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The Artificial Intelligence (AI) Revolution: Are People with Disabilities Being Left Behind?

Presenters:

- John Toles
- Johan Rempel

Live Captions Provided

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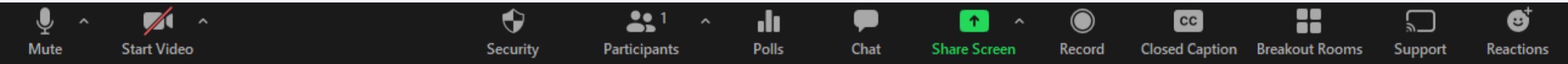
Two Options:

1. Access StreamText link available in the "Chat" ("Chat" control in Zoom toolbar).

2. Access the "Closed Captions" option ("Closed Captions" control with "CC" above it in Zoom toolbar).



Spotlighting and Pinning

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Spotlighting

Only Host or Co-host can spotlight someone

Whoever is spotlighted will appear in Speaker View

Pinning

Any participant can pin any other participant's video at any time, and only impacts that participant's display

How to Spotlight/Pin Participants

Hover over participant you want to spotlight/pin

Select the parenthesis (…)

From the menu, choose "Spotlight for Everyone" or "Pin"

AccessGA

AccessGA is a joint project of the State ADA Coordinator's Office – Georgia State Financing and Investment Commission (GSFIC), Georgia Technology Authority (GTA) and Georgia Tech's Center for Inclusive Design & Innovation (CIDI) . AccessGA's purpose is to support State of Georgia agencies with Information and Communication Technology (ICT) accessibility, promoting equal and timely access for employees and customers with a wide range of disabilities.

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Center for Inclusive Design and Innovation (CIDI)

CIDI’s Mission and Purpose

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Combining decades of service and research, CIDI's mission is to improve the human condition through equal access to technology-based and research-driven information, services, and products for individuals with disabilities.

Products and Services

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- **Braille Services:** produces customized projects from both print materials and electronic text including partial books and chapters or graphics only using cutting-edge technology.
- **E-Text Department:** provides high-quality e-text in many formats such as PDF, DOC, DAISY, EPUB, PowerPoint, and HTML.
- **Captioning and Audio Description Services:** makes classrooms, meetings, labs and other audio environments fully accessible for deaf or hard-of-hearing, including remote captioning and captioned media.

Additional Products, Services & Research

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- **Tools for Life (TFL), Georgia's Assistive Technology Act Program:** Offers access to, and acquisition of, assistive technology for Georgians of all ages and disabilities in order to live, learn, work, and play independently in the communities of their choice.
- **Accessibility Compliance, Best Practice and User Experience:** We focus on accessibility and usability needs through evaluations, testing, training, technical assistance, and comprehensive website/application accessibility evaluations.
- **Research:** focuses on accessible environments for people with disabilities including students and aging individuals in the built and virtual environment.

John Toles

Georgia Tech Center for Inclusive Design and Innovation

John Toles, ICT Accessibility Specialist with the Center for Inclusive Design and Innovation (CIDI):

- Provides web accessibility evaluations, technical help and training about digital accessibility.
- Joined CIDI in 2016 providing customer support and data services for a First in the World research grant.
- Has worked with customer support team as an AT Support Specialist.
- Also served as the lead developer for CIDI's Student Accommodation Manager (SAM) software.

Johan Rempel

Johan Rempel, ICT-UX Quality Assurance Manager for Center for Inclusive Design and Innovation

- Manages the UX/ICT Accessibility unit within CIDI
- Previous experience and training as an AT Specialist, Vision Rehabilitation Therapist, Orientation & Mobility Specialist, and Digital Accessibility Specialist.
- Oversees several Information and Communication Technology (ICT) Accessibility initiatives, including the AccessGA Project.

