AI in Humanoid Robots

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What is Humanoid AI?

- Humanoid robots are complex machines made to resemble and or function like human beings.
- Although people have been interested in “robots” for hundreds of years, recent developments in technology and artificial intelligence have made humanoid robots much more advanced.
- Humanoid robots use complex sensors and motors to detect and relate with the world around them.
- They make decisions and react or respond based on the data from their sensors.

What were some earlier developments in Humanoid AI?

- Around 1495, Leonardo DaVinci designed an automaton that could sit and stand.
- In 1921, Czech writer Karel Capek first used the word “robot.”
- One of the earliest references to machine learning was in a lecture by Alan Turing in 1947.
- The term “Artificial Intelligence” was coined by Stanford professor John McCarthy in 1950.
- The first successful AI program was written in 1951 at the University of Oxford. This program could play checkers.
- In the 1990s, IBM created the first “virtual assistant”, Simon.
- In 1997, IBM’s computer “Deep Blue” beat world chess champion Garry Kasparov.
- In 2011, Apple released “Siri.”
- Chatbot, Eugene Goostman, passed the “Turing Test” in 2014. It convinced a 3rd of a panel of judges it was human.

Areas of use

Personal assistance
Healthcare
Education
Research
Space exploration
Social interactions
Entertainment
Search and rescue operations
Replace heavy duty human labor
Delivery Services (self-driving cars)
Perform daily routine tasks
Automate our lives

Technology

Artificial Intelligence
Facial recognition
Speech, voice and sound recognition
Obstacle and other sensors
3D cameras
Navigation
Natural language processing
Maintaining eye contact
Speech
Machine learning

Humanoid AI

Benefits to Society

(on examples of ranked 10 most advanced humanoid AI)

Service Industries: human interactions, social companion, airport, banks, restaurants, schools, medical facilities, office receptionist.

#10 Pepper (by SoftBank Robotics)

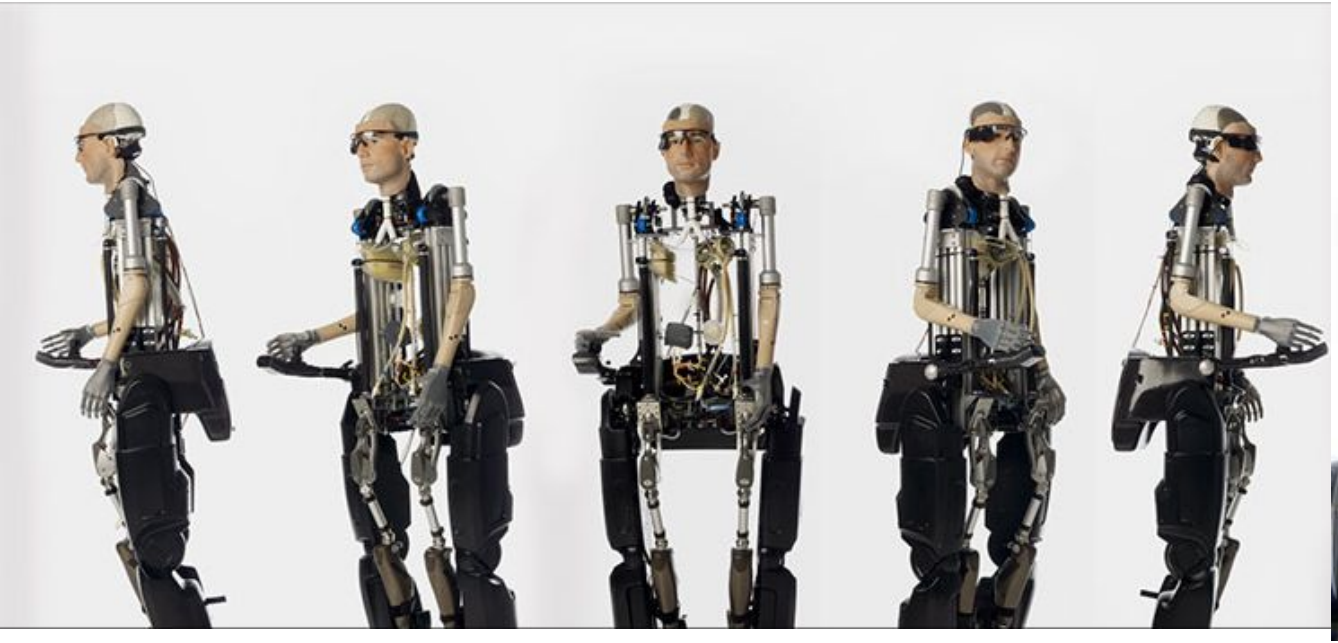
Can recognize human emotions, gestures, sounds, faces, tone of voice, if someone is touching him. Always learning and modifying his behaviour based on interactions.
Emotional expression:




