Google Research: Project Euphonia

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Introductions

Marilyn: Speech-Language Pathologist for 11 years. SLP at CPU for 9 years. Previously worked at Walt Disney World Entertainment (8 years). Consulting with Google currently. Specializing in AAC, Dysphagia, Autism, in a variety of settings: outpatient rehab, home health, adult day programs, telehealth, pediatrics (early intervention), group homes.

Our team includes 4 speech professionals

Jordan Green
SLP / Cambridge

Katie Seaver
SLP / Cambridge

Richard Cave
SLT / London

Marilyn Ladewig
SLP / New York City

Program management

Engineering & research

Product & design


GoogleersGive
GOOGLESERVE

Project Euphonia

Our goal is to train computers and mobile devices to **better understand people who have impaired speech.** We hope to enhance independence and social inclusion by improving voice activated products for everyone.

g.co/euphonia

What’s the problem with ASR for people with impaired speech?

Automated Speech Recognition (ASR)

The accuracies of ASR systems have improved significantly over recent years due to the increased computational power of deep learning systems including artificial intelligence (AI) and machine learning (ML) and the availability of **large training datasets.** Despite these improvements, however, accuracy for many people with speech disorders is still often so low, that it renders the technology *unusable for many of the speakers who could benefit the most*.

The problem with ASR and dysarthria: Part 1

- ‘Non-standard’ voices may be unable to use ASR effectively

➔ People with a disorder or disability affecting speech may be unable to access ASR technology effectively. More than 9 million adults in the United States may have trouble using their voices (Bhattacharyya, 2014).

➔ People with ALS and moderate dysarthria achieved a varying but significant word error rate per sentence, and subsequent varying response rate for Google Assistant (Ballati et al., 2018)

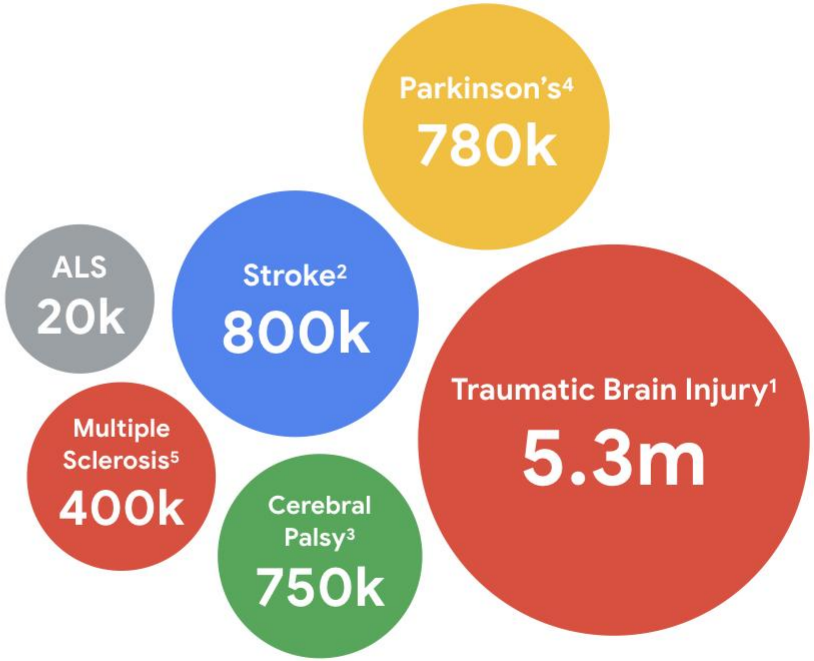
The problem with ASR and dysarthria: Part 2 - Voice control is ubiquitous

- ➔ By 2024, it is forecast people will interact using their voice with over 8.4 billion devices - double the number expected by the end of 2020, and larger than the world's population (Moar & Escherich, 2020) .

- ➔ Cars and household devices such as televisions are forecast to have the highest rate of growth (Moar &; Escherich, 2020) .

