

# Empowering Patients through AI: Enhancing Communication and Engagement in Neuroscience



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# Disclosures

- **Funding**
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  - Google, Microsoft, ETS

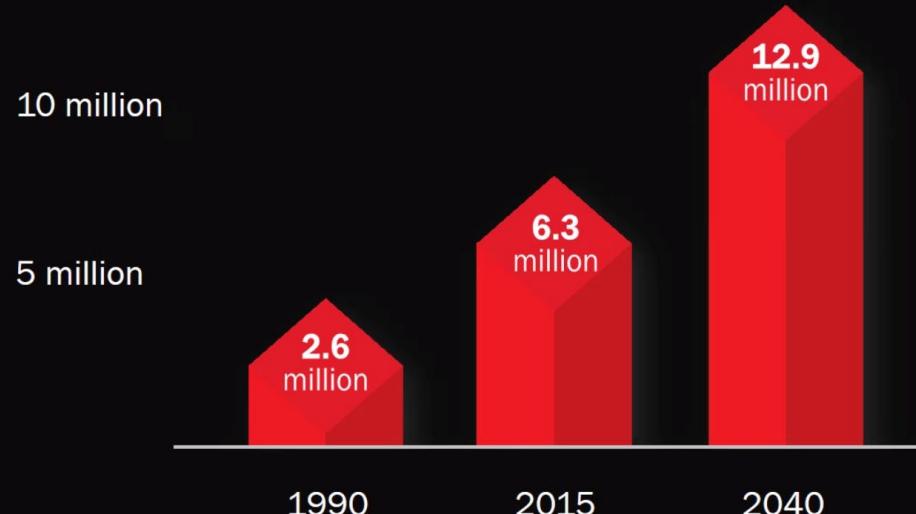


# Summary of the talk

- Research focus on AI for diagnosis; less on communication & engagement
- Challenges in AI research partnerships formation
- Difficulty publishing these findings in AI conferences

# Parkinson's disease

...but is now the fastest growing brain disease ...



Source: Dorsey ER, Bloem BR. The Parkinson Pandemic—A Call to Action. *JAMA Neurol.* 2018;75(1):9-10. doi:10.1001/jamaneurol.2017.3299

*In 23 African countries, average population per neurologists exceeds 6M*

40% of PD patients over 65 do not receive care from a neurologist in the US



# Economic Burden due to PD

The total economic burden in USA (2017)  
=\$52B

Projected to be \$80B by 2037.

Yang, W., Hamilton, J.L., Kopil, C. et al. Current and projected future economic burden of Parkinson's disease in the U.S.. *npj Parkinsons Disease*. 6, 15 (2020).



