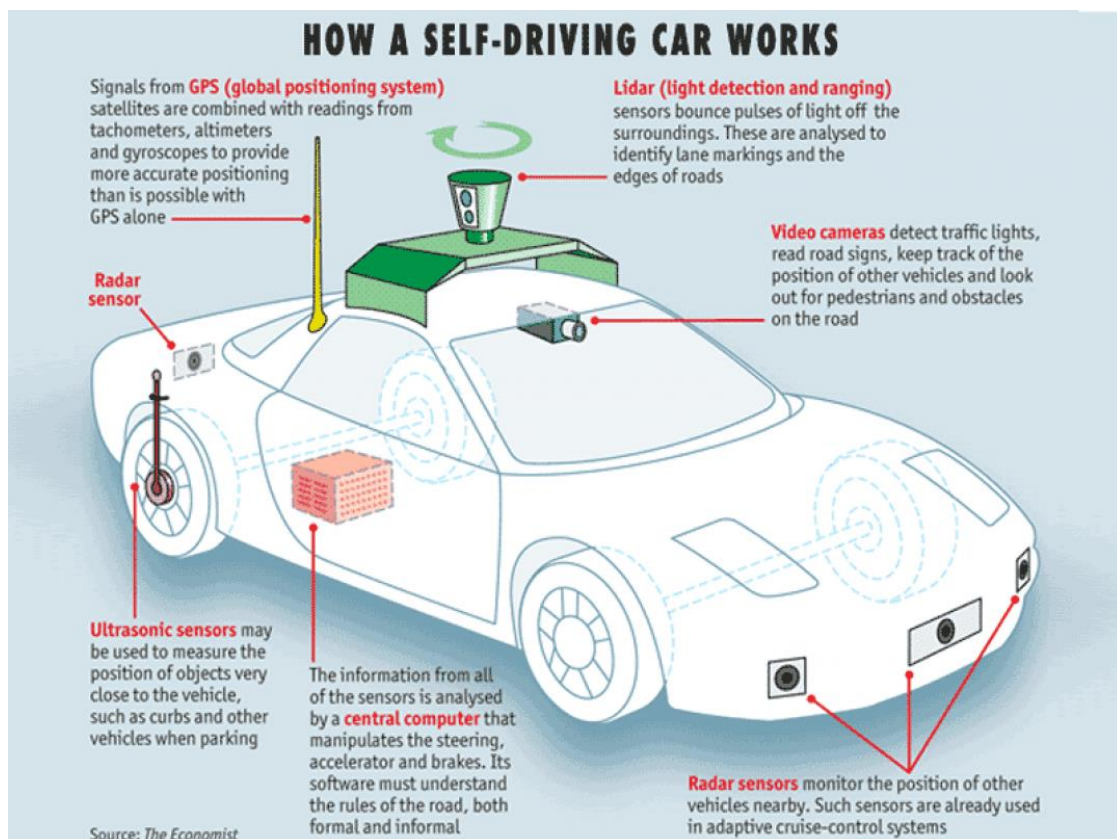
1. Mobile robots are usually used as a platform to study autonomous systems. These robots can be classified based on the nature of the environment into indoor and outdoor robots. Give two application examples for each of these two categories. [2 Mark]

2. [Search Exercise]

Search the World Wide Web for applications and manufacturers of unmanned vehicles and summarize this information in 1-page maximum. [3 Mark]

3. [Reading Exercise]