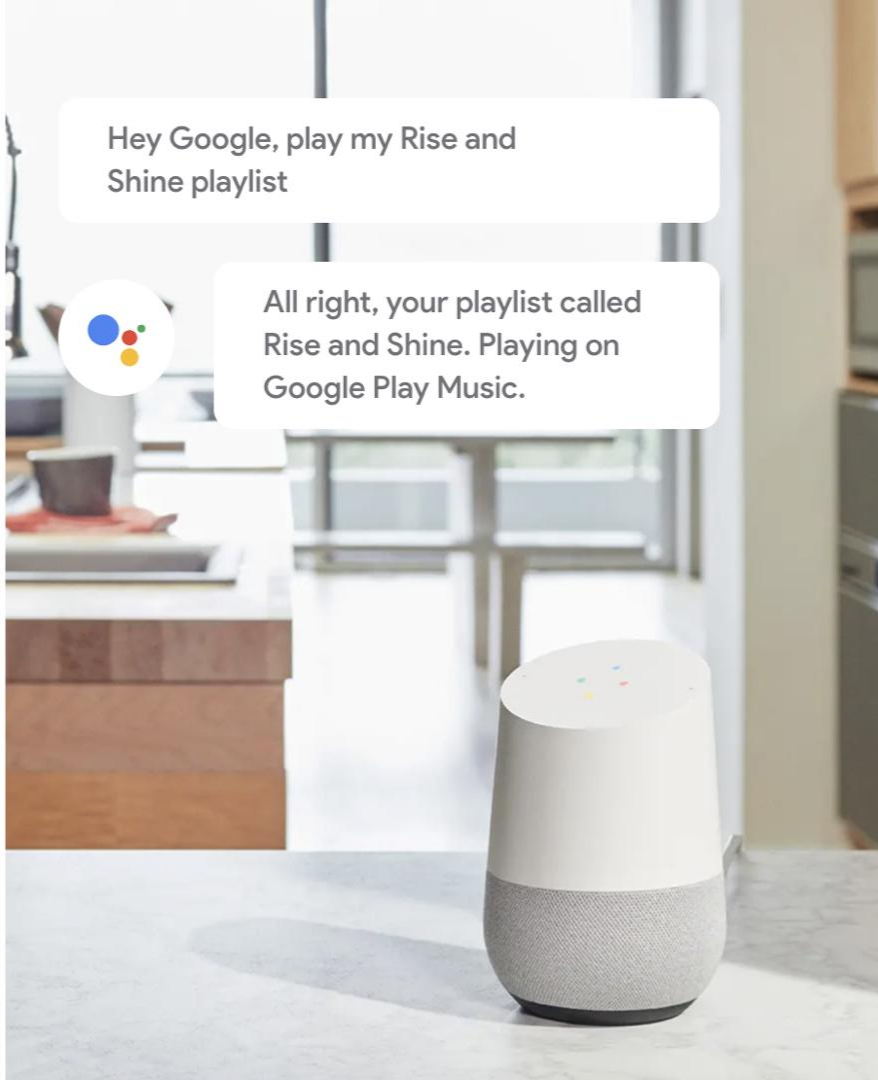
For people who have difficulty pronouncing words due to disabilities, communication is an ongoing challenge.

Prevalence of neurologic conditions in the US



[1]Traumatic Brain Injury, Association of Neurological Surgeons
[2]Stroke Facts, Centers for Disease Control and Prevention
[3]Cerebral Palsy Facts and Statistics, Cerebral Palsy Guidance
[4]Prevalence of Parkinson's disease across North America, Nature Partner Journals
[5]Multiple Sclerosis Statistics, Multiple Sclerosis News Today

Voice activated technologies don’t work well either for people with non-standard speech.



Can we make speech recognition work better for people with impaired speech?

Maybe, if we have (a lot of) examples!

What is AI?

