# The WeWALK smart cane: reimagining adaptive technology

**WeWALK**

## Challenge: Reimagining the long white cane with modern technology

Long white canes are a valuable tool that can be enhanced with technology.

## Solution: A smart cane built for the smartphone era

WeWALK uses ultrasonic sensors, vibration, a touchpad, Bluetooth, and AI to bring new safety functionality to the traditional white cane.

## Results: Increased confidence and independence for people with visual impairments

The WeWALK smart cane improves users' safety and independence, helping them overcome key barriers to mobility.

"Worldwide, there are about 250 million people with visual impairments, 50 million of whom use a traditional white cane to help them get around. This is an amazing tool, don't get me wrong, but it hasn't really changed in nearly 100 years. Everything else has changed dramatically with technology, so we asked ourselves: why not the white cane?"

This is Jean Marc Feghali, Head of R&D at London-based start-up WeWALK. WeWALK is a company dedicated to bringing modern technology to the traditional long white cane, one of the most essential and prevalent tools used by people with visual impairments. "The long white cane is essential for many people with visual impairments, myself included, but we saw an opportunity to enhance it with technology. By adding voice control, Bluetooth, a touchpad, ultrasonic sensors, vibration, AI, and more, we've built a smart cane that can improve the safety of users and help them overcome key barriers to mobility, ultimately contributing to a more equitable and accessible world."

## The WeWALK smart cane

The WeWALK team, some of whom have visual impairments themselves, eat, sleep, and breathe assistive and adaptive technology. The team deeply understands the challenges facing people with visual impairments such as detecting low-hanging objects and holding a cane in one hand and bouncing between apps on a phone with the other. This experience can be exhausting, frustrating, and dangerous for users.

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The WeWALK story began when co-founder Kürşat Ceylan was traveling across New York City. Ceylan, who's been blind since birth, was speaking at the United Nations' Convention for the Rights of Persons with Disabilities and, while making his way from the airport to his hotel with his suitcase, smartphone, and traditional white cane in hand, collided with a pole, causing him injury.

The WeWALK team wanted to address these challenges and started by asking: How might we develop a new white cane for the smartphone era? What if a white cane could bring all of a user's mobility apps into one seamless experience? What if it included voice control and a touchpad so that the user could control their phone directly from their cane, keeping their other hand free to carry suitcases or open doors? What if it had ultrasonic sensors and vibrated when it detected a low-hanging object? What if it came with a companion app that enabled the white cane to improve over time with a simple app update?

A new type of white cane that could offer this experience would help improve a user's safety, mobility, and independence.

So, in 2017, WeWALK began building it.

"With WeWALK, we wanted to build a product that brings modern technology to the long white cane and has the flexibility to keep improving over time. Everything we do, every part of WeWALK, is designed to bring more confidence, independence, and safety to our users," notes Feghali. "One of the biggest barriers for people who are blind or have low vision when it comes to seeing friends and family or accessing employment is mobility. Having a visual impairment impacts your spatial memory, your ability to orientate, and that alone is enough to stop a lot of people from leaving their house. It can really be demotivating."

Feghali continues, "Look, everyone has things they worry about on a day-to-day basis, but for someone with a visual impairment, they also have to worry about everything taking them so much longer. Sometimes areas are not accessible, that can be an immediate showstopper. So, in the long-term, many visually impaired people can end up in a cycle of inactivity, not wanting to leave their homes, not accessing their own cities, not accessing employment. This creates societal segregation, but by equipping people with a tool like WeWALK that says, 'Hey, we can make this journey a little more accessible', you can motivate people and give them the confidence to live their lives."

## The history behind WeWALK

WeWALK began as part of the Young Guru Academy (YGA), an international non-profit based in Turkey dedicated to raising young, high potential impact entrepreneurs in the field of accessibility technologies and STEM education. In 2018, WeWALK spun off from YGA and formed its own company, and in 2020, it became part of the Microsoft AI for Accessibility program.

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"We've received support from almost every level of Microsoft," notes Gökhan Meriçliler, one of the co-founders behind WeWALK. "Even before we got accepted to the AI for Good cohort in the UK, we had some experience working with the Microsoft team in Turkey because they had a partnership with YGA. That's where we first met the Microsoft team, and that's where the Azure team helped us develop some of our earliest software strategy. Later, when we came over to the UK as part of the AI for Good cohort, WeWALK was already on the market, but we needed some help with long term strategy – we were looking for some guidance and experience on improving the technology. We got really excited because Microsoft was a perfect match for this."