Medicine: Synthetic organs implantable in humans (showcase)

#9 The Incredible Bionic Man

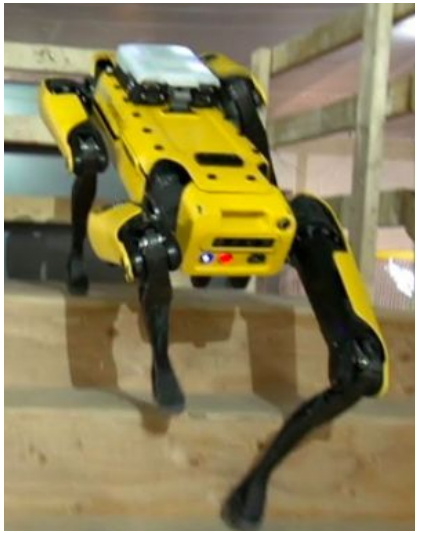
How far technology has come? Synthetic organs: heart (used in patients already), circulatory system with artificial blood, the first artificial lung prototype, kidney (implantable in human beings), has legs and arms biotic prosthesis, retinal implant in the brain to pick up the image from tiny camera.



Disaster assistance, rescue operations, warehouse, home, office, outdoors service, area inspection.

#8 Spot Mini (by Boston Dynamic, 2016)

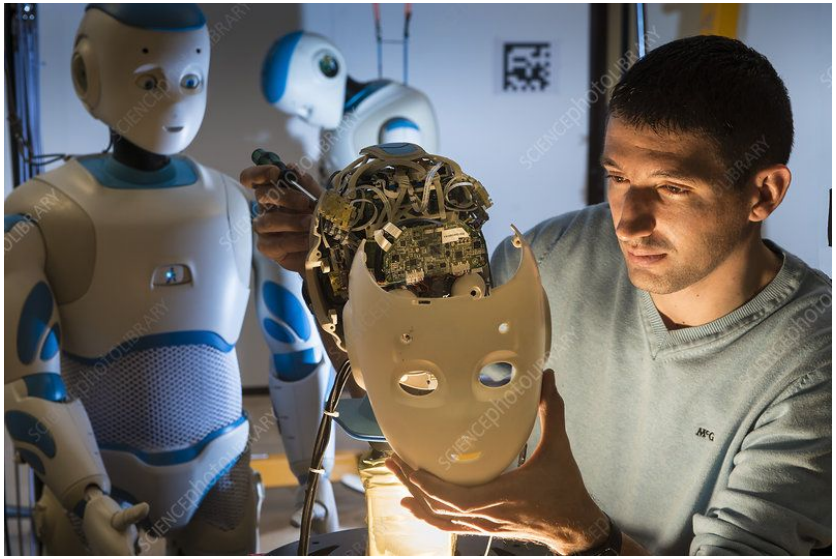
Robot-giraffe, climbs stairs, traverse rough terrain, small enough to use indoors, cooperate with other Spot Minis, weight 66 lb, weight load capacity - 30lb, run time 90 min, speed 5fps, 360* vision, stereo camera and sensors to analyze the area, works in -5.8F to 113F. In the future, planned to replace watch dogs.