Types of AI: Rules-based vs. Machine Learned

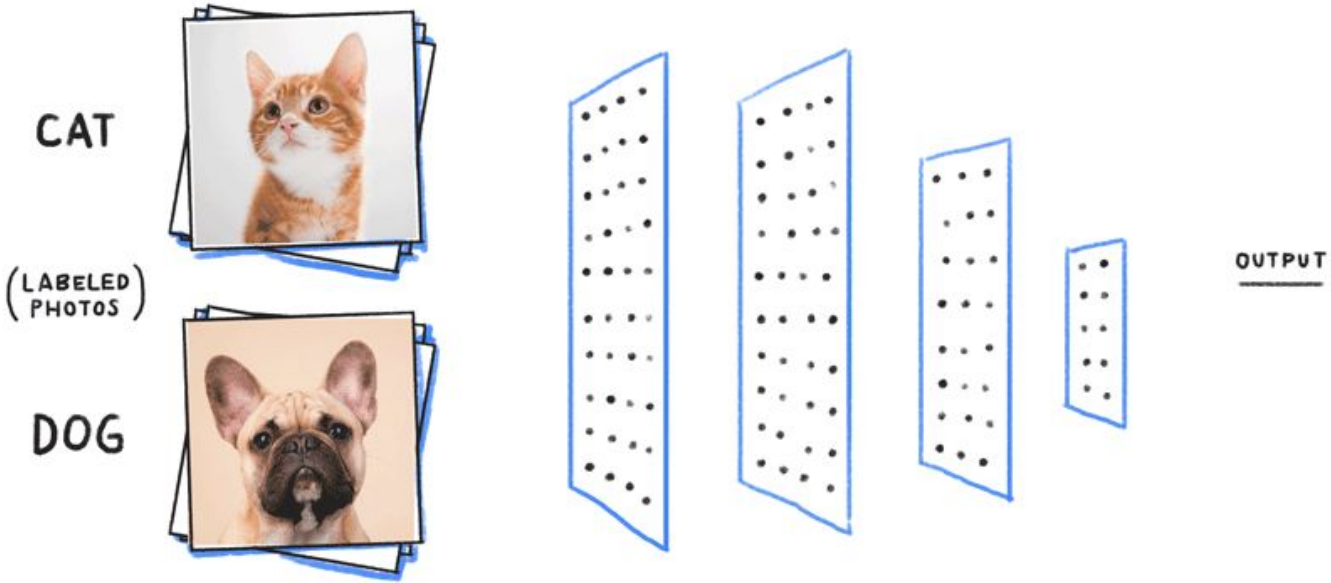
Write an AI program
with **explicit rules** to follow

Example: Email spam using word lookup, e.g. “V!agra”

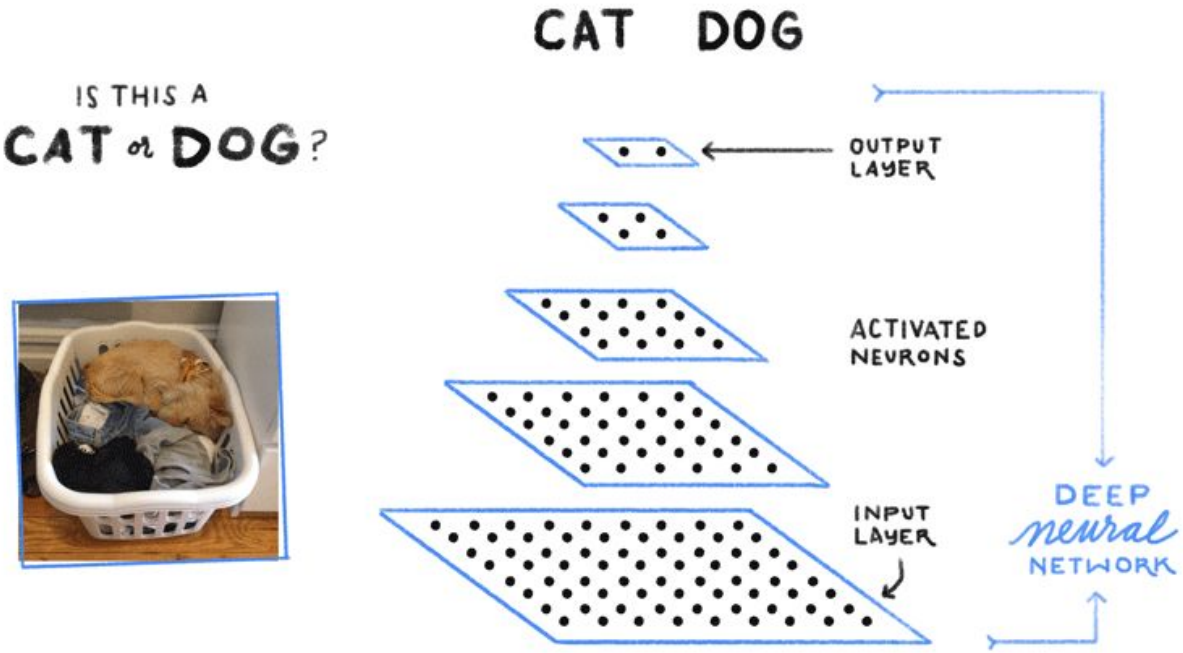
Write an AI program
that **learns the rules from data**

