Commentary

Autonomous Vehicles in Rural Communities: Is It Feasible?

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■ **ALTHOUGH MUCH RESEARCH** has been devoted to the effects of autonomous vehicles (AVs) on urban areas, little work has been dedicated to the potential impacts of AVs in rural areas, especially related to feasibility and accessibility [1]. Due to the lack of reliable public transportation, automobiles play a crucial role for rural residents to commute for work, shopping, and other reasons. According to the U.S. Bureau of Labor Statistics, rural households have on average more vehicles than urban households [2]. In 2015, the average rural household spent about 13.7% of their income on vehicle purchases, maintenance, and repairs in comparison to 8.3% for urban households [2]. As the cost of vehicles is one of the top concerns for many rural residents [5], there will be concerns about the affordability of AVs in these areas as their initial prices might be high [1]. Given the current struggles with affording and maintaining vehicles for rural residents, rural residents may not be able to afford or maintain personal AVs, at least not in the beginning. There is also a concern whether rural communities will have access to funding to build the necessary transportation infrastructure to deploy AVs.

Scalability—Will automated buses be next?

It can be assumed that as AVs are introduced at a larger scale so that companies will begin to assess their use and feasibility for automated buses. But how will this impact rural communities? Current public transportation in rural areas is often inadequate due to the lack of appropriate infrastructure, limited bus schedules and bus stops, lack of information about bus schedules, and fares [3]. Alternative transit models have been adopted [4]. However, flaws still exist with these models due to scalability issues, schedule disruptions, and denial of pickup if the request is made after the schedule for the day or time has already been finalized. For example, one may be able to schedule a pickup time that was previously unavailable to them if the automated bus can alter its route impromptu. So, automated buses have the potential to address the transportation issues in rural areas, but solutions must be thoroughly vetted for proper execution before deployment. However, if the automated bus is not programmed to allow for impromptu pickups, then the same issue will arise as before, in which a rural resident may be denied pickup if the request is not made further in advance. Therefore, it is essential to assess the current transportation issues in rural areas before deploying AVs

and automated buses to avoid potentially further perpetuating current issues.

New business models

One way to combat existing barriers to the implementation of AVs in rural areas is to stimulate new automotive and ridesharing business models that help people incorporate AVs into their lives. These new business models could provide alternatives to traditional public transportation and ridesharing. Private companies could potentially lead the mass transition to AVs. Legacy automobile companies, such as Ford and BMW, have already taken steps toward incorporating AV technology in their business model [6]. However, there are still questions regarding ethical decisions, infrastructure, and ridesharing employment in rural communities—problems that need to be properly assessed and addressed when creating new technology and developing new business models. Issues with roadways in rural areas will need to be overcome, thereby creating a gap in the market for companies that make AVs that do not rely on paving guidelines to function. There is also the issue of inadequate technological infrastructure in rural areas. The implementation of AVs in rural areas is largely contingent upon broadband technology, a field where there is still room for significant improvement when considering rural communities. Companies are also anticipating changes in public transportation, where the interaction of driverless taxi service and ridesharing is the predominant form of transportation. Although this model would work well in urban areas, it would not fit rural areas where walking and hailing taxis are not the primary form of transport.

Rural areas at large

It is also important to note that the rural communities vary across and within states and countries. Additionally, there are multiple rural definitions, with some based on population density and geographical isolation [7]. Across rural communities, there are also cultural differences. These factors, along with how close a rural area is to an urban/metropolitan area and how economically developed is the area (e.g., agriculture, industrial, tourism, etc.), may also impact whether AVs are deployed in the rural area and how quickly it is deployed within the rural area compared to its urban counterpart. Additionally, it is important that AV manufacturers and policymakers view rural residents as valuable stakeholders and include them in the process before deploying AVs in rural areas. All rural communities are not the same; therefore, their needs are different, which has an impact on whether AVs should be deployed in a specific rural area and how it should be implemented. And no one is better to answer those questions than rural residents themselves because they are the ones that will be impacted the deployment of the AVs in their communities.

AS TRANSPORTATION EVOLVES to include AVs, the transportation needs of rural communities must be adequately assessed. Sufficient transportation is vital to the livelihood of rural residents. Therefore, we must ensure that the current barriers of rural transportation are adequately addressed and are not further perpetuated in the development and deployment of AVs. ∎

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