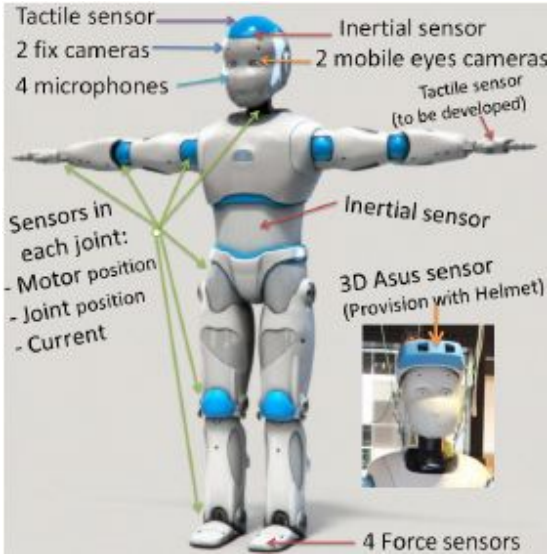


Companionship: Assist elderly and disabled people in daily needs

#7 Romeo (European Labs, mainly France)

French accent, designed to assist elderly and disabled people, body is made up from carbon fiber not to hurt human being in his care, 88 lb, 4.5 feet tall, can walk, take objects with his hands, help people to get into and get out of bed, has 3D view to interact with surrounding, can speak since he has cognitive support and conversation modules.

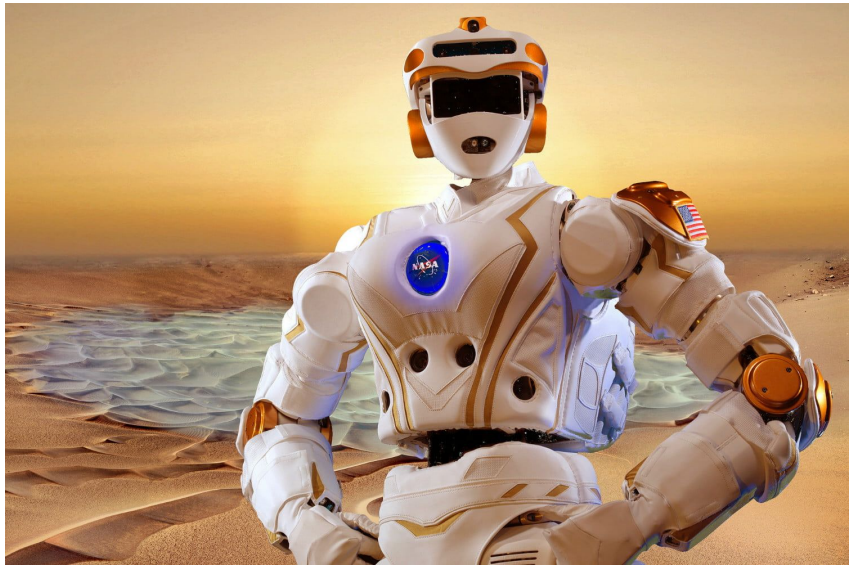




Space exploration (Mars)

#6 Valkyrie Robonaut 5, aka NASA R5

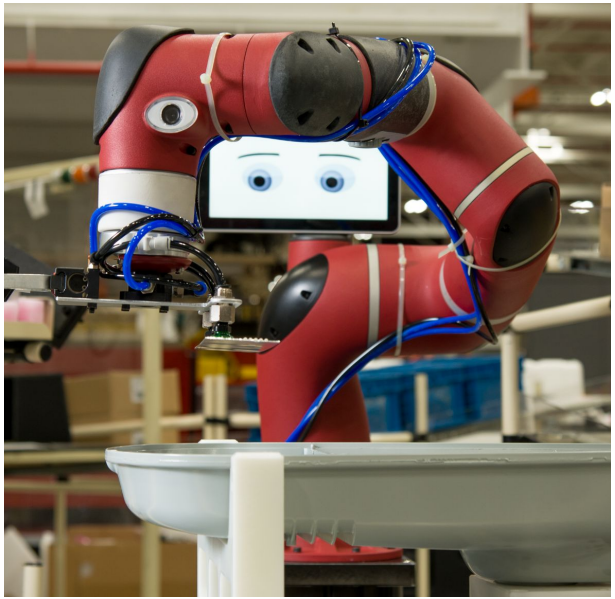
Built by Johnson Space Center to be sent to Colonized Mars, has fully articulated limbs, capable of being under extreme temperatures, has about 200 sensors for exploration Marcian territory. 300 lbs, 6ft tall, able to use screws and assemble the structures by itself - extremely important since it is unfeasible to control Valkyrie on Mars from Earth.



