Autonomous vehicles (AV) do not have real time speed limit data. Vehicles currently depend on GPS data (which uses a database) for speed limit data. If a speed limit were to change on an ill traveled road the onboard computer wouldn’t have a proper way of recognize that change. Autonomous cars haven’t reached its full potential because of several challenges: a) They must make decisions fast in very diverse conditions; b) They must be optimized to reduce environmental pollution, which includes optimizing their routes, driving styles, and communication with other vehicles; c) There is a large gap between the technology level and current legislation; d) The onboard computer must be able to make the “right” decision in any given imminent danger (I Barabás1\*, A Todoruț1, N Cordoș1, A Molea1). Our team will attempt to solve the first challenge. The least considered, yet equally important, diverse condition that can occur are speed changes. Currently GPS’s tell you the speed limit based on a database and if a AV were to drive a speed based on this database how would it know the speed to go when the car enters a new road or construction zone? Those don’t get entered into the database as fast as the vehicle will need it.

Our solution is to fuse computer vision with vehicle safety sensory technology to compute the speed limit of the current road real time. Using deep learning and an extensive data set we will train the algorithm to learn what a speed limit sign looks like and retrieve the numbers on that sign. We are aiming for at least 90% accuracy on the computer vision aspect. To supplement any misreads the algorithm makes it will cross-reference with real time speed limit data delivered by Waze users. Just as users report construction zones, accidents, police stops, etc. we hope to add speed limit reports, although this is not our primary focus. Being able to detect and follow speed limits will reduce the number of speed related motor vehicle fatalities, which can bring great value to companies on the forefront of this technology. In 2016, speeding contributed to 27% of all fatal crashes (NHTSA) so if a company like Toyota or Honda can reduce that percentage would save approximately 10,000 lives per year. Not only does this give legislators more incentive to push AV on the agenda, but it will bring in more revenue as the company is seen as a dependable automotive giant. Furthermore as AVs are able to communicate with each other and their environment, the controlled speed can bring a reduction in fuel consumption as much as 5-20% (I Barabás1\*, A Todoruț1, N Cordoș1, A Molea1). The conservation in fuel will reduce carbon emissions which may bring tax incentives from the government. In any case being able to visually detect speed limit signs as you pass it is going to be far more valuable and useful than depending on a system that waits for a database to be updated to provide current information.

One huge pain point to our solution will exist in the training phase. Our solution is highly dependent on a good dataset. If the algorithm trains on a dataset with speed limit signs that are too far or too close the accuracy, recall, and precision may be off. In addition choosing the right algorithm will be vital to predict what a speed limit sign is. We are thinking of using OpenCV haar cascades for detection. A separate algorithm will be used for extracting digits from the speed limit signs. This may prove to be difficult as well because of different lighting, number sizes, or obstructions that may be on the sign like spray paint or flyers.

The potential market for our product is the entirety of the vehicle market as well as any competitors attempt to solve the problem of speed in AVs. According to CB Insights there are at least 46 identified companies developing road-going self-driving vehicles. The industry ranges from automotive to telecommunications. Some of the major players include Amazon, Apple, Aptiv, Audi, etc. Many of the non-automotive companies are paired with major automakers to expedite their research in the field.

The main driver for speeds in human driven vehicles is traffic flow. If the speed limit said 55 mph but the traffic is flowing at 50 a human driver can only go as fast as the car ahead. Likewise many companies are focusing on detecting vehicles in the near vicinity. There is not much focus on speed limit signs because if the traffic is flowing faster than the speed limit then the vehicle can go at the the speed limit as displayed in the database. With our solution if the same circumstances should arise you would have access to the speed limit as displayed on the road, regardless of what the GPS says. With businesses focusing on vehicle detection rather than speed sign detection it puts us in a unique niche. There will not be much competition due to the original approach we are taking.

Competitors are building autonomous safety technology as we speak but are testing in private. Because the legislation isn’t up to date with the technology there are no AVs on the road but many companies are planning to have fleets operational between 2019-2021. For example Ford plans on having fully autonomous vehicles in commercial operation by 2021. They have partnered and invested with four different technology companies to make it possible. The vehicle is to operate without a steering wheel, gas pedal, or brake pedal within “geo-fenced areas” as part of a ride sharing experience.

Our customers are small and large automakers looking to make their way into the AV market but do not have the knowledge to implement the technology. Ford Motor plans to spend $4 billion by 2023 in the AV business including a $1 billion investment in start Argo AI. Since our market includes name brand companies like Ford, we can assume if our product works very well we can expect at least half a million in revenue to provide the product as a service. We would also be open to a buy out for at least $1 billion, for investment into future ideas.

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