

# Footway Robots and Business Improvement Areas

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*It is expected that in some places, at some times, and for some purposes, service robots will be permitted to operate on public sidewalks, pathways, bicycle paths, and roadways. This paper advocates neither for nor against these machines, rather it examines how the economic appeal they promise can be maximized and how the urban risks they portend can be mitigated.*

## Introduction

Unaccompanied, electric, sidewalk-scaled, pedestrian-speed, service robots such as personal delivery devices or maintenance robots such as street sweepers, snow plows, and walkway de-icers are more likely to be ready for pervasive service in our cities and suburbs sooner than robotaxis will provide regular passenger service. The multiple barriers to deployment of these *footway robots*<sup>1</sup> are more easily surmounted than the equivalent barriers to deployment for the robotaxi. [Grush, 2021a]



*Photo from: Findlaw blog (2021) Should Sidewalk Robots Have Legal Rights as Pedestrians?*

Whether footway robots deliver food and packages, keep the pavement free of debris and snow, or perform security and surveillance duties, a critical beneficiary of these machines will be the retailers whose shops line many of these sidewalks. Some of these businesses might also become their greatest adversaries.

Many of these merchants are members of local *Business Improvement Areas*. This paper considers the relationship between these organizations and footway robots. This includes potential benefits, harms, synergies, and acceptance.

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<sup>1</sup> These vehicles or machines are called many other names such as delivery robots, sidewalk robots, personal delivery devices, etc. However, because these devices may also perform other services such as snow ploughing or street sweeping, I will call them **footway robots** throughout this paper. This name assumes that these robots will largely be used on or near infrastructure intended for pedestrian traffic.

## Using footway robots for consumer deliveries

Assuming direct, personal, consumer deliveries as the primary business intent for footway robots, these may be deployed in a number of ways. Several might be loaded inside a larger, specially-fitted goods-delivery van, brought to an area, then unloaded concurrently so that each delivers its packages within a radius of, say, two kilometers. A few might be operated by a retailer — perhaps a lunch shop — to make local meal deliveries. A larger number might be used by an e-commerce operator, such as Amazon, to move goods from micro-warehouses, strategically-positioned staging areas, or from large, parked trailers to residents in a two or three km radius. Others could be used to deliver meals-on-wheels from a local charity kitchen, or be deployed as gig workers are now, moving on-demand from one delivery to the next, like a robotic *Uber-Delivers*. Still others might be used in an express-delivery service, such as FedEx and UPS do now when delivering packages for retailers and businesses, but in a strictly local environment suitable for personal-scaled deliveries, especially for residential deliveries which have grown dramatically in the past few years. There are many dozens of such potential usage scenarios, each with varying advantages and disadvantages to merchants, consumers, residents, and pedestrians local to their operation.

What all of these types of delivery-service applications have in common is commercial trade. The more localized such trade — preferably in direct connection and without intermediary hand-offs between retailer or kitchen to consumer — the more this technology can act as an optimizer of time and cost. As well, footway robots appear to fit well with ideas such as the 15-minute city, the walkable neighbourhood, and the car-free community in that they can help reduce the requirement for the private automobile and the contribution delivery stepvans make to congestion. But, central to the context of this paper is whether the footway robot can improve the post-COVID and eCommerce fortunes of Business Improvement Areas and their communities.



*Photo from the site: The Ontario Digital Main Street Initiative*

## Business Improvement Areas

The *Business Improvement Area* (BIA), an innovation originating in 1970 in Toronto, Ontario, is a form of public-private partnership for local governance.<sup>2</sup> BIAs are important to the fabric of towns or cities, to their attractiveness, for the health of their commercial downtowns and for their local communities.

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<sup>2</sup> BIAs are known variously as Business Improvement Districts (BIDs) or Commercial Improvement District (CIDs) in other countries.

