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Engineering Problems of an Autonomous Vehicle

TEAMWORK PROJECT

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Budapest, 2017

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Preface

Autonomous vehicle technology offers the possibility of fundamentally changing transportation. Equipping cars and light vehicles with this technology will likely reduce crashes, energy consumption, and pollution and reduce the costs of congestion, as well.

This technology is most easily conceptualized using a five-part continuum suggested by the National Highway Traffic Safety Administration (NHTSA), with different benefits of the technology realized at different levels of automation:

- **Level 0:** The human driver is in complete control of all functions of the car.
- **Level 1:** One function is automated.
- **Level 2:** More than one function is automated at the same time (e.g., steering and acceleration), but the driver must remain constantly attentive.
- **Level 3:** The driving functions are sufficiently automated that the driver can safely engage in other activities.
- **Level 4:** The car can drive itself without a human driver.

Careful policymaking will be necessary to maximize the social benefits that this technology will enable, while minimizing the disadvantages[1].

In this teamwork project we would like continue this way of thinking. We would like to generate more advantages of autonomous vehicles investigating the possibilities of a **Level 4** type autonomous vehicle to explore a given environment.

Hopefully, our "mini-ROBOT" will be able to drive itself without a human driver avoiding different types of obstacles and bounds while it will give us a detailed map about these position and size. In order to finde the best solution, first of all, simulation environment was created by Wolfram Mathematica. Several types of algorithm were tested using this simulaion environment concerning capability of avoiding obstacles, running time and completeness of the output map. After the simulations the best algorithm was implemented in an Arduino microcontroller. Various type of sensors were used in order to get information about position of the "mini-ROBOT" and to get information about the distance and positions of the obstacles.

1 The "mini-ROBOT"

References

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