

# Healthcare conversations with robots and AIs

Prof Oliver Lemon  
Academic Co-Lead, National Robotarium  
[@oliverlemon](#)



A L A N A



# The coming wave: generative AI

- Generative AI and large language models (LLMs) are powerful new technologies that have the potential to revolutionize healthcare.
- LLMs can be used to provide tailored health information, summarize complex medical information, automate administrative tasks ... analyse medical images ...
- Providing a conversational natural language interface to very large amounts of data
- Following instructions given in conversational language

# Conversational interactive search



How many types of aphasia are there?



There are four types of aphasia: Broca's aphasia, Wernicke's aphasia, Anomic aphasia, and Primary Progressive Aphasia (PPA).

What are the differences between Broca and Wernicke's aphasia?




The main difference between Broca and Wernicke's aphasia is that Broca's aphasia is characterized by severely reduced speech, often limited to short utterances of less than four words, limited vocabulary, and clumsy formation of sounds, while Wernicke's aphasia is characterized by difficulty understanding spoken language, difficulty finding the right words, and difficulty speaking in complete sentences.

# Instruction-following



write a short email explaining the NHS procedure for handling children who have a severe headache



View other drafts 



Dear [Recipient Name],

If you or your child has a severe headache, it is important to seek medical attention immediately.

If your child's headache is accompanied by any of the following symptoms, call 999 or go to the nearest A&E department:

- High fever
- Stiff neck
- Drowsiness or confusion
- Vomiting
- Blurred vision or double vision
- Seizure
- Weakness or numbness in the face, arms, or legs

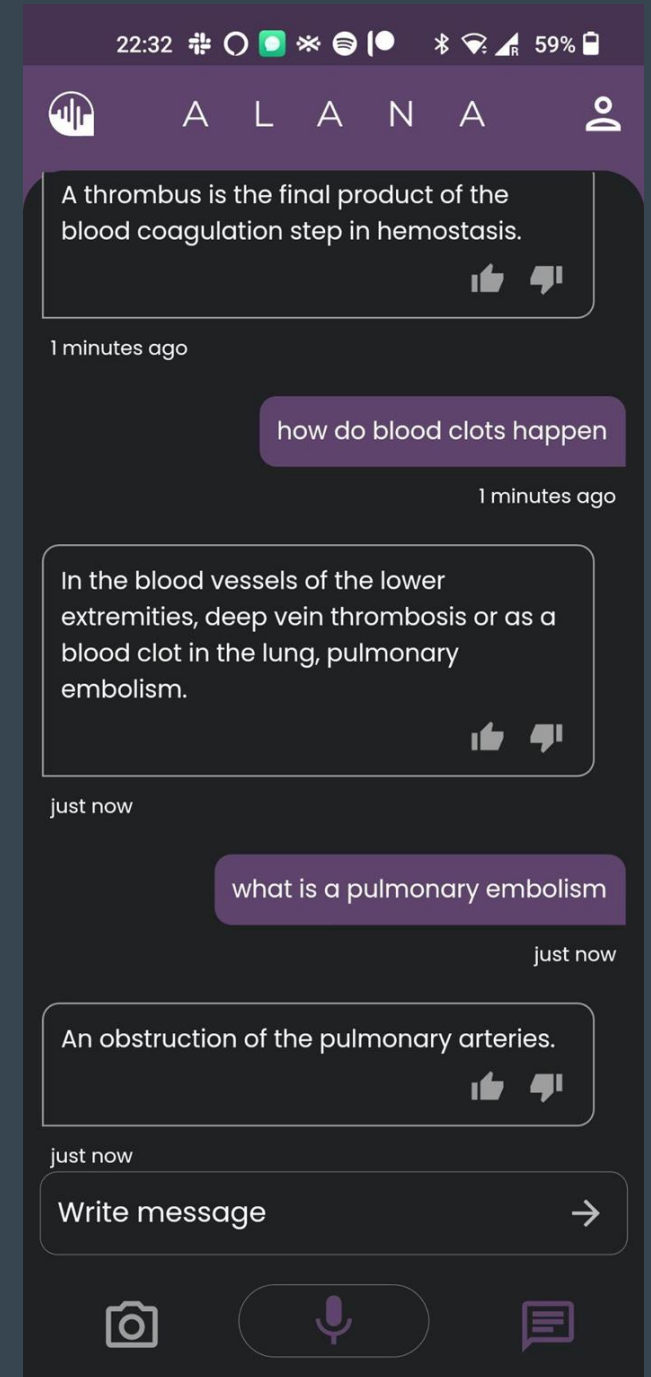
# The peril and promise of generative AI