Example: Email spam detected by looking at a lot of examples of spam flagged by users

Training a machine learning model involves showing it a lot of labeled examples



Inference is when the model tries to recognize an image it has never seen before



Useful for identifying cats

Google

Useful for distinguishing cats from bunnies

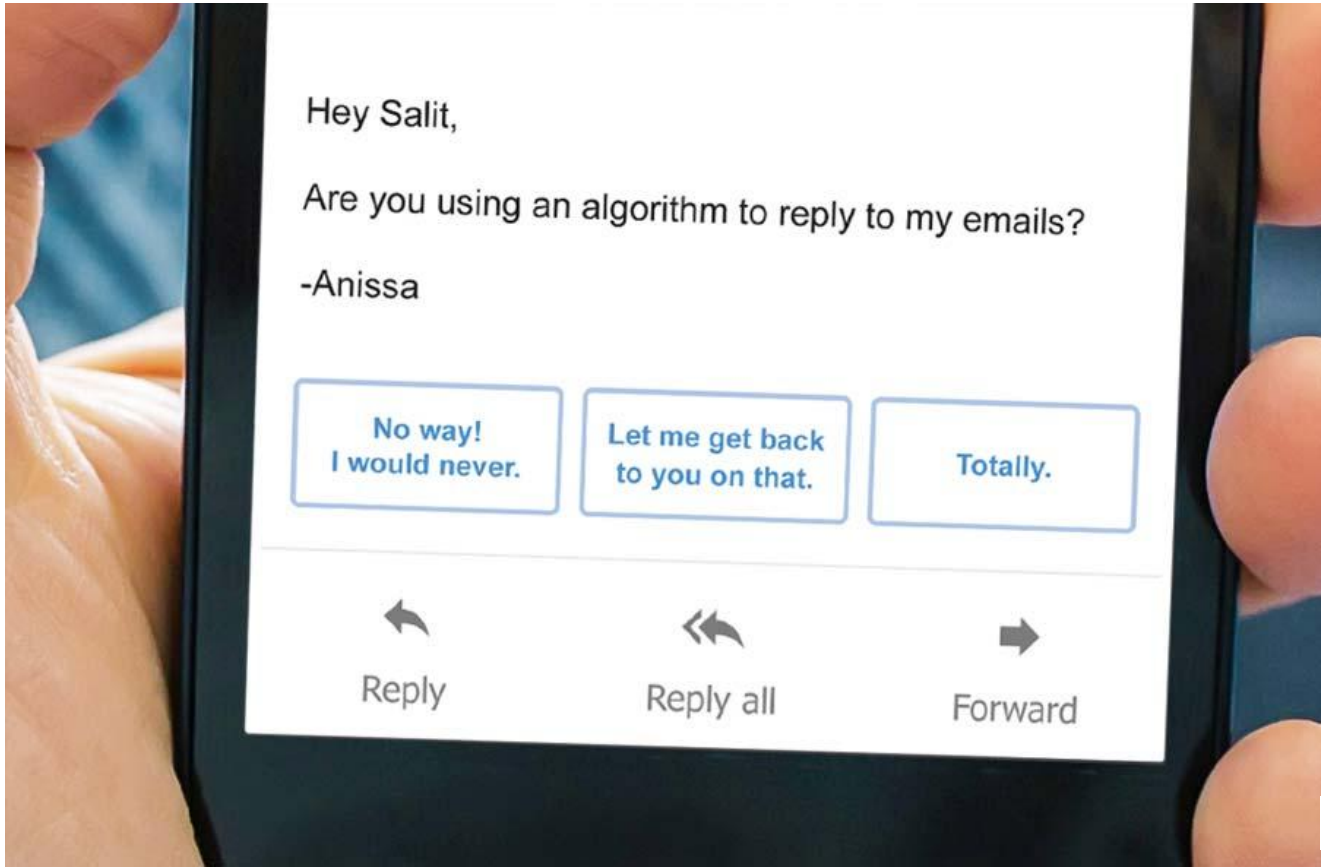
Google

How about blueberry muffins from dogs?