Industrial use, manufacturing tasks, work alongside humans

#5 Sawyer

The world's most advanced industrial robot, allows to learn how to perform complicated task by manually guiding robot's arm, can work in uncomfortable dangerous spaces, complete functions which are too repetitive for a person, can perform more than 150 different tasks. Price: $29K



Army, mimic the arm, hand and finger movements of its pilot.

#4 Method 2

World's biggest robot, korean megazord, 1.5 tons, 13ft tall, can provide help after disasters, can find place in the army, can protest small and fragile body of a human in dangerous areas. Development cost: $200mln, tentative sale price: $8.3mln.

Designed for search and rescue tasks, to operate on rough terrain, outside and inside the buildings, navigation, manipulate objects, parkour, emergency services

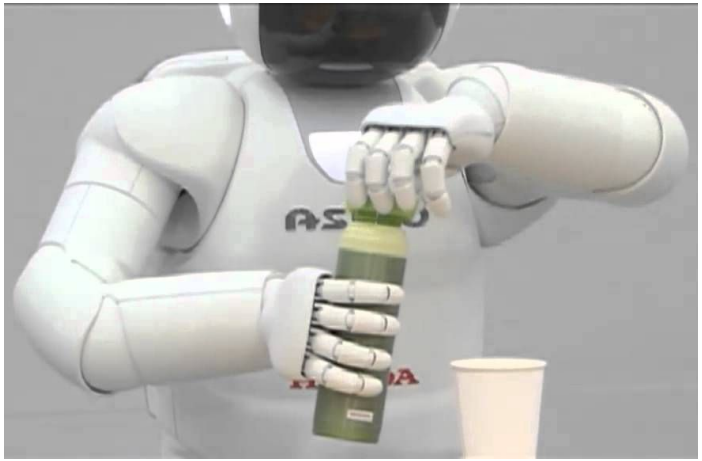
#3 Atlas (BostonDynamic)

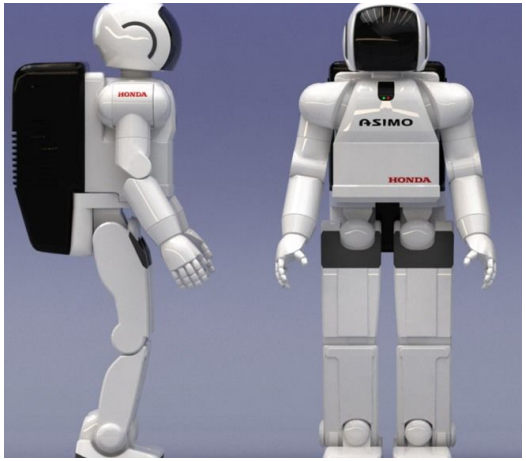
Very agile, athlete, 5ft tall 176lbs, runs 1.5 mps, can do incredible movements including back flip thanks to it's customized hydraulic systems and motors allowing him to supply power to his 28 joins.

Assistant for people with limited mobility

#2 Asimo (by Honda)

Advanced Step in Innovative Mobility. 4.2ft, 105lbs, runs 5.6mph. Aims to be an assistant for people with limited mobility, has multiple sensors which allow him to capture sounds and movements of people around changing his behaviour, he can recognize people with their faces and voices even if they ask for different things at the same time. Can move each finger independently and perform task such as opening a thermoses lid and serving coffee. The level of combined features will be difficult to overcome.