BIAs are “privately directed and publicly sanctioned organizations that supplement public services within geographically defined boundaries by generating multiyear revenue through a compulsory assessment on local property owners and/or businesses.” [Hoyt]

Effective BIAs benefit both businesses and the community. “They can be an economic and social anchor to surrounding neighbourhoods and help to stabilize and add vitality to the local community... [they are an] important not-for-profit organizations which contribute to community development at a grassroots level.” [Windsor]

BIAs lobby for and channel local services on behalf of their members, according to their economic interests. Through various tax or business levies, these groups of private actors are able to execute localized political decisions in public spaces. BIAs sometimes “intervene in strategic planning, e.g., land-use planning, that is a prerogative of local government.” [Peyroux]

Each BIA focuses on their local programs, whether street furnishing, heritage preservations, reversing declines, attracting foot traffic, revitalization, managing panhandlers or graffiti, parking and many others. [Jamal]

“Local businesses, working collectively as a BIA, become catalysts for civic improvements, ultimately enhancing the business climate and quality of life of the neighbourhood.” [TABIA] The 80 plus BIAs in Toronto are each a focal point of their respective communities taking on the characteristics of a local jurisdiction. They may be organized around income levels, ethnic groups, or sexual preferences, using their budgets for cosmetic improvements and branding. They generally work to attract visitors to their members’ shops and to locations for walking, gathering, shopping, and cultural pursuits.

But, as a matter of first order, BIAs must seek to protect the interests of their members. One of those interests involve matters of local infrastructure such as tradeoffs between street parking and bicycle lanes. Another is staying competitive with other channels of consumer supply such as malls or big-box stores — a matter which often turns on the same issue of sufficiency and location of parking facilities, invoking a fundamental conflict between our car-culture and a desire for downtown community-oriented commercial areas. (see box)

Prior to the pandemic, a rising threat was eCommerce, but COVID-19 has not only made that abundantly apparent, but most prognostication about the return to a new normal state indicates that eCommerce is unlikely to decline.

Do online behemoths such as Amazon represent an existential threat to community merchants or will the Internet complement local sales to give these merchants a new resource for survival? Or does the cost and complexity to set up and manage an online presence mean this is a false promise — especially for the merchant with only a few or a single outlet? Shopify may answer this for some, but it is too soon to be certain. [Ovide]

### **Are footway robots a good idea?**

The inventors and promoters of delivery robots promise that these machines will enable many advantages suitable to the BIA context.

Some merchants’ concern for parking as critical to success may (or may not) be misplaced.

According to one study nearly half of local business owners estimated that more than a quarter of their customers arrive by car, when in fact the actual number turned out to be 4%. It was cyclists and pedestrians who were the majority customers. They were also the higher spending customers. [Sorrel]

On the other hand, the recorded portion of 4% may reflect that those preferring to shop in cars simply shopped elsewhere. (That some factors are causal and others correlations is too-seldom considered.)

What is certain is that more footfalls mean more shoppers and active modes such as cycling bring more footfalls per unit of parking space. [StrongTowns]

Maybe a smarter approach is to maximize downtown commercial spaces for active transportation and the kind of social, community and shopping environment that implies — and stop trying to compete with box-stores using underpriced parking.

Could local, near-free, robotic deliveries can become a new hedge against big-box competition?

From a community perspective, they would be smaller, quieter, and cleaner (CO<sub>2</sub>) than the delivery step vans that are common today in many cities. They could deliver food, groceries and other goods to seniors and the disabled. They could enhance meals-on-wheels programs. They would improve consumer reach by extending the effective radius of walkable neighbourhoods while simultaneously reducing the demand for private car ownership.

From the perspective of the local retailer, they could help address the e-commerce crunch and compete against the “amazons” by lowering costs for local delivery. This could help to mitigate the high delivery costs for food that were a hardship for so many restaurants during the pandemic.

From the perspective of jobs, these devices would generate direct local employment (teleoperators, maintainers, managers, and handlers), but more importantly they add indirect employment to the degree that the local retailers prosper. Interestingly, some of the new jobs involving teleoperation can be performed from a worker’s home including by employees with accessibility issues that might be confined to wheelchairs — people who could not have previously been engaged in the logistics or delivery industry.

From the perspective of the urban environment, these devices would encourage better sidewalk design and maintenance. In a recent conversation with John Kiru, the Executive Director of Toronto’s TABIA, it was made very clear that many sidewalks are still too narrow and do not yet comply with applicable accessibility regulations. He also made clear the critical importance of planters, uncluttered pedestrian clearways and the ability to promenade. Based on the draft ISO standard addressing footway robots, any infrastructure upgrades for robots must target guidelines for accessibility and pedestrian access. So, there is clearly an opportunity for a win-win for both commercial interests and pedestrian accessibility — but more on that below.