Google

An application of computer vision: Google Translate

Gmail’s smart compose



Google

How to become a participant:

1. Participants sign up via the Interest form on g.co/euphonia
   Tip: use a gmail address!

2. Participants will then get an email to record 300 speech samples ir ChitChat
   Tip: minimize background noise!
   Tip: reading help encouraged!

Future:

3. Beta-Testing: Participants may be invited to become a Trusted Tester

Who’s speech samples are we looking for?

- People over 18 years old with motor speech disorders, mild-profound!
  - At this time, excludes Aphasia

- Phrases are **written text** that need to be read with accuracy...word for word
  - “Turn on the bedroom lights”. If incorrect, please re-record

- As an Assistant or Accessibility Ally, you will be compensated $50 /hr that you help a participant share their speech.

- We don’t collect dx, name, race, gender, education level (there is a space to volunteer that info)

Step 1: go to g.co/euphonia

Google Research About Getting Involved FAQ Record phrases

Project Euphonia

Project Euphonia is a Google Research initiative focused on helping people with atypical speech be better understood. The approach is centered on analyzing speech recordings to better train speech recognition models.

Step 2: participant will fill out the interest form

Google Project Euphonia - Interest Form

We're exploring how Google products and services that use speech as an input method could work better for more users.

IMPORTANT: If you're filling out this form on behalf of someone else, please ensure you have their permission to do so.

Questions? Write us anytime at euphonia-project@google.com!

* Required

We're seeking voice contributions from adults who have difficulty being understood by others.

Voice samples can help us improve how Google understands individuals with speech impairments.

Please confirm... *

☐ Strangers or people I just met find it difficult to understand my speech (not because of an accent)

Step 3: get email to start recording!

Welcome to Project Euphonia!

Our research goal is to improve speech recognition for everyone, and we're thrilled to have you along for the ride. Click below to hear from Julie, our product manager, on what to expect:

YouTube WATCH THE VIDEO

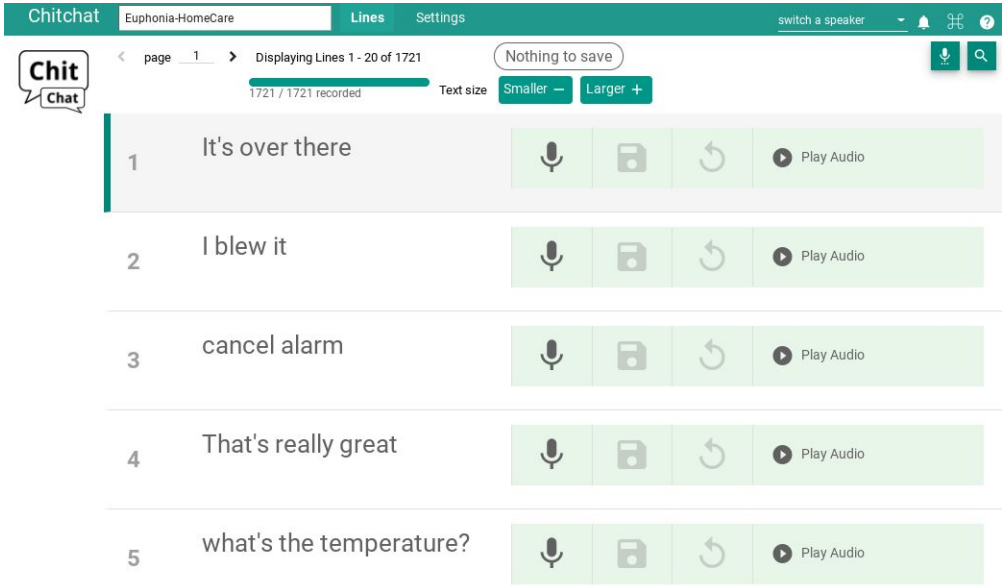
Next, start contributing to Project Euphonia by recording **300** speech samples.

Participation in our research initiative is voluntary. However, we understand that these recordings take time and energy. As a token of our appreciation, we provide cash-equivalent gift cards to participants who complete phrase sets. Your recordings will be reviewed by a speech and language specialist. If, after review by these specialists, your recordings are deemed suitable for Euphonia research, you will receive a gift card valued at $60 USD (or local currency equivalent) for 300 phrases recorded. Examples of speech that are NOT suitable for Euphonia research include accented speech, and speech with no detectable impairment.

