Abstract.

Autonomous vehicles have become an incontestably important field, having in store challenges for both industry [1, 2] and research [3, 4]. Since the vehicle are not guided by a physical driver´s navigation skills, an important topic is finding a route based on sensor data collected by itself and other vehicles (V2V communication [5]). Besides the given long-term circumstances, e.g. road layout, width of the road, or intersections, also temporary changes have to be considered, e.g. traffic jams, or construction sites. If we follow this train of thought, it is not only of interesting *whether* there is a route, but we also want the vehicle to find the *best* route. The definition of *best* depends on the vehicle itself, it may be, e.g. the fastest, the most fuel efficient, or a route without tolls or height restrictions. And by driving around, each vehicle leaves a kind of trace by sending tracking and sensor data to, e.g. centralised data base points, or other vehicles. These traces are rather similar to chemical *footprints* left behind by ants in the evolutionary biology [x]. Here, we have to distinguish between different effects of footprints on ants when discovering footprints from other ant colonies and map this behaviour to the routing decisions of autonomous vehicles: (a) the ant follows **positive** footprints, e.g. to find a food source. This maps to a truck that prefers following tracks driven on by other trucks, meaning there are no height restrictions that may force the truck to get stuck or turn around and loose precious time. (b) **neutral** footprints are ignored by ants, this can be mapped to trucks ignoring traces by motorcycles, since they may have really different criteria when selecting their route (e.g. beautiful landscape). (c) **negative** footprints are avoided by ants, e.g. because they don´t want to fight a superior colony. For vehicles, this may mean e.g. avoiding routes with a police patrol when something on the car is broken; or cars searching for the fastest route avoiding tracks done by mopeds, because they imply routes where slow vehicles are allowed and disturb the experience of driving fast. Attributes that may considered by assembling this *digital footprint* left behind by vehicles can be (a) **characteristics of the vehicles**: speed, maximum speed, distance to other vehicles, initiated manoeuvres, the dimensions (weight, height, …), or emission values. (b) **Attributed of the environment** are: intersections, town or highway, rights of way, speed limits, etc.

[1] <http://www.bmwblog.com/tag/bmw-autonomous-car/>

[2] <https://static.googleusercontent.com/media/www.google.com/de//selfdrivingcar/>

[3] <http://cars.stanford.edu/index.html>

[4] <http://www.sciencedirect.com/science/article/pii/S0925231213010126>

[5] <https://www.car-2-car.org/index.php?eID=tx_nawsecuredl&u=0&g=0&t=1453825923&hash=9f4ad0302c4f64980259fc9bbd21ac731e7775ea&file=fileadmin/downloads/publications/Further_publications_by_non-members/AASHTOConnectedVehicleDeployAnalysis_finalreport.pdf>