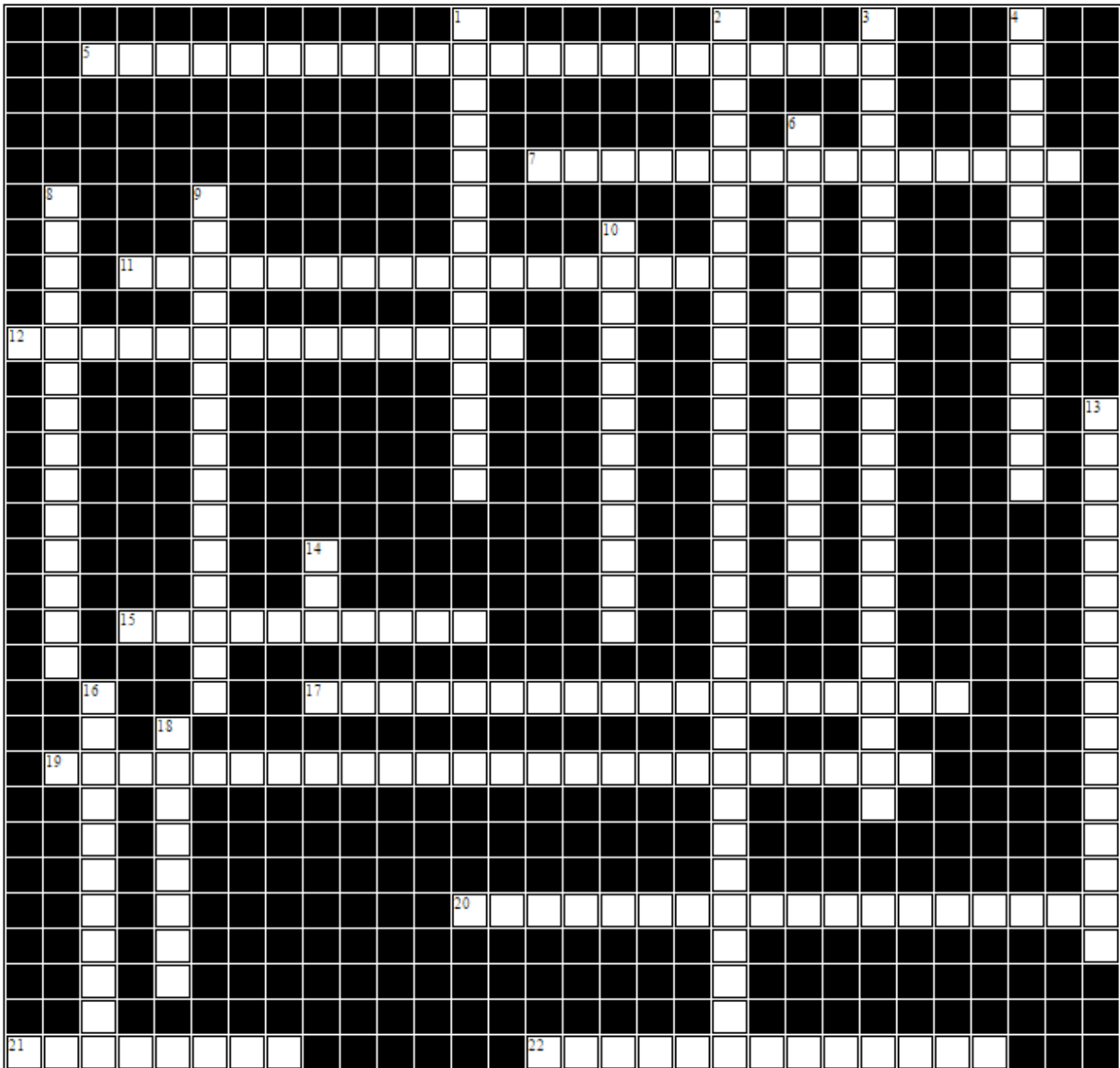
A recently published article by Robhub entitled "[46 research reports analyze the robotics industry and autonomous vehicles](#)", provides statistics and market forecasts about autonomous vehicles including service robots, driverless cars and unmanned ground/aerial vehicle in general.



Source: The Economist

Read this article and extract useful descriptive statistics and present them in graphical format (column/bar charts, pie charts, histograms and line/trend graphs, etc.). Comment on these graphs (maximum 2-pages). [4 Mark]

4. Solve the following crossword puzzle: [11 Marks]



Across

- 5. Another name for topologic navigation.
- 7. A level of autonomy where the system role is to control subtasks and human role is to control another subtasks and monitor the operation of the system.
- 11. A locomotion system that is characterized by a series of point contacts between the robot and the ground.
- 12. An example for service robots for professional use.
- 15. The study of how to design robot appendages and control mechanisms to allow robots to move

Down

- 1. A localization method where the robot incrementally corrects its position relative to an initial location.
- 2. An international initiative that aims at preemptively banning lethal autonomous weaponized vehicles.
- 3. An aircraft with no onboard pilot
- 4. An example for service robots for personal use.
- 6. A wheel with two degrees of freedom; rotation around the (motorized) wheel axle and the contact point.

- fluidly and efficiently.
17. A locomotion system that is very sensitive to the relative velocity of the two wheels.
 19. A mobile robot that follows markers or wires in the floor, or uses vision, magnets, or lasers for navigation and that can be used to tow objects.
 20. A vehicle that is able to imitate the actions and sometimes the appearance of an intelligent creature and can perceive unstructured and dynamic environments and act autonomously.
 21. A desirable feature in any artificial system that reflect their ability to adapt to changes in its environment or itself and continue to reach its goal.
 22. A wheel with three degrees of freedom; rotation around the (motorized) wheel axle, around the rollers and around the contact point.
 8. A variation on the classic Trolley Problem in the autonomous vehicles domain.
 9. An intelligence cycle that allows an artificial system to sense, aware, decide, adapt, learn and act autonomously.
 10. The number of centered orientable wheels that can be steered independently in order to steer the robot.
 13. A system that follows a script, albeit a potentially quite sophisticated one; if it encounters an unplanned-for situation, it stops and waits for human help.
 14. Minimum number of DOF required to move a leg forward.
 16. An application domain where high level of autonomy is desirable.
 18. A second wave of digital revolution.

Hint: Spaces and dashes MUST be used if the answer consists of more than one word.