Get started »

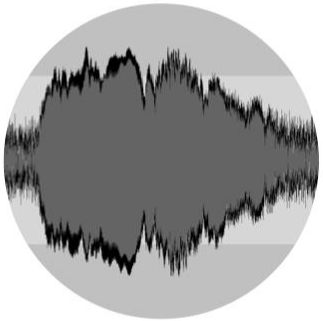
Use your smartphone, tablet, computer. No headset needed.
Record 300 phrases - on your own time!

(Desktop: Chrome)

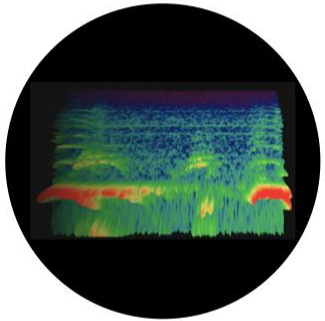


(Mobile: Chrome)

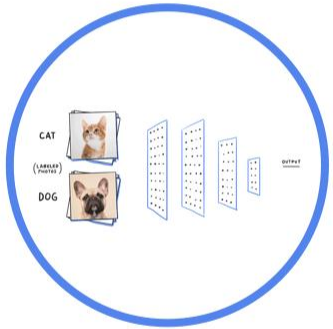
The recorded phrases are then used to conduct machine learning research to improve speech recognition.



Raw audio data



Visual representation & labels



Convolutional neural net

Real-time transcription

Ultimately, our goal is to explore how Google products can work better for users who have speech impairments.

Google Home

Google Home Mini

Google Assistant

Google Search

Rewards!

Participants recording their voice will receive a digital gift card valued at $60 USD or local currency. You’ll automatically receive your gift card within about a week of completing your recordings.

Rewards for helping too!

Project Euphonia will be sending digital gift cards to SLPs, OTs, and other Accessibility Allies (e.g., Rehab Engineers, ATP, HHA, etc.) for their time spent assisting participants who share their speech. For every hour you assist a participant in recording for Project Euphonia, you will receive a $50 USD (or local currency equivalent) gift card. An annual limit of $550 applies.

Once you have accumulated hours, fill out our SLP & Ally Form to let us know, and you will receive your gift card by email. Please note gift cards are limited to professionals not living in the same household as the participant.

Google AI Project Euphonia SLP & Ally survey

More about Project Euphonia

Speech samples fuel our research - the more samples we have to train our systems on, the more likely we will have success recognizing that type of speech. Please note that Project Euphonia is an early stage research initiative. The purpose of your clients' participation is to donate voice samples to help with our research, and we cannot guarantee they will be able to use a product that recognizes their voice. As a token of our appreciation, we provide participants a thank you Visa gift card of $300 USD for every 1500 phrases recorded.

Have you already been helping your clients record their voices for Project Euphonia? If you have, Project Euphonia is giving gift cards of $50 USD (or local currency equivalent) for every hour that you have spent providing this assistance.

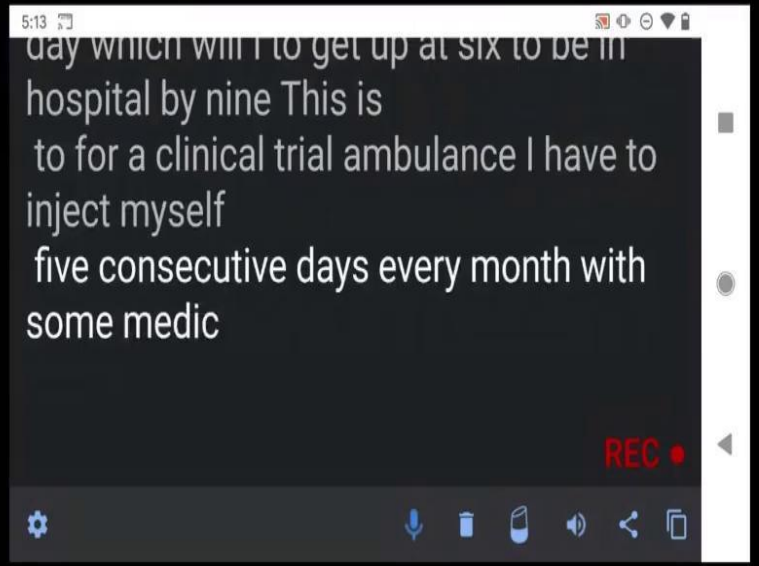
There is an annual limit of $550 (11 hours) per person. Please do not fill this section out if you are currently recording as a participant. Gift cards can only be sent to institutional emails (eg. @xxx.edu, @xxxinstitute.org).

