Microsoft

AI for Accessibility

3 years of progress

Microsoft's $25 million program supports AI solutions to improve independence and inclusion for people with disabilities.

In 2018, Microsoft announced the launch of AI for Accessibility, a five-year program dedicated to leveraging the power of artificial intelligence (AI) and machine learning (ML) to create new assistive technology and solutions for people with disabilities.

This program, part of our AI for Good initiative, provides Microsoft cloud and AI technologies to those working to address some of the biggest opportunities for people living with disabilities.

By providing grants, technology, and technical expertise, we aim to empower researchers, startups, nonprofits, and assistive technology companies around the globe to push the limits of what AI can do in accessibility. We also prioritize awarding projects led by and with people with disabilities, instead of for people with disabilities. This keeps projects centered in the communities they benefit.

We are now three years into the program and are excited to share some of the progress our grantees have made toward creating a more accessible and inclusive world. We invite you to read about their accomplishments and consider the gaps that remain. Most importantly, we hope you will join us on our journey to ensure independence and inclusion for all people, regardless of how they see, hear, speak, move, or think.

A responsibility and an opportunity

At Microsoft, we believe technology can empower everyone to achieve more, but we also have a responsibility to ensure that technology is reaching everyone. Technology can exclude people from accessing opportunities if it is not designed with accessibility in mind. And, while we recognize that the adoption of AI technologies is accelerating, we also understand the importance of taking a deliberate and principled approach to developing AI solutions responsibly.

Building a future where everyone can access the benefits of technology has, perhaps, never been more important than it is today. Rapid changes in technology and the accelerated pace of digital transformation are bringing new opportunities to empower people and organizations. Those very changes are also putting millions of people at risk of being left out or left behind in an increasingly digital world.

People with disabilities often face inequities, which can be compounded by other parts of their identity (such as gender, ethnicity, or economic status). The current health and economic crises caused by the global COVID-19 pandemic worsened gaps further. And disability—whether temporary, situational, or permanent—can affect any of us at any time.

The challenge to create a more equitable, inclusive society is complex, and no single company, industry, or leader can solve it alone. That is why we all must work together and why we created the AI for Accessibility program.

When it comes to accessibility, we must follow the lead of people with disabilities, who are best able to imagine, design, and deploy solutions that address their challenges, expand their opportunities, and amplify their strengths. By tapping into this talent pool, we will not only develop new, accessible solutions, but we will also drive exciting innovations that can benefit everyone.

ACCESSIBILITY is about ensuring people can participate and contribute independently and completely regardless of how they see, hear, speak, move, or think.

We hope you join us as we push the limits of how AI can advance accessibility worldwide.

Why AI?

AI, designed responsibly, can enhance tools and services by personalizing the experience to an individual's needs and strengths.

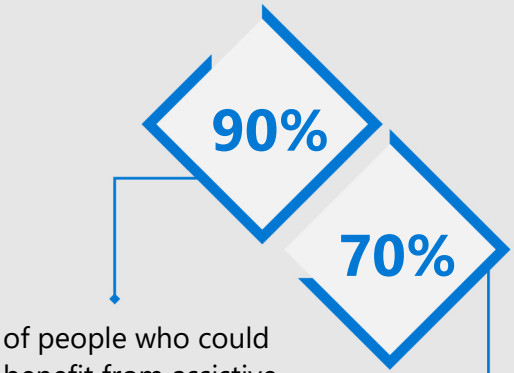
In this report, we will cover:

01 The current state of AI and accessibility, including the lack of inclusive data and how to address this need.

02 Our focus areas in the realm of accessibility and AI, including education, employment, community, and home.

03 Next steps that further these efforts now and in the future.

1+ billion
people have a disability.



of people who could benefit from assistive technology cannot access it

of disabilities are "invisible," so you may not know what others experience

The ORBIT dataset: Advancing teachable object recognition

Object recognition systems have made advances in recent years, but they rely on training datasets with thousands of high-quality, labelled examples per object category. Few-shot learning aims to reduce these demands by training models that can recognize completely novel objects from only a few examples.

In partnership with City, University of London, Microsoft Research introduced the ORBIT dataset and benchmark for learning new objects from only a few, high-variation examples. This work is grounded in real-world application of teachable object recognizers for people who are blind or low vision.

There is massive potential for further innovation to impact a broad range of real-world vision applications including tools for the blind community.

