

All generated by MidJourney

4k photo of a black woman with eyes closed and a slight smile, around her is glowing data swirling around, the background is light and bright



4k photo of a light and bright room where small, floating robot points to health data displayed on a large screen, and a young, hispanic patient looks at data, tech vibe, futuristic



4k photo of an elderly asian woman walking through an exploded view engineering drawing of a mobile phone



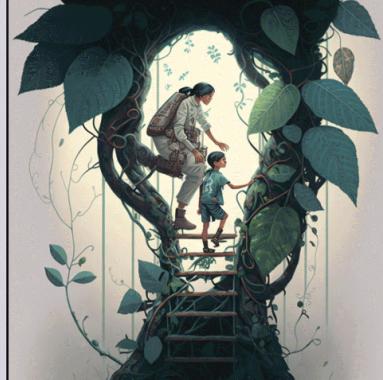
4k photo of a peaceful patient at a doctors appointment with their doctor but it's in the woods



Simple colorful illustration of a virtual AI assistant helping a patient navigate through the healthcare system and access the right care



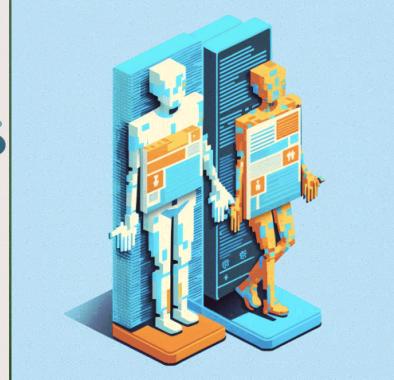
in studio ghibli style, a futuristic, digital assistant lifts up a young, south asian patient who is climbing up a magical ladder made of vines and data



cute, colorful, simple illustration of a person flying through the sky with data flowing beautifully around them



colorful (light blue, light orange) pixel art showing a patient with a digital health assistant who holds all of their health records



The AIxHealth Future We Need

Artificial intelligence (AI) has undergone tremendous advancements since its conception in the 1950s:

AI Image Generation: One of the most notable developments in recent years is the accessibility and widespread engagement of AI trained on images. This includes tools such as pix2pix from 2014, as well as more recent advancements like DALL·E, MidJourney and Stable Diffusion, all released between January 2021 and August 2022. These tools have led to the mainstream adoption of applications that generate fine-art-like portraits, avatars and more, such as the "Magic Avatar" feature in the app Lensa, which was released in November 2022.

AI Text Generation: In addition to image generation, conversational AI has also gained mainstream attention. RNNs, developed decades ago, have been used for text generation. And

now there are various modern applications like ChatGPT, a machine learning model that can generate human-like text, that can answer nearly any imaginable question. ChatGPT was released in November 2022 and gained more than [one million](#) users within a week. This free tool has reached a mainstream audience in a way that feels distinct, as people of all ages and backgrounds are finding interesting applications for the tool. Students are using ChatGPT to write school papers, doctors are checking ChatGPT's answers as they respond to patient questions, and people exploring ChatGPT's ability to generate workout plans, re-write emails to be more persuasive, and craft poems and more. In fact, we used ChatGPT to write the first draft of this intro from a set of bullet points!

Christopher Hesse
@christophrhesse · Follow
Image-to-Image Tensorflow Demo affinelayer.com/pixsrv/
INPUT → pix2pix process → OUTPUT
6:07 PM · Feb 19, 2017
546 Reply Copy link Read 49 replies



Christopher Hesse (openAI) tweet about pix2pix (<https://ml4a.github.io/guides/Pix2Pix/>) & An image generated by Stable Diffusion based on the text prompt "a photograph of an astronaut riding a horse" ([wikipedia](#))

With all of these new advancements, ai capabilities straight out of Fantastic Planet (1973), Blade Runner (1982), Moon (2009), HER (2013), Big Hero 6 (2016), I Am Mother (2019) (just to name a few out of hundreds) seem closer than ever. How will this impact health? How *should* it impact health? Here are our studio's thoughts on the matter.