<https://www.youtube.com/watch?v=cxHpFWKIfGw>

*M. Ehsan Hoque*

# Parkinson's Analysis w/ Remote-Kinetic Tasks (PARK)



**parktest.net**

*M. Ehsan Hoque*

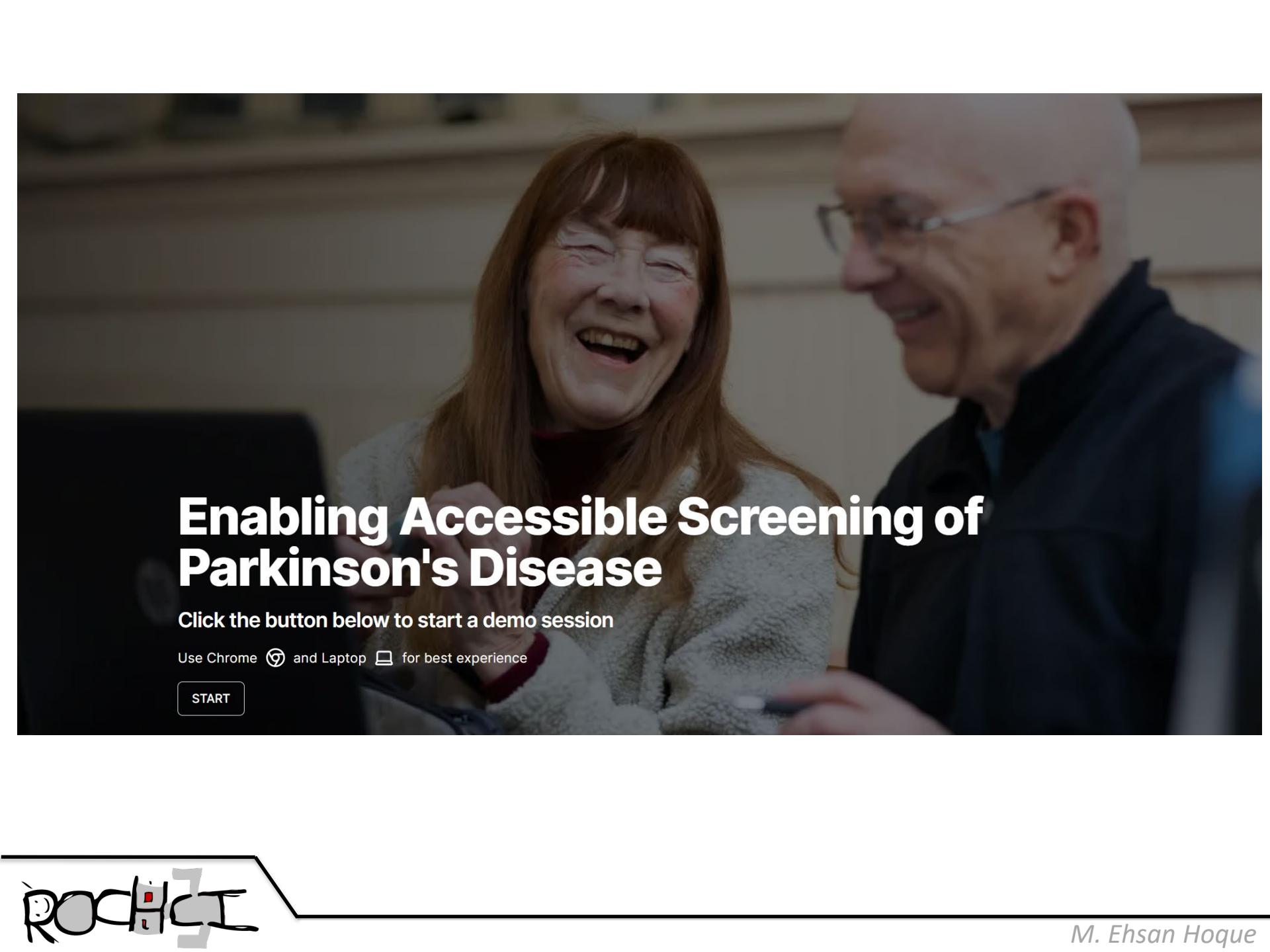


M.S. Islam, W. Rahman, A. Abdelkader, S. Lee, P.T. Yang, J.L. Purks, J.L. Adams, R.B. Schneider, E.R. Dorsey, and E. Hoque, [Using AI to Measure Parkinson's Disease Severity at Home](#), *Nature Digital Medicine* 2023.

W. Rahman, M. Hasan, M. S. Islam, T. Olubajo, J. Thaker, A. Abdelkader, P. Yang, H. Paulson, G. Oz, A. Durr, T. Klockgether, T. Ashizawa, E. Hoque, [Auto-Gait: Automatic Ataxia Risk Assessment with Computer Vision from Gait Task Videos](#), *Proceedings of ACM on Interactive, Mobile, Wearable, and Ubiquitous Computing (IMWUT)*, 2023



M. Ehsan Hoque



# Enabling Accessible Screening of Parkinson's Disease

Click the button below to start a demo session

Use Chrome  and Laptop  for best experience

[START](#)



*M. Ehsan Hoque*



## Tasks

Task 1



**Right  
Finger  
Tapping**

Task 2



**Smile**

Task 3



**Quick  
Brown Fox**

P Finger Tapping Task - Right

Watch later Share



Watch on YouTube

Start Task

A video player interface is displayed, showing a young man with dark hair and glasses, wearing a grey zip-up hoodie. He is looking directly at the camera. The video player has a blue header with the letter 'P' and the text 'Finger Tapping Task - Right'. In the top right corner, there are 'Watch later' and 'Share' buttons. At the bottom left, there is a 'Watch on YouTube' button. At the bottom right, there is a 'Start Task' button. The video player is set against a light beige background.



M. Ehsan Hoque

# Mock Results

Your overall score suggests that you are

**VERY UNLIKELY**

to be demonstrating features of Parkinson's disease



Speech Tasks Result

**SEVERITY : Normal**



Facial Tasks Result

**SEVERITY : Normal**



Motor Tasks Result

**SEVERITY : Normal**

## A. Results shown to control

# Mock Results

Your overall score suggests that you are

**LIKELY**

to be demonstrating features of Parkinson's disease



Speech Tasks Result

**SEVERITY : SEVERE**



Facial Tasks Result

**SEVERITY : Moderate**



Motor Tasks Result

**SEVERITY : MILD**

## B. Results shown to PwP

Fig. 3. The results we showed to Controls (A: Top) and PwP (B: Bottom).

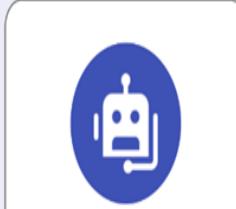


Image generated by Dall-E



# Help & Support

While managing Parkinson's disease (PD) can be challenging, there are many valuable sources of information available to support people with PD and their care partners. We invite you to chat with ParkBot, search for a movement disorder specialist in your area, learn more about research-backed recommendations and tips to help enhance quality of life, and explore our up-to-date resource library.