01

Lack of inclusive data: Combatting the "data desert"

Currently, there is simply not enough data—in terms of both quantity and quality—that includes disability communities to power the accessible systems we envision. We call this lack of inclusive data a "data desert."

Without data, there is no machine learning. This is problematic for researchers or developers looking to use AI to develop new experiences and solutions that assist people with everyday tasks. AI systems model the world based on the data they're given. If AI algorithms aren't trained on inclusive data, the system won't work well for people excluded from that dataset—or worse yet, it can actively harm or discriminate against them.

That is why we are investing in grantee projects that focus on improving the existence of and access to inclusive data.

University of Texas creates more meaningful image descriptions

Computer vision algorithms typically learn from large image datasets taken by sighted people with items that are centered and in focus. But an algorithm that has only been trained on these images is likely to perform poorly in describing what's in a photo taken by a person who is blind, which may be off center, blurry, or backlit. And sometimes the thing that person wants to know hinges on a detail that a person who is sighted might not think to label.

The University of Texas's VizWiz-Captions project digs into this common problem. It trained an AI algorithm on nearly 40,000 photos taken by people who are blind or have low vision to more accurately predict captions for a given image. Researchers anticipate the open-source results will help assistive technology developers create better solutions for the people who use them.

Our areas of focus: Where AI can add the most value

People everywhere deserve to participate fully in their communities and independently make choices for their own lives. For technology to enable this, people, regardless of disability and experience, must be represented in every stage of developing a product or service. This core value is integrated into everything we do in the AI for Accessibility program.

To decide where to concentrate our efforts, we conferred with communities of people with disabilities. We also relied on the professional and lived diverse experiences of the AI for Accessibility team, whose members have decades of combined expertise creating opportunity through accessible technology. The areas where AI can have the biggest impact include Education, Employment, Community, and Home.

Our grantees have made important strides in improving technology and creating new solutions in each of these areas and this is only the beginning.

Improving access in education

The challenge: Everyone deserves a quality education, but restricted educational opportunities and unmet classroom accommodations block the path for students with disabilities to pursue fundamental learning, advanced degrees, and the career of their choice.

How AI can help: AI technology in the classroom is particularly suited to address this disconnect. Advancements in transcription, translation, and language understanding capabilities have already helped people with disabilities tap into educational opportunities. We believe AI can continue to expand educational access in new and exciting ways. AI for Accessibility provides grants and technical support to projects and events that advance the accessibility of learning materials, language development, and assistive technology.

Education grants in action:

inAble: Helping blind students take tests more independently

To many students who are blind or have low vision, relying on in-person test readers and writers can present a substantial hurdle. Without access to readily available and affordable accommodations, these barriers cam limit students' ability to demonstrate their knowledge and move on to higher education.

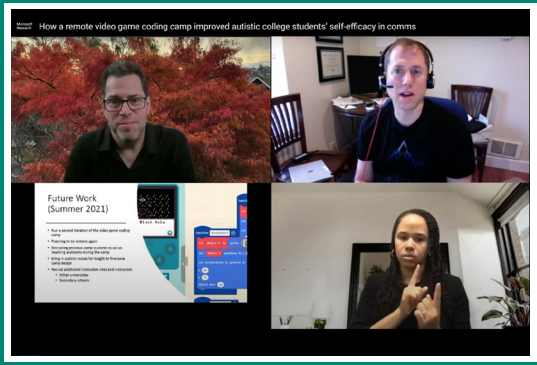
inABLE partnered with **iSTEM** to create I-Assistant, which uses text-to-speech, speech recognition, language understanding, and computer vision to help young people who are blind take exams more independently. This AI tool creates a conversational experience for exams involving free form answers. It is being offered to students in Africa and India initially, with plans to roll out the experience to more locations.

Solutions like I-Assistant help students like Nancy Muthoni, who is enrolled in inABLE's Computer Labs for the Blind program in Kenya, fulfill their potential. She says, *"I'm learning new things every day. My advice to anyone with any challenges in life: Always be courageous and consistent in everything you do."*

Building a community of changemakers:

Higher education works toward an inclusive CS pipeline

Representation and inclusion in technology careers are crucial if we want to make AI more accessible. To further this aim, the University of Washington, the University of Colorado, and Microsoft led the Accessible Computer Science Education Workshop. A diverse range of technologists, researchers, education experts, and civic leaders came together to identify what research is needed to develop tools, services, and ecosystems to make computer science (CS) education more accessible to people with disabilities.