Meriçliler continues, "Jean Marc and I spent almost 18 weeks at the Microsoft Reactor office in London, working very closely with the Microsoft for Startups team. They helped us immensely, introducing us to many different colleagues within Microsoft and helping us build our AI strategy. They've helped us mature our product and model our social impact. We even received a shoutout during a keynote speech at Future Decoded, a large Microsoft event. In an instant, everyone in the European tech community knew about us and reached out about partnership opportunities. That really put us on the map."

WeWALK also received support from Microsoft via the Microsoft One Commercial Partner Hackathon. "Being part of the Hackathon helped us develop our AI roadmap – it was an extremely fruitful experience," notes Feghali. "It allowed us to dive deep into the workings of our proposed model, and the Microsoft team helped us rapidly acclimate to the extensive services available in Azure. Additionally, the motivation and positivity portrayed by the Hackathon organizers and participants was truly refreshing and inspirational. As a result of the Hackathon, we were able to decide on our system architecture and design our UI, marking a great step forward for our project."

To this day, WeWALK still works closely with both YGA and Microsoft on product and strategy development. They are also open to partnering with other assistive and adaptive technology solution providers. "There's no such thing as competition in the visually impaired world," notes Feghali. "We're all making assistive tools to help people; that's the end goal. So, if we see a promising adaptive technology growing in popularity, it's in our best interest to partner with them, integrate it into WeWALK, and provide it to our customers."

## Putting AI to work for WeWALK users

One of the most innovative features of the WeWALK smart cane is the way it uses AI. While in use, the cane's gyroscope and accelerometer allow it to collect mobility data on the user, tracking things like the midline of the cane, the cane swipe angle, and the number of swipes per step.

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"What we realized from interviewing a bunch of mobility trainers is that most of them have a lot of clients in their caseload, sometimes up to 40 or 50 people per trainer," explains Feghali. "These clients take a short mobility training course, typically about two weeks, and then go off on their own and do their own thing. Unfortunately, there's no way for the mobility trainer to follow up on this and no easy mechanism for tracking someone's progress. This is a problem though because a lot of visual impairments are progressive—some people do lose their vision entirely, it's not often the case that someone has a stable level of sight for their entire life."

Feghali continues, "So what we're doing to address this is feeding the user's mobility data back to Azure AI, comparing it with existing datasets, and beginning to identify mobility patterns. We can then hand this data back to the visually impaired person and their mobility trainer so they can track their progress."

When asked what it's been like to work with Azure AI, İpek Erdoğan, Machine Learning Engineer at WeWALK, said, "Right from the beginning, the value of Azure AI was so clear. It made it really easy for us to investigate and understand our dataset, which is one of the most important and challenging hurdles when using machine learning. We're also using the Language Understanding (LUIS) service from Microsoft to help with our natural language processing. Language processing is tough to do from scratch, so using this ready-to-go service has helped us achieve accurate results even when we give it a small amount of input data. Overall, working with Azure AI has been great."

## The path ahead – WeWALK is just getting started

In just a few short years on the market, the WeWALK smart cane has improved the lives of thousands of users.

Although WeWALK would be considered a revolutionary piece of technology by any outsider, Feghali sees it as a relatively simple endeavor. "WeWALK isn't doing anything revolutionary from a technical standpoint. It's controlling an app on a smartphone, and that app is just accessing other apps via APIs. It's an exercise in simplicity. By making things accessible, like the WeWALK app and the cane's interface, we give people a little more confidence that they're going to be able to complete their journey safely and independently."

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As WeWALK continues to develop its features, their next goal is getting it into the hands of the people who need it most. "We have developed partnerships with governments, charities, health-care providers, and telecom companies to offer subsidized smart cane packages below the USD600 price point," notes Meriçliler. "Recently, we signed a protocol with the Ministry of Education in Turkey aiming to deliver WeWALK to children with visual impairments at the school level. They will integrate it into their mobility training sessions, and we will reach over 3,500 students in just a few years. This will improve their confidence with the technology and will provide WeWALK with additional mobility data so we can keep improving our services."

WeWALK has a few more ideas for improvements they'd like to make, such as integration with smart city sensors. By integrating WeWALK with sensors throughout the London Tube or the New York City Subway, for example, users could more easily navigate around crowds, events, and delays. This, alongside autonomous vehicle integration, are just a few of the team's big ideas for the future.

## Making a difference with technology

Technological advancements like AI have the power to improve all of our lives. Technology can improve productivity and generate new insights, and for people with disabilities, technology like WeWALK can be life changing. It can mean more peace of mind every time someone steps outside. It can mean empowerment. It can mean greater independence.

Microsoft is proud to have companies like WeWALK as part of the Microsoft Partner Network who are using technology to make the world a more accessible place. Together, we can help every person and every organization on the planet to achieve more.



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