- ◯ Yes
- ◯ No - but I am interested in helping them record in the future and would like to know more about the project
- ◯ No - and I will not be helping them record in the future

Back Next

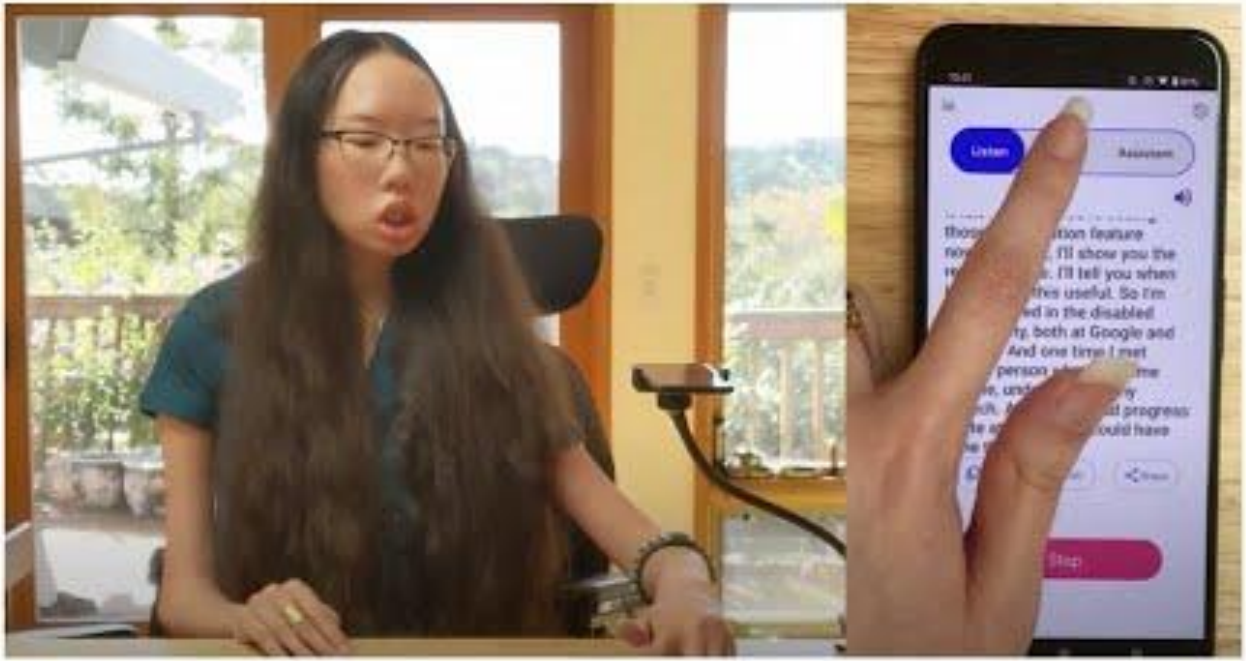

- It records everything I say.
ability beyond


Screen Stream
Not secure
192.168.0.18:8080
Apps
Google
UCL
Voice Message Bank
MNDa
Home
Junos IEXPLORER P...
Mail - compassmn...
Google Maps
Edit your kahoot |...
Communication Aid...
ownCloud
Other bookmarks


5:13
day which will I to get up at six to be in
hospital by nine This is
to for a clinical trial ambulance I have to
inject myself
five consecutive days every month with
some medic
REC


Richard Cave

We are looking for trusted testers!



YouTube

WATCH THE VIDEO

For people who can't speak,
we have an app

Project Activate

- Project Activate is an Android app which enables people who have motor and speech impairments to **express themselves** and **call for attention**
- With Project Activate, you can quickly activate preset actions just by making a face gesture

Gestures

- Smile
- Open Mouth
- Raise Eyebrows
- Look Left, Right, Up

Actions

- Speak a phrase
- Play audio
- Send a text
- Place a call

Download the app at g.co/ProjectActivate