Overcoming barriers to employment

The challenge: Technology affects employment in both positive and negative ways. Assistive technology enables many people to use their skills at work and helps advance a more inclusive organizational culture.

At the same time, the increasing use of AI tools in recruiting can make it more difficult for people with disabilities to land a job. The shift to remote work, which has accelerated during the COVID-19 pandemic, has also disproportionately impacted people with disabilities.

Globally, the unemployment rate for people with disabilities is more than double that of people without. This results in limitations in a person's career but also represents an untapped talent pool for organizations.

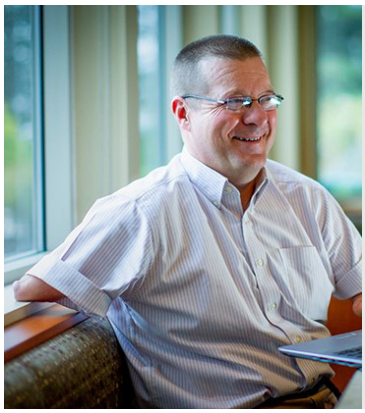
How AI can help: We see disability as a strength that organizations are missing unless they focus on inclusion in hiring, training, and retaining talent. The innovation that results from a diverse workforce can spark inclusive economic recovery efforts and inspire the new ideas organizations need to thrive in an ever-changing world.

Employment is not only a means to make money; it is also a matter of dignity and autonomy. That is why we invest in projects through all stages of employment: job search, interviewing, and upskilling.

Disability is a strength. People with disabilities contribute new ideas, skills, and perspectives that benefit everyone.

Employment grants in action:

Our Ability helps streamline the job search process



John Robinson knows the sting of unemployment firsthand. After he graduated from college, he watched his peers get hired while he was left behind.

That experience inspired Robinson, who was born a congenital amputee, to found **Our Ability**, a company that connects people with disabilities to just-right job openings. Our Ability is designing a chatbot using Azure's AI capabilities and voice-to-text technology. This chatbot will help people share their experience and skills, then identify existing job openings that are a good match.

Robinson says that the solution will help job seekers advance their career and organizations' ability to hire people best suited for open positions. He says, *"With AI and machine learning, we're going to revolutionize the way people with disabilities find work."*

Bringing together cross-sector experts:

New York University disrupts exclusion in AI

Discussion and debate among disability scholars, AI developers, and CS researchers sparked new ideas at the Disability, Bias, and AI Workshop. This event, co-hosted by the AI Now Institute at New York University (NYU), the NYU Center for Disability Studies, and Microsoft, identified additional research needed to ensure AI technologies are developed responsibly with respect to disability, and do not reproduce and extend histories of marginalization, such as exclusion in the workplace.

Connecting communities through inclusive AI

The challenge: Mental health is the top cause of disability in the world. Roughly one in four people worldwide can expect to experience a mental health condition at some point in their life, such as anxiety, depression, or substance use disorder, according to the United Nations and the World Health Organization. And in some countries the number of mental health professionals in no way meets the demand.

Untreated mental health conditions, just like unaddressed physical health conditions, affect workplace productivity and overall quality of life. This has been exacerbated during the COVID-19 pandemic.

How AI can help: The widespread and persistent nature of mental health challenges suggests that we need a diverse range of supports and solutions. We envision the possibilities for technology to help people and their providers monitor, manage, and improve their mental wellbeing.

What's more, we recognize that personal relationships protect mental health. That is why we also focus on solutions designed to help people stay in touch with friends and loved ones, communicate across differences, and get the support they need.

In our Community focus area, our grantees leverage technology to nurture connection, deepen personal relationships, and protect mental health.

Community grants in action:

Mental Health America texts a lifeline

People of all ages need support for mental health, yet young people rarely seek treatment. Some mental health organizations are meeting young adults where they are: via text message.

Northwestern University, University of Toronto, and **Mental Health America** have teamed up to develop an adaptive, responsive text messaging platform. This long-term project will create an automated text messaging service that aims to improve the well-being of young people experiencing mental health problems, such as depression and anxiety.

AI will help people get the right messages at the right time. While not a replacement for treatment, this text messaging service may bridge support for people who are not ready to talk with a doctor or therapist.