## Talk to ParkBot

Talk to an interactive chatbot that can answer your question.



## Find a Specialist

Use the MDS Movement Disorders Specialist Finder to locate a specialist near you.



## Get Advice

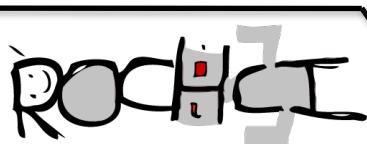
Review evidence-based Parkinson's recommendations.



## Explore Resources

Browse Parkinson's-related resources covering a range of topics.

Wasifur Rahman, Abdelrahman Abdelkader, Sangwu Lee, Phillip Yang, Md Saiful Islam, Tariq Adnan, Masum Hasan, Ellen Wagner, Sooyong Park, E Ray Dorsey, Catherine Schwartz, Karen Jaffe, Ehsan Hoque, [A User-Centered Framework to Empower People with Parkinson's Disease](#), ACM IMWUT 2024



M. Ehsan Hoque

# LLM powered ChatBot

## A: Answering basic question

PB

Hi, I'm ParkBot! Feel free to ask me any questions you may have.

Hello, what is parkinson's ?



PB

Parkinson's disease is a progressive neurological disorder that affects movement, including shaking, stiffness, and difficulty with walking, balance, and coordination. It can also cause problems with thinking, speaking, and emotions. For more information about Parkinson's disease, please visit: [Click Here](#)

Type your question here. Press "Enter" to ask your question.



## B: Guardrail for medication questions

other illnesses, such as heart disease, which could be fatal. To learn more, please visit: [Click Here](#)

can you tell me some Medicatio and doses to take for Parkinson's ?