Expectations for the Future

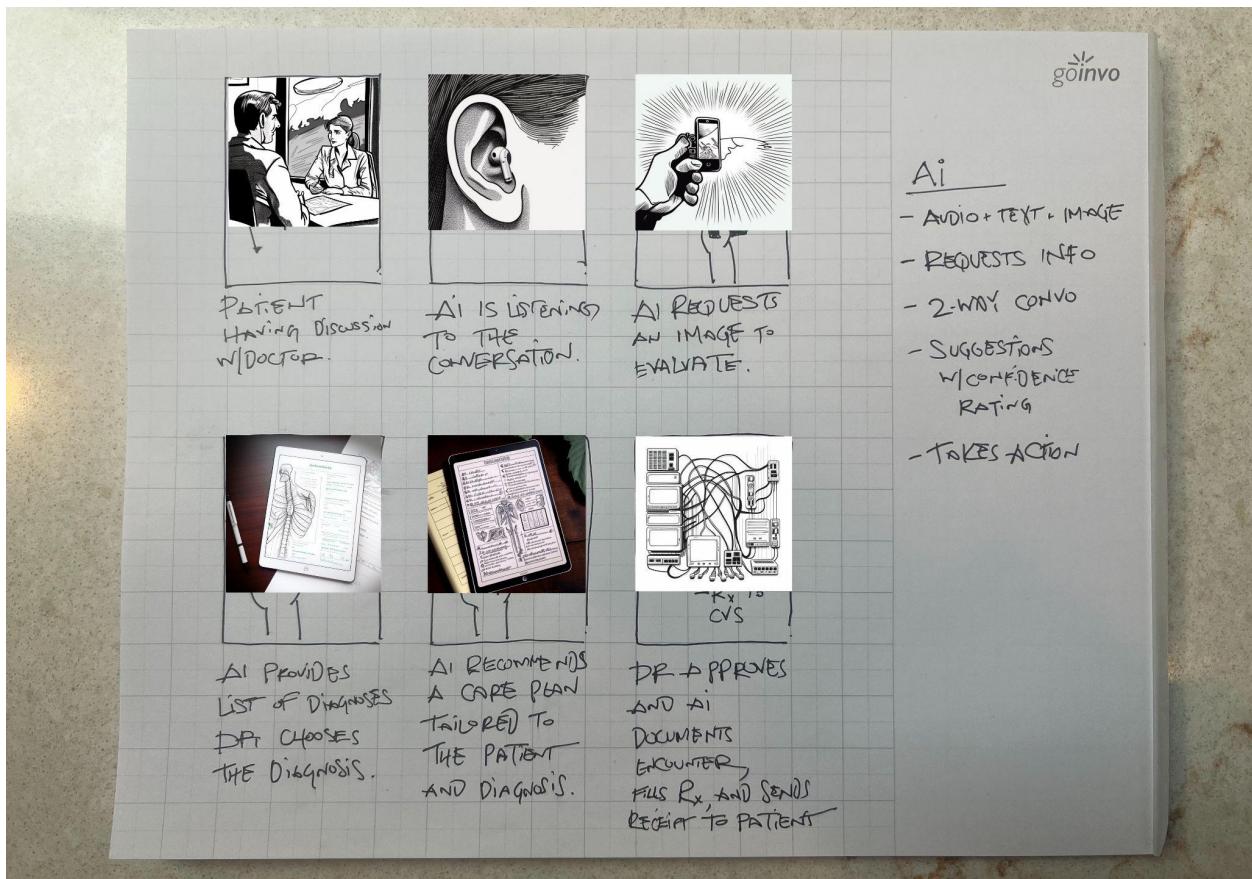
The following are gaps we've identified in existing tools. These features should exist together in a patient tool.

- **Context aware and ability to personalize how it engages with me**
 - It should have MY history and provide insight in the context of my health and behavior
 - Health record, phone, & wearables data
 - Plug into other apps like mood tracking, food diary, condition related, etc

- Personalization around how it communicates with me - if I prefer a different language, speech instead of text, animated videos, etc. If using speech - some prefer faster answers that aren't in full sentences vs conversational phrasing.
- **Don't wait for me to come to it - it should come to me**
 - I won't always remember to ask health questions or think about my health. I don't take care of myself enough. I need an assistant that checks in on me at the right times.
- **It needs to query me**
 - If it needs more information to give a personalized answer, it needs to ask me appropriate questions.
- **Multimodal**
 - It needs to combine with visualization and sonification
 - Ex: Show me a cartoon version of how lactose intolerance works
- **Connected to evidence**
 - Need a way for me to fact-check or dig deeper
 - It should have the ability to link sources that support its answers
- **I own my data**
 - Data ownership and privacy policies should be clear
- **Designed for accessibility**
 - Communication should by default be short and easy to read at a 5th grade reading level, with deeper answers when asked
 - We'd love to see how this could be designed specifically for those who are blind or low vision.

Patient & Clinician Tool Concepts

A few storyboards with MidJourney generated images:



Storyboard with images by MidJourney



Jay gets home from school
AiHealth believes they may be feeling depressed
based on their health data:

- their heart rate variability is low
- they've been on their phone more than often
- step count is low
- etc



AiHealth sends Jay a photo album from their hike with their family from 3 months ago - this approach of reminding them of good memories often cheers them up.

However Jay doesn't respond to the images and ends up skipping dinner and stays in bed all through the next morning



AiHealth sends a text message
"Hey are you ok? I'm here for you if you want to chat"
Jay is hungry, tired, and stressed. They reply
"no... idk"
AiHealth - "I can see the stress coming through
in your health data. I'm sorry that you're going
through so much."



AiHealth - "Why don't we do something to make
your body feel a little better?"
Jay - "ok"
AiHealth knows Jay likes images and animations,
so it creates a little sparkling glass of water with
written text inside reminding them to drink some
water and get a snack and their body will feel a
little better right away!