Tackling entrenched challenges through interdisciplinary work

Intersectional event explores AI, mental health, and race

The Workshop on Mental Health, Societal Bias, and Black Communities explored the intersection of disability and race. Experts from across disciplines addressed how to improve representation in AI, increase mental health research from and in Black communities, and how AI can both help and harm Black people seeking mental health support. The group shared its insights, including how mental health services can be better designed with interdisciplinary collaborations, to keep the conversation going (Report: https://aka.ms/ai4amhreport).

Technology increases opportunity at home and beyond

The challenge: Disconnects in the experience of a person with disability and the use of technology stems from a lack of inclusive data, which leads to biases in solutions that affect not only people with disabilities but everyone else, too. That is why support our grantees on collecting and using more representative data, including data from people with disabilities.

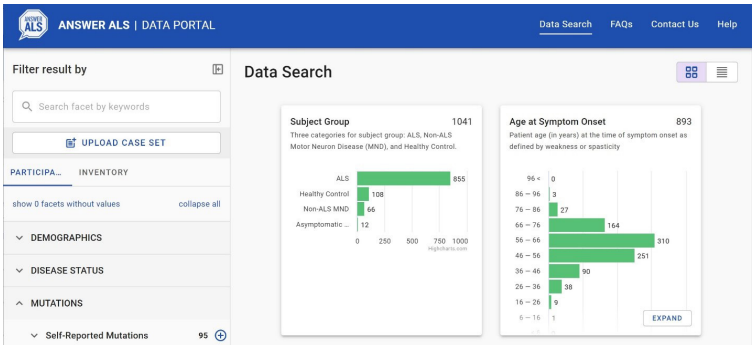
How AI can help: In our Home focus area, we aim to advance opportunities in daily life. These growth areas include the use of common technology, from smartphones to appliances; accessible transportation; and software tools that help with everything from reading a menu to accessing healthcare.

Inclusive technology solutions are as varied and diverse as the strengths of people with disabilities. Our grantees have made impressive progress in ensuring all people are able to live the way they choose.

Answer ALS advances the search for a cure

A few years ago, lawyer Jay Quinlan noticed he was losing some control of his fingers and feet. After several misdiagnoses, he discovered he was living with ALS, a degenerative disease that currently has no cure.

Quinlan is one of roughly 1,000 people with ALS who have contributed genomic data to the largest-yet dataset and research study on the disease. The nonprofit Answer ALS has partnered with Microsoft and the technology consulting firm EPAM to gather this data, securely store it on the Microsoft Azure cloud, provide researchers with powerful tools to analyze the anonymized information—and, they hope, accelerate a breakthrough cure for ALS.



"I want to do my part to let the researchers advance their work," Quinlan says. "I want to do what I can to help future patients have a hope that someday they will find a cure for this."

Event envisions smarter sign language tools

The Sign Language Recognition and Translation Workshop brought together innovators and academics from diverse backgrounds to identify how to improve tools that preserve sign language and improve communication access in the Deaf and hard-of-hearing signing communities. The joint effort identified challenges to progress and possible solutions in sign language recognition and translation tools. The group shared their insights, plus recommendations on areas for the community to address next, in a paper that received the ASSETS 2019 Best Paper Award.

Where we go from here

We have an exciting opportunity to explore how to create the next generation of accessible technology—and the wave of innovation that comes with it.

While the concepts of accessibility and the strength of disability are not new, the capabilities of technology and the number of people who are committed to designing inclusive technology are both new and powerful. But, as we stated in the beginning of this report, this progress cannot be driven by one company, industry, or program alone. It will take all of us to realize the full potential of inclusive and responsible AI, and to meet the demand for what the global disability community deserves.

Microsoft is committed to continue focusing on areas where our strength—technology—can best be leveraged.

We invite you to join us. Wherever you are starting from, as a member of the global accessibility community, you are a part of the team to push the limits of what AI can do and highlight how people with disabilities are changing the world for the better. Together, we will improve inclusion of people with disabilities worldwide now and for years to come.

Ways you can contribute

Apply for a grant

If you have an idea that can use AI to empower people with disabilities, we encourage you to learn more about our AI for Accessibility program.

Increase representation

Investigate your organization's hiring practices. What do the policies and practices say about your organization's view of accessibility? Can they be improved? Can resources like Responsible AI Principles, Inclusive AI Best Practices, or the Microsoft Disability Inclusion Journey help?

Design for accessibility

Consider the accessibility of your offerings from start to finish, not as a nice-to-have add-on. Hire a diverse team and test your product or service with a diverse set of users. Our Accessibility Evolution Model and Accessibility Training Resources are available to help.