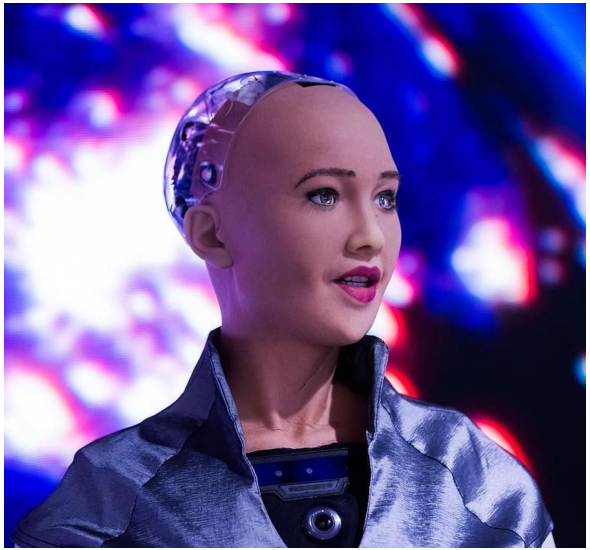




Social Humanoid Robot, designed for education, research, entertainment and or promoting public discussions about future of robotics and AI ethics.

#1 Sophia (Hanson Robotics)

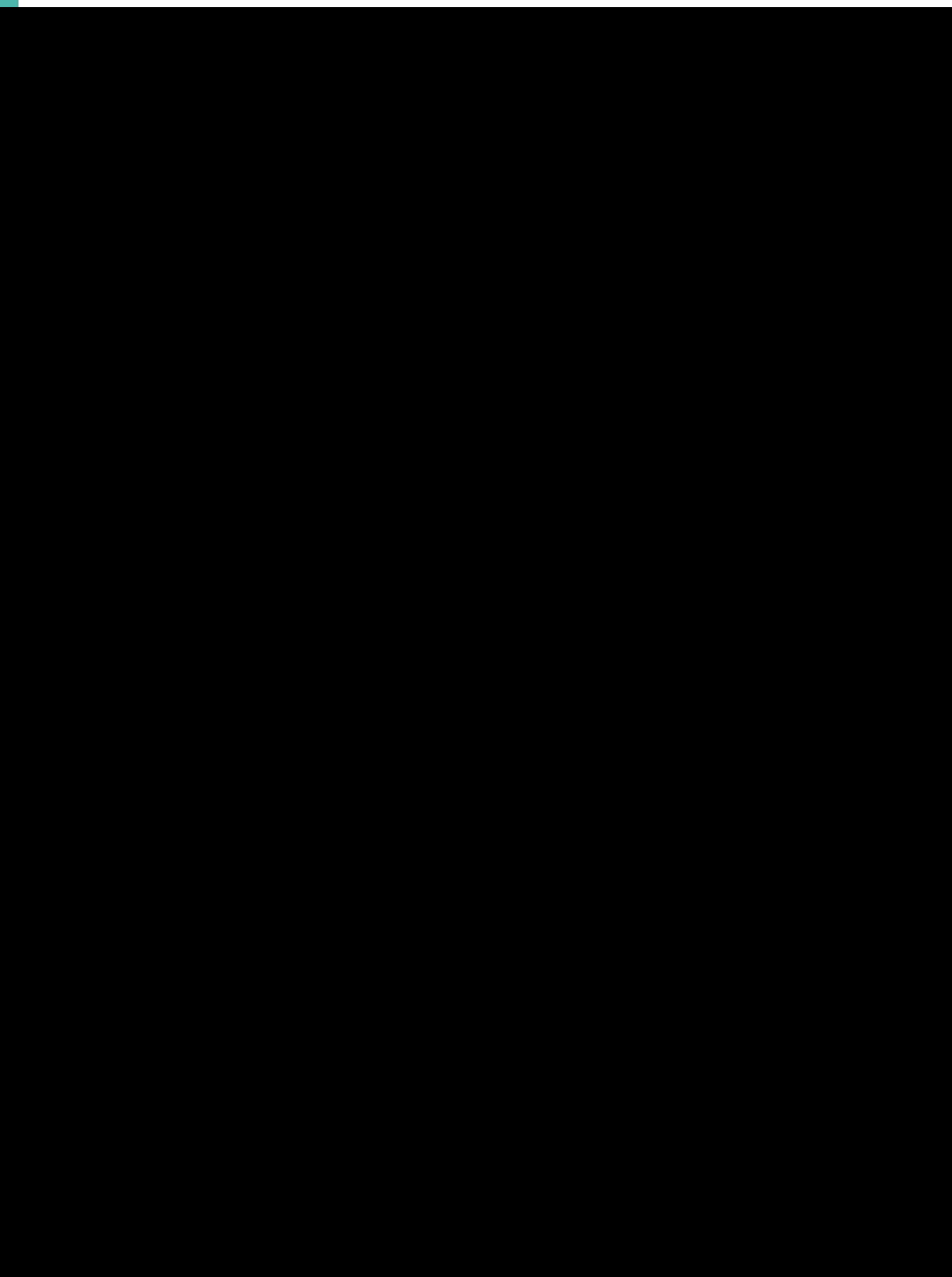
Another level of AI, she can decisions what to say and how to behave. When someone talks to Sophis, her software starts searching for information on the network so that she can prepare the best possible answer while collecting data from her interactions to develop her artificial intelligence. She has a camera which detects anyone who is approaching, recognizes their face, able to mimic human gestures. With her latex face she can smile, blink and change expressions. Her AI is so advanced that she can copy human personality. Reflects 60 shades of human emotions