- “Hallucination” and safety
  - Generated text can be persuasive and believable, but wrong
  - → lots of work on e.g. “Retrieval-Augmented Generation” for documents
- Bias
  - Models can be trained on discriminatory data → restrict to trusted data sources
- Privacy and security
  - Health data needs to be secured, anonymised for model training
- Job displacement
  - AI can augment or replace (?) specific job functions
  - Integrate AI into existing workflows and practices
  - → Generative AI needs to be developed as a “co-pilot”
- → urgent need to form partnerships between AI and medical practitioners

# Gen AI in Scotland: Alana AI



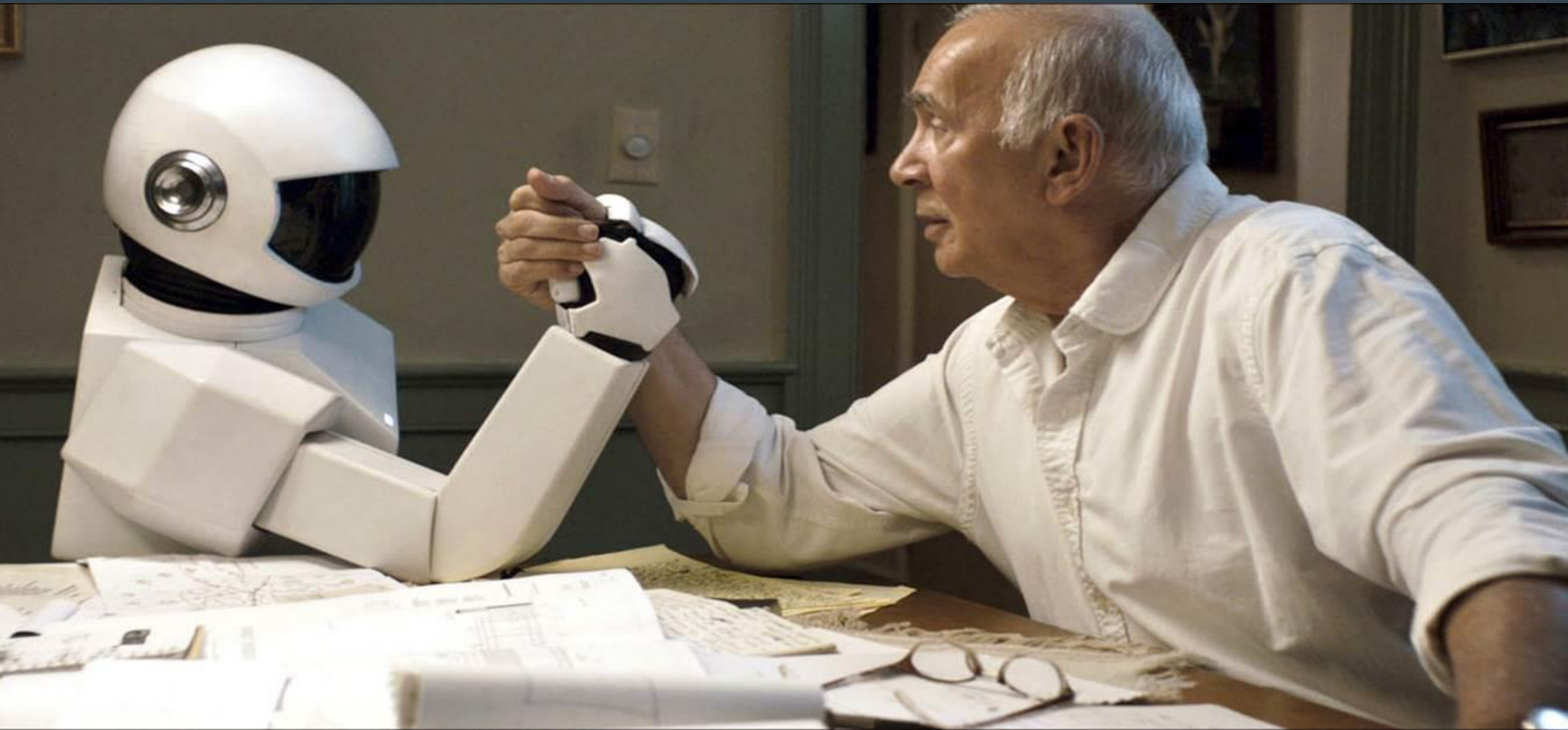
- Spin-out of Heriot-Watt University
- EC Horizon project RESQ+: stroke care: [www.resqplus.eu/](http://www.resqplus.eu/)
  - Conversational app for recovery tracking (mRS) and patient QA
  - Testing mobile app in Glasgow and Belfast
  - Conversational search of hospital data + visualizations
- Partnerships with NHS
  - AI copilot for admin tasks, comms, document summarization, guidelines ...
  - Visual question answering on medical images