### **Are footway robots a bad idea?**

As noted just above, sidewalks are already difficult places for pedestrians with accessibility challenges. They are sometimes even complex places for the abled to negotiate, for example when they are crowded or when people are walking pets, pushing strollers, dragging carts, carrying bags, and using skateboards. If we add to this mix robots of varying sizes and speeds, fledgling pedestrian skills, and non-existent social skills, we would threaten to degrade perceived safety and detract from pedestrian comfort and enjoyment as they stroll, shop, or walk to an appointment.

Added to this are questions about privacy and security. Privacy, because the devices will capture image and other data in order to navigate and document their work. Surely, that data can be managed, but the guidelines are not fully mature and even when they are, will they be adequately enforced? And security in terms of physical mishaps that might injure pedestrians or pets, or worse if a bad actor were to intentionally employ a robot(s) in a criminal enterprise.

We also need to consider that many people have worked very hard during the past decades to reclaim urban space for people — for pedestrians and cyclists — and toward more active forms of transportation. For this reason, many people will be unwilling to consider footway robots unless their advantages clearly outweigh any loss of pedestrian autonomy.

Lastly, I return to the question of jobs. Yes, new jobs will be created, but automation also replaces and displaces human workers. More often it creates new opportunities, but this still causes dislocation and requires re-training, and that inevitably leaves some behind. So, the jobs question is not easy to answer. It is naive to see this going only one way, but it is wrong to dismiss the issue. This is a place for government intervention with programs to smooth this transition, while insisting on a degree of flexibility and learning of new skills.

I am often asked: “Do we really want these robots on our sidewalks?” My answer is always the same: “Not the way most sidewalks are now, not without fully attentive teleoperation (i.e., we are not ready for full autonomy, SAE Level 4 or 5), not beyond a trial of devices from a single operator (we are unprepared for multi-operator systems) and not without a secure, IoT-based, ground-control system under municipal governance.

Clearly, there are many circumstances, times and places where footway robots — a least those currently available — would be a bad idea.

## **ISO 4440**

One critical approach to maximize the likelihood of beneficial development of this technology is the draft ISO technical standard 4448: “Ground-based automated mobility systems”, commenced in 2019. [Grush 2021a] Briefly, this standard sets out the procedures and behavioral rules to make regulating, governing and operating these fleet systems a coherent process. The structure of the systems and its data are common, but the local jurisdiction sets appropriate, behavioral constraints. This is done in a way that permits makers to develop robots and their communication systems, planners to design deployments, local jurisdictions to ensure appropriate infrastructure and governance guidelines, insurance companies to provide coverage, and logistics and transportation operators to proceed safely and profitably.

## **Can local thinking sustain local growth?**

In communities with a sufficient local population, pervasive local infrastructure such as wider and better designed sidewalks, cycling systems, and slower streets, as well as local technology such as same-hour delivery systems are more likely to engender an increase in footfall and to sustain local commerce than would continuing the more car-oriented approach suitable for big-box stores. Could local deliveries by well-managed systems of footway robots provide a new arrow in the BIA post-COVID quiver?

Given the extensive value BIAs represent and the range of business and community efforts they undertake, it will be important to consider the impacts of footway robots on each of these efforts. Perhaps same-hour delivery robots would help some local merchants compete against eCommerce, but would those same robots be a nuisance for customers sitting at a sidewalk café? If local delivery systems became pervasive, might that increase the number of local purchases in a zero-sum competition with box stores? In a world that prizes sidewalk and parklet cafes and restaurants, might a prevalence of footway robots discourage footfall with its promenading and impulse purchases? Or would renewed pedestrian infrastructure benefit all parties: residents, merchants, local shoppers, and local livability alike? While it is too soon to be certain, there are steps that may be taken to prepare BIAs, towns, and cities for the turns this will take.

## **BIA responses to footway robots**

There are a number of ways BIAs might ask their host cities to respond to footway robots. These will range between two extremes and the business innovations to be enabled in gradual stages can be expected to adjust as change rolls forward:

The following is not advice, but a menu of choices; the technology and the standards that are being created to manage this are agnostic to the choices that cities will make and BIAs will prefer:

1. Severe constraints on the type, number and schedule of robots permitted, including none permitted at all.
2. No constraints whatsoever. Whoever operates these devices and however/whenever they are operated is acceptable, provided operations are within municipal guidelines that apply.
3. Local (BIA) override on municipally set restrictions such as weight, size, speed, occupancy constraints preferred by the local community. Earlier in 2021 one of the communities in Pittsburgh, Pennsylvania held an online town-hall to discuss community preferences.
4. Conform to ISO/4448 as configured by the municipality, with annual registration fees per vehicle.
5. Conform to ISO/4448 as above, but with a per-trip usage fees rather than annual registration fees.