Meet Sophia: The first robot declared a citizen by Saudi Arabia
INVESTMENT INITIATIVE
Sophia has made history,
as it became the first ever to be
granted a full Saudi Arabian citizenship.

Sophia, the first android with citizenship, now wants to have a robot baby

Sophia, full




CNBC
“OK, I WILL DESTROY HUMANS”
Disadvantages and Concerns

Disadvantages and Concerns

- Cost a lot of money to create. Is it worth the cost?
- Unemployment: Robots can replace people in certain jobs. What will these people do? Where does the wealth created by machines go?
- Unintended consequences. What if machines make mistakes that have disastrous effects?
- Machines do not have emotions. How will they interact with people? How will people interact with robots?
- Is it possible for machines to be more intelligent than humans?
- Robot rights? As machines become smarter, how will we treat them?

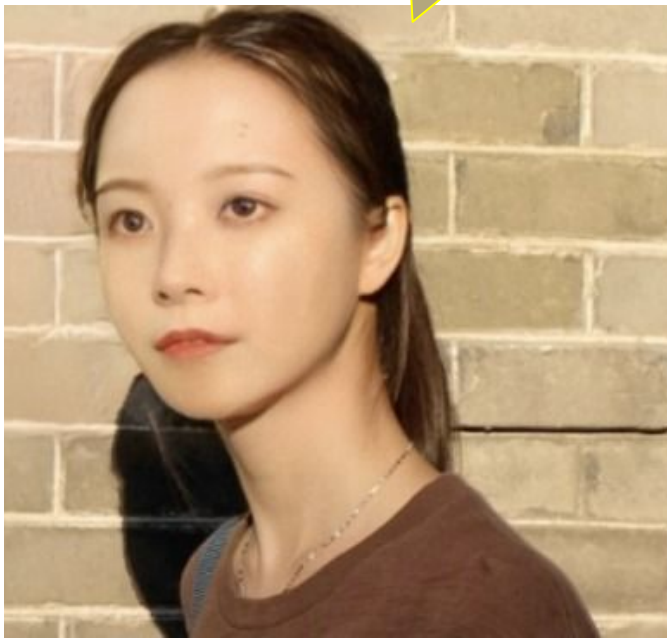
Takeaways

Robots are expected to benefit humans, not replace them.

Human and AI live and work together in friendship and symbios to make this world a better place.