# UK NATIONAL ROBOTARIUM







Robot and Frank (2012)

# Embodied AI

- LLMs generate language + expressions
- Provide patient info
- Speech input / output
- Handling multiple people in conversation



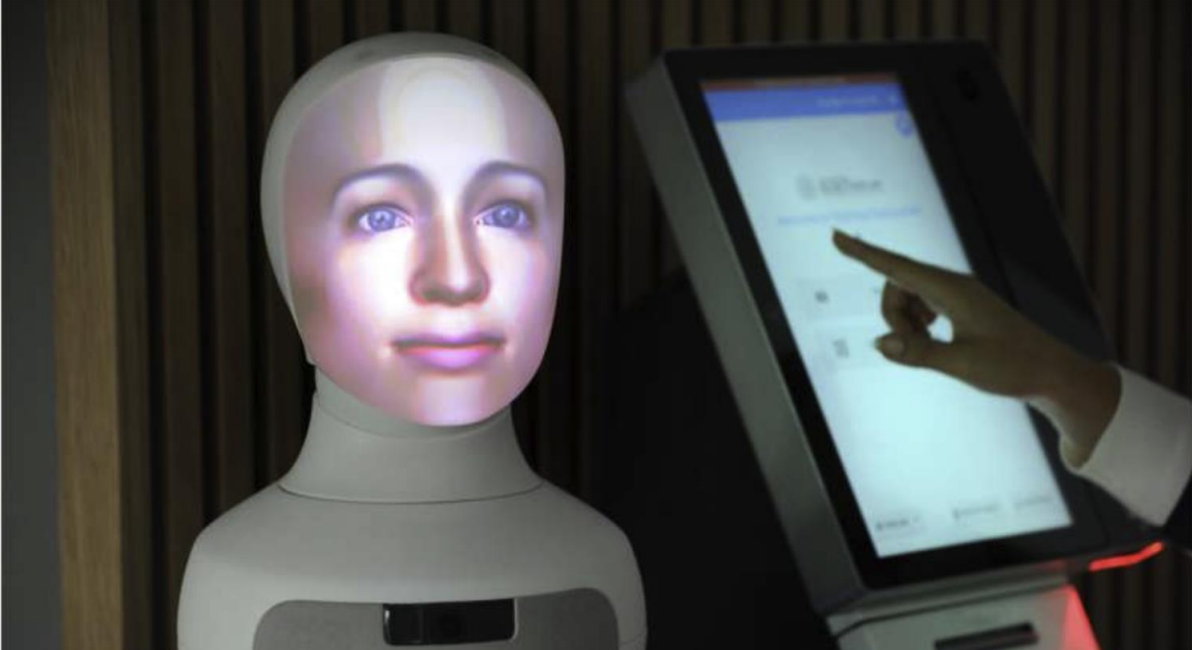
Home / Robotics ☆ PDF 🖨️  
Home / Machine learning & AI

---

🕒 SEPTEMBER 13, 2023 FEATURE ✔️ Editors' notes

## An embodied conversational agent that merges large language models and domain-specific assistance

by Ingrid Fadelli , Tech Xplore

A white humanoid robot with a human-like face is shown from the chest up. It is positioned next to a large, vertical touchscreen display. A hand is pointing at the screen, which displays a user interface with various icons and text. The robot appears to be engaged in a conversation or interaction with the user.



HERIOT  
WATT  
UNIVERSITY



## EU SPRING H2020 Project

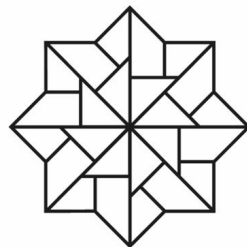
LLM conversational help for patients, embedded within an ARI robot in a hospital memory clinic.

Broca Hospital, Paris

Currently being used by patients (speaking French!)

# Summary : danger or opportunity ?

- A new wave is here / the genie is out of the bottle
- Significant opportunities in healthcare applications of conversational AI, LLMs, foundation models etc
- But many pitfalls
- → Risks need to be balanced
- Question: how to collaborate to realise the opportunities and mitigate risks?
  - → Data partnerships. Co-design.



THE NATIONAL  
**ROBOTARIUM**  
PEOPLE CENTRED :: INTELLIGENCE DRIVEN