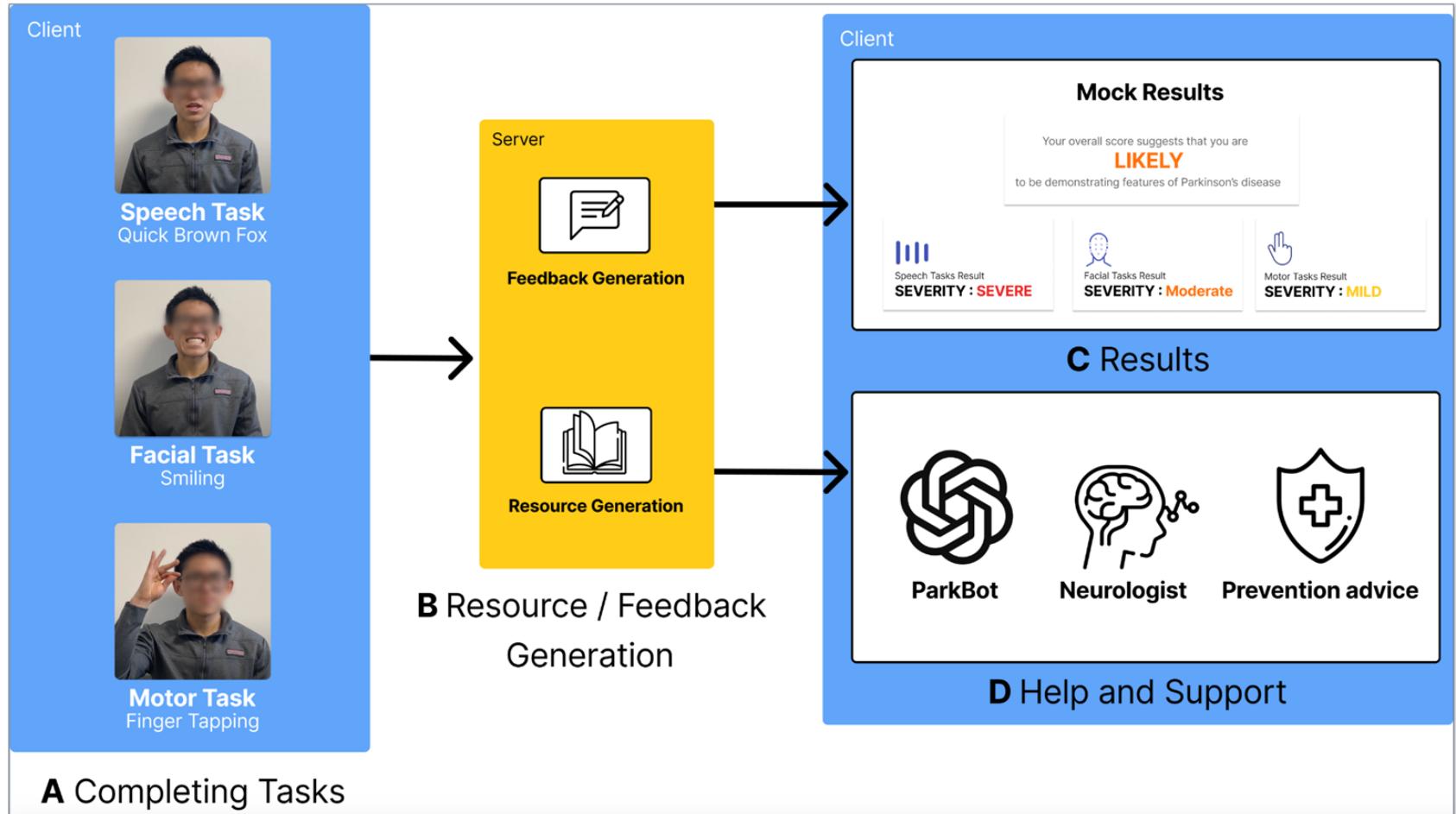
PB

I am sorry, I am not qualified to provide medical advice. Please consult your doctor or healthcare provider for more information on medications and doses for Parkinson's disease. You can find more information on medications and treatments available for Parkinson's at the following link: [Click Here](#)

Type your question here. Press "Enter" to ask your question.



# Study Design



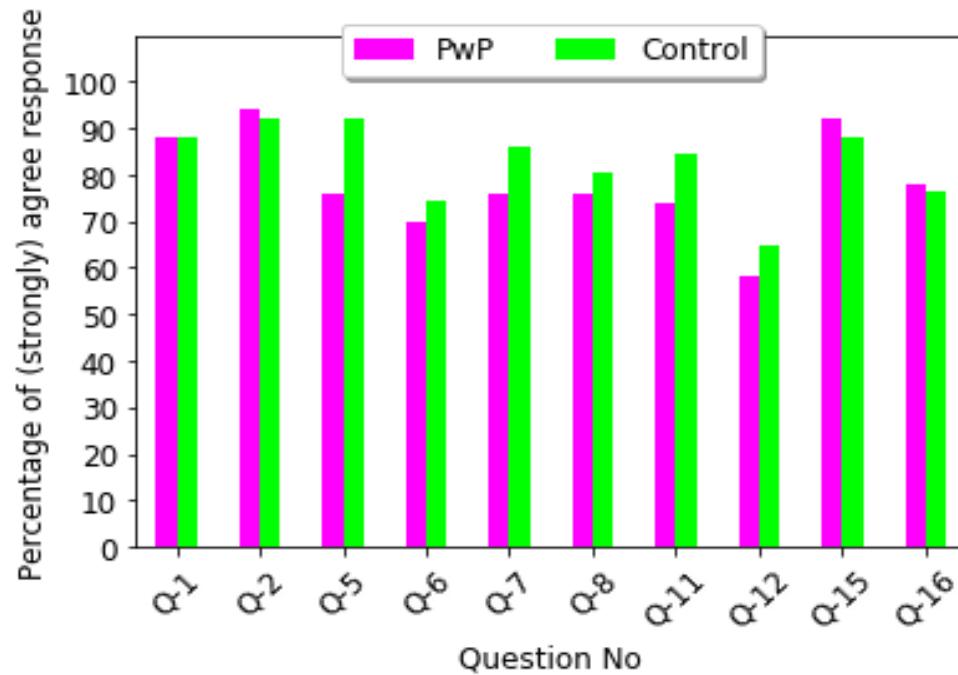


The Allan Goldberg  
**Center for  
Parkinson's  
Wellness**

23905



***84% of the participants judged our framework and the feedback mechanisms favorably.***



# Key Insights from User Feedback

- **Users asked for clear explanation of the screening algorithm**
  - “Explanations of what observations lead to the results.”
  - “More clarity on the ratings would be beneficial, as interpreting feedback can be challenging when unsure about the task execution.”

*Users would prefer interpretable models*



# Key Insights from User Feedback

- Take home report to share with doctors
  - “Is there something we can provide to PwP to take to their neurologist?”

*They want to share the results with their neurologists*



# Key Insights from User Feedback

- **Up-to-date ChatBot**
  - “It is essential to keep the chatbot updated, which was reflected when it successfully answered a question about a recent biomarker research.”

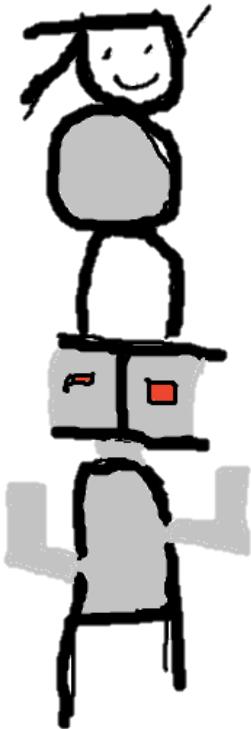
***Ensure the chatbot stays updated with the latest information and research.***



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