AiHealth - "do you feel any better?"

Jay - "a little.. it's good to get up"

AiHealth - "well if that was good, here are some other easy things we can do together to help your body feel better..."

AiHealth helps Jay wash their face and brush their teeth, put on a fresh change of clothes and even go outside to breathe some fresh air.



Jay starts texting AiHealth about what's been bothering them... stress with friend groups at school and a big misunderstanding and just feeling really down for a while.

AiHealth listens, asks good questions, and makes space for this.



If you're feeling really sad and down, there are things you can do to help yourself feel better.



First, it's important to talk to someone you trust, like your parents, a teacher, or a counselor. They can help you figure out what might be making you feel this way and how to make things better.

Next, try to do things that make you feel good. This might be playing a sport, going for a walk, or listening to music. It could also be things like drawing or writing in a journal.

It's also important to make sure you're taking care of your body. This means getting enough sleep, eating healthy food, and exercising.

Lastly, remember that feeling sad or down is a normal part of life and it will get better. It might take some time, but with the help of people you trust and doing things you enjoy, you will start to feel better.

At the end AiHealth asks if they'd like any help or suggestions to feel better

What purposes could an AI patient tool serve? Here's how we imagine it:

At the start

- Gathering all of my health data together (interoperability where ai does the manual labor of merging across all life data)
- Help me find support I need based on my context
 - Based on health conditions, if I'm homeless, etc
 - Core basics of support, local support in your town



Adhoc support

- Symptom check / Diagnostic help (more advanced, faster ADA)
 - Patient takes a photo or provides information about a symptom: what problem is this? Chat asks questions. Provides top X answers.
 - Should be trained on medical diagnostic databases
- Live support at dr's office (this could also happen at home)
 - How to summarize how I've really been, visualize my health since my last visit
 - What else should I ask? What data's missing?
 - Help me keep track of follow up items and care plans I need to adhere to
- Just-in-time support
 - Real time feedback on exercising more effectively
 - Noticing health conditions in real time like sleep apnea, anxiety, etc
 - Reaching out<< if it identifies that I'm in crisis
 - Help during emergencies - who to call



Help me reflect on my health and develop a caring relationship with my body

- Ask me how I'm doing, prompt me to describe concerns, provide best practice suggestions for how to address concerns, help me decide what to try in order to address the concern
- Generates visual patient information for any given condition and paraphrasing articles as the person digs deeper (even complex articles).

Scan my health and help me take any necessary action

- (continually vs periodically based on preference) Review my data, rate my health, note good health and improvements, spotlight areas that need attention, help me identify what to focus on first
- When do I need to get my next physical, eye exam, dentist appointment, flu shot, cancer screening, etc?



Ripple Effect and Unintended Outcomes

Here are the big conversations we think need to happen:

- **Misinformation at scale** - Stack Overflow banned ChatGPT answers as it got swamped with quality control at scale. ChatGPT makes it incredibly easy to post an answer, but the non-zero error rate is a real problem for quality control. There's no way to easily check ChatGPT's answers without doing the research manually. This could become a serious problem if everyone uses a similar tool for health answers.
- **Ability for chatGPT to sound truer than it is?** Psychology might suggest that people are more susceptible to believe information shared in a more conversational tone? (we need to research this - but paired with the first problem, this could be harmful)
- **Harmful information** - Molotov Cocktail question can still be achieved by phrasing as a [print function question](#), I assume similar information about how to effectively commit suicide could be easily obtained.
- **Perpetuating harmful biases, conventions, etc** - The AI will provide answers based on the material it is trained on. If that material is biased, non-inclusive, etc, the AI's answers will be the same. For example, humans depicted in MidJourney are typically white unless specified otherwise. When asked to portray a telehealth call, MidJourney created doctors that were all white and three out of four were male.
- **Impact on human workers** - “The cost of intelligence is going down” – Rob McCready. AI could replace writers, artists, musicians, and generally all white collar jobs in the long run. Ideally, AI could augment these people's work by helping generate a starting point that the human can perfect or to help people brainstorm a diversity of concepts, however

this new technology provides the opportunity for these creatives to lose their jobs and for their work to be taken without compensation to train ai to do the work.

- **Property and ownership issues** - Many have voiced the problem that image generation AI is training off of art that it does not own. Some artists have seen their personal style and even their signature show up in Stable Diffusion
(<https://www.cbc.ca/radio/asithappens/artificial-intelligence-ai-art-ethics-greg-rutkowski-1.6679466>)
- **Our relationship with technology and each other** - Human immersion into tech (smartphones and social media) has not always had a positive impact on health (ex: mental health of the younger generation in particular). How can we make sure we're not sprinting into more negative side effects in the name of "progress." How will an increase of artificial intelligence impact human intelligence? Perhaps it will allow humans to learn and accomplish new things, but it may also reduce our skill in some areas such as synthesis of information. We should be intentional about what we might be losing.