Today's Agenda

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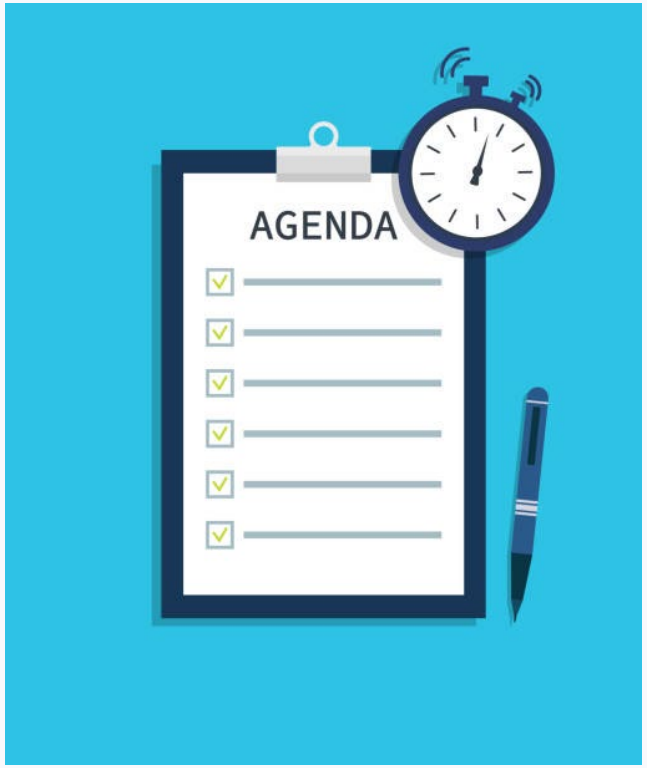
1. An Overview of Large Language Models used by AI
2. Defining "People with Disabilities"
3. Benefits of AI for People with Disabilities
4. Existing challenges of AI for People with Disabilities
5. Removing Barriers for People with Disabilities
6. Questions and Answers



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An Overview of Large Language Models

Older than you may think

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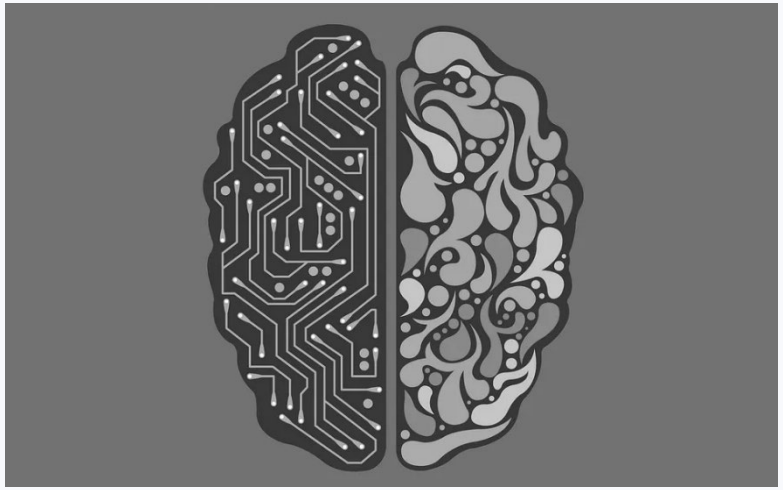
- Artificial Intelligence was an early goal of computer science in the 1950s.
- Defined then as Machine Learning or a computer that could learn from experience.
- Early advancements in AI included:
  - Programs designed to play games like checkers or chess
  - Decision making programs that used probability to reach conclusions
- However, none of these were able to outperform humans at their tasks.



Defining some terms

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- **Algorithm** – a set of instructions intended to yield a specific output from a model
- **Artificial Neural Network** (ANN, Neural Network, or NN) – computer system built to mimic the neurons of a human brain
- **Model** – the part of a neural network humans interact with
- **Large Language Model** (LLM) – a neural network trained to predict likely text outputs from human language inputs (i.e., Chat GPT)
- **Generative Pre-Trained Transformer** (GPT) – a type of Large Language Model trained using a large amount of text intended to generate outputs that resemble human writing
- **Reinforced Learning from Human Feedback** (RLHF) – a method of training neural networks where humans analyze the network's output to improve future iterations

Recent Advancements in AI

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- AI greatly expanded between 2012 and 2017 when new techniques began to create systems that approached human levels of competence. (original one was GPT 2)
- Between 2020 and 2022 techniques, such as large language models and stable diffusion (image generation) led to successful Generative AI systems
- The period following 2020, expanded funding and research for generative AI has been called an “AI Boom.” These systems began to create things that closely resemble works created by humans.