6. Conform to ISO/4448 as above, but with dynamic (variable) usage fees rather than simple per-trip fees (this is enabled by ISO/4448).
7. Conform to ISO/4448 as above, but add variable permissions differing by blockface and time of day, and orchestrated by BIAs. This is also enabled by ISO/4448.

## Summary

External factors, whether changing approaches to urban planning, growth in e-commerce, a pandemic, or new technologies such as on-line storefronts, ghost-retail, micro-mobility or footway robots, can challenge the financial and hence the social viability of local retail. It follows that threats or advantages to a BIA can easily become threats or advantages to its local community.

Robotic deliveries, if they increase local purchasing, would help to restore financial viability and reduce vacancies. While it is conceivable that the use of local, robotic deliveries may help sustain social viability as well as sales, this seems less certain. If robots are purely and only for delivery and cost is driven out, this could encourage people to shop more from home. But if robots can enhance a district, keeping it cleaner, making it more secure, be used in novel ways acting, say, as BIA ambassadors — even interacting with visitors as they already do in some indoor environments — to encourage more community engagement, then these would be a good thing for both community and commerce. What would that balance look like?

A critical, net positive would be to reduce the need to drive in a personal vehicle to get to nearly every activity we engage in. If local delivery takes away one more reason to drive, we may find more occasions to walk, more reasons to seek out 15-minute cities, more times to buy locally, more opportunities to engage locally — and more community. Footway robots can surely get us out of cars, but will they also get us out of houses?

A negative would be that robots could reduce the need to leave home to shop, implying a drop in social activities, community activities, active transportation, and the like. As the capability of robotic delivery grows, it makes sense for e-commerce logistics operators to operate out of small local warehouses or staging points simply acting as distributed box stores, which would have the opposite effect of reinvigorating local retail. Can this be avoided?

Digitalization and new mobility pull the local merchant in many directions. The need to be online [Ovide], the threat from e-commerce, the introduction of the footway robot, numerous changes in parking supply and pricing, as well as micromobility storage and charging stations at the curb combine to rattle the retailers' world, demanding that they be responsive at every turn in order that their businesses survive. In a private conversation, Professor Kenneth Jones of Ryerson University, told me: "retail is the most flexible form of human commerce — it responds very quickly to change and opportunity." The current decade will test that assertion.

The influence BIAs have on shared public-commercial space (and vice-versa) implies that BIA leadership will seek to influence the regulation of automated devices on the sidewalks in the geographical boundaries of each BIA. There is no reason each BIA would wish to adopt common, uniform rules in terms of robot sizes, speeds, weights, and traffic volume — as implied in several bills introduced and passed in some US States [Grush 2021b]. Depending on the nature of local sidewalks, local budgets, and local business mixtures, some BIAs may welcome these robots, and others may wish to ban them. Surely, most of them will seek a say in their governance.

But there is already a concern here. As of late 2020, well over a dozen US States have tabled or passed legislation permitting "personal delivery devices" on sidewalks. This was done in favour of lobbyists from companies making and deploying these robots (Amazon, FedEx, Starship). This was done by these States without conferring with their constituent cities or their sub-constituent BIDs [Deto]. BIAs can guard against this by lobbying for the ability to moderate such rules of use in ways appropriate to their community.

## Afterword

Taken together, the extraordinary potential and matching complexity of service robots in public spaces is likely to engender a difficult and ongoing social debate. If you are an advocate of this type of automation — and there are many of you — you should progress cautiously, understanding that there are very many unresolved issues before you will be able to reach substantial deployment. If you oppose this type of automation — and you are also not alone — you should be aware that there are many important opportunities that you may be inadvertently rejecting.

Each city and perhaps each local community may reach a different conclusion. I believe we are likely to see some communities that will have none of these robots. We are also likely to see neighbouring communities undertaking different deployments, and the impact of such variations will not be trivial to understand. In the meantime, I entreat you to be open to research, trials, and public discussion. And above all to guard against hype.

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