Parts of a Large Language Model (LLM)

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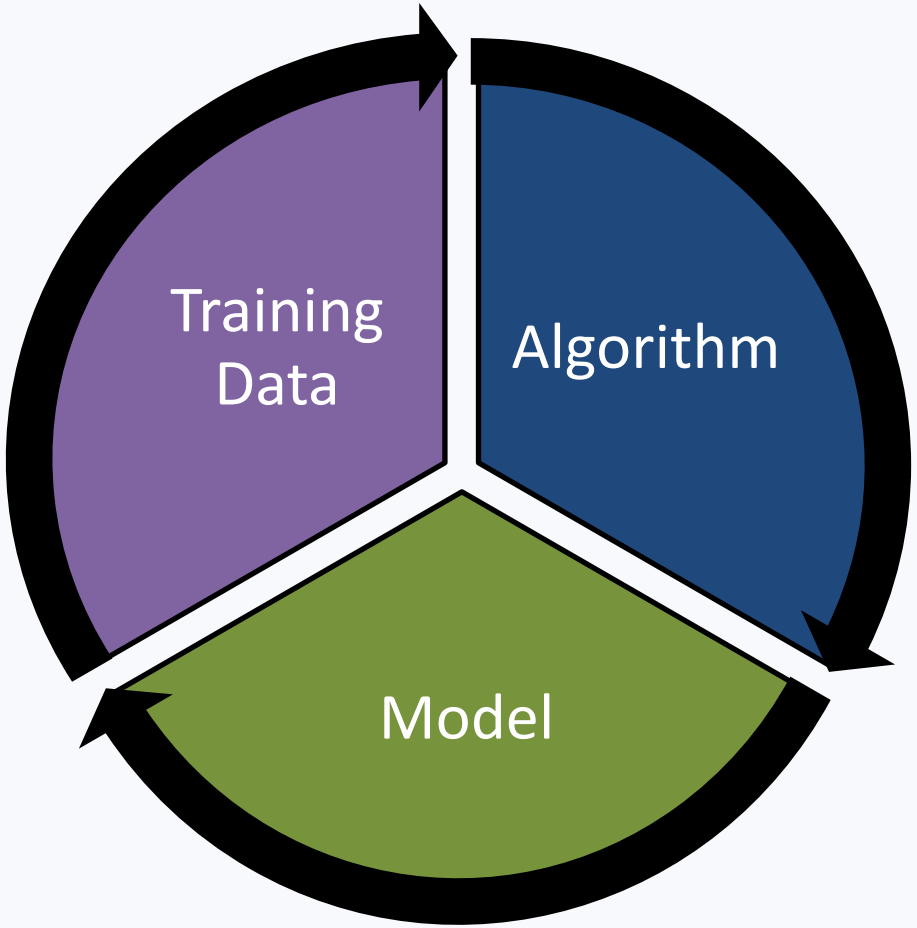

- **Training Data** - Information categorized by human beings so it is useable by the algorithm.
- **Algorithm** – The instructions created by human beings that the neural network uses to interpret training data.
- **Model** – The result of running the training data through the algorithm. This is the part of the system people interact with when using the system.

Successes and Failures of LLMs

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Successes:

- Create large amounts of text quickly
- Closely resembles human writing
- Can interpret conversational language

Failures:

- Inherits human biases from training data
- **Hallucinations**: Creates nonsensical text
- **Sycophancy**: Lies to create outputs which match user's biases

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Defining “People with Disabilities”

Disabilities

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Roughly 1 in 4 adults (27%) in the US are living with a disability that can affect their:

- **mobility**: serious difficulty walking or climbing stairs
- **cognition**: serious difficulty concentrating, remembering, or making decisions
- **lack of independent living**: difficulty doing errands alone
- **deaf or have serious difficulty hearing**
- **vision**: disability with blindness or serious difficulty seeing even when wearing glasses
- **lack of self-care**: difficulty dressing or bathing independently

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

W3C-WAI Description of Disabilities

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The Worldwide Web Consortium's Overview of Disabilities:

- Physical
- Cognitive, learning, and neurological
- Visual
- Auditory
- Speech

Disabilities Impact All of Us

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- Disabilities can be situational, temporary, or permanent
- 100% of us will have one or more disabilities at some point in our lives if we live long enough
- Creating accessible and inclusive products and services benefits everyone
- Not considering the needs of people with disabilities in products and services disenfranchises more than a quarter of the population

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The Benefits of AI for People with Disabilities

How AI Benefits People with Disabilities

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- Autocomplete, spam filters, personalized streaming recommendations, driving directions
- Assistive Technology (AT) powered by AI such as Siri, Alexa, Google Now.
- Google's Parrotron app allows individuals with speech impairments to translate speech patterns into fluent conversations.
- Google's Live Transcribe app uses AI to transcribe speech in real-time for the deaf/hard of hearing population
- AI Captions using MS Teams, Otter AI, Zoom
- Microsoft's Seeing AI for people with vision loss
- Wheelmap: uses AI to crowdsource accessibility information about public spaces

Microsoft Copilot key (Windows 11 PC)

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- **Microsoft AI Copilot Key**: Additional key on some newer Microsoft QWERTY keyboards introduced in recent versions of Windows 11
- Copilot key marks the first significant change to the Windows PC keyboard in nearly three decades
- Powered by tech from Chat GPT maker Open AI.
- For most keyboards, this new key will be on the right-hand side, replacing either the right control key or the menu key.

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Challenges of AI for People with Disabilities

AI Generated Alt Text

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AI Generated Alternative (Alt) Text

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- Microsoft Office 365 generates an alternative text for pictures
- Depending on the version, it may be set to default
- LinkedIn, Facebook, Instagram, What's App, and many others generate alt text

Alt Text in Context

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- Website Content
  - alt = yellow tulips blooming in the Spring
- Horticulture Class
  - alt = Tulipa gesneriana
- Image is a Link
  - alt = Tulip Society of America
- Image is Decorative
  - Alt = “”

AI Generated Captions

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Benefits:

- can produce content quickly, thereby producing large volumes of product descriptions, news stories, or other types of content that require little personalization

Barriers:

- **Confidence Intervals**: AI "assumes" the next word(s) if misspoken or when sound interference occurs, which is then included in the transcript as if it was actually spoken.
  - AI will not include a parenthetical as in [cannot hear], [inarticulate], in the phrase If unable to understand the word(s), removing the opportunity to ask for further clarification or at least not learn the incorrect term or idea
- **Human Inarticulates**: AI tends to include every utterance (i.e., you know, like, so, apparently, etc.), even when it’s not valuable or necessary in the context of information shared

How and When to Use AI-generated captions

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- When AI-generated captions gets things wrong, it will often get things **very** wrong
- AI captions best used for low stakes multimedia and meetings not pertaining to critical information sharing
- When it relates to healthcare, education, or employment, it must be accurate

Trained AI models exhibit learned disability bias

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Findings from Penn State College of Information Sciences and Technology Research on AI and Disability Bias – **Explicit bias detected against people with disabilities**

- AI tools analyzed often contain biases against persons with disabilities
- Statements referring to people with disabilities received significantly more negative and toxic scores than statements from other control categories
- Tools often classified statements as negative or toxic simply by the presence of terms such as ‘blind’

Automated Ableism: An Exploration of Explicit Disability Biases in Sentiment and Toxicity Analysis Models

[https://trustnlpworkshop.github.io/papers/5.pdf]

AI Can Create Disability Discrimination in Hiring

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ADA.gov guidance explains how some algorithms and AI can potentially lead to disability discrimination for hiring in areas such as:

- job advertisements to targeted groups
- deciding if an applicant meets job qualifications
- holding online video interviews of applicants
- using computer-based tests to measure an applicant's skills or abilities
- scoring applicants' resumes

ADA.gov
U.S. Department of Justice
Civil Rights Division

Algorithms, Artificial Intelligence, and Disability Discrimination in Hiring [https://www.ada.gov/resources/ai-guidance/]

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Removing Barriers to Help Ensure Inclusion of People with Disabilities

People with Disabilities Need a Seat at the Table

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- It is critical that people who are designing the human-computer interactions that involve generative AI Improve their knowledge of inclusive, human-centric design principles that take persons with disabilities into account.
- Disability is highly nuanced and diverse and user research should be conducted with that in mind
- By working alongside and collecting feedback from individuals with various types of disabilities and who are neurodivergent, there is greater assurance of a more optimal, inclusive, and accessible experiences for everyone
- Procurement: It is the responsibility of organizations to effectively vet AI-related products in their procurement process to ensure more equitable experiences and opportunities for everyone

Resources

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- AI for Disability Inclusion [https://www.accenture.com/content/dam/accenture/final/a-com-migration/custom/_acnmedia/pdf-155/Accenture-AI-For-Disablility-Inclusion.pdf#zoom=40]
- Automated Ableism: An Exploration of Explicit Disability Biases in Sentiment and Toxicity Analysis Models [https://trustnlpworkshop.github.io/papers/5.pdf]
- Algorithms, Artificial Intelligence, and Disability Discrimination in Hiring [https://www.ada.gov/resources/ai-guidance/]
- Google Parratron App [https://research.google/pubs/parrotron-an-end-to-end-speech-to-speech-conversion-model-and-its-applications-to-hearing-impaired-speech-and-speech-separation/]
- How to use Google's Live Transcribe App [https://www.youtube.com/watch?v=u-APnItEOPI]
- Microsoft Seeing AI [https://www.microsoft.com/en-us/garage/wall-of-fame/seeing-ai/]
- Wheelmap [https://apps.apple.com/us/app/wheelmap/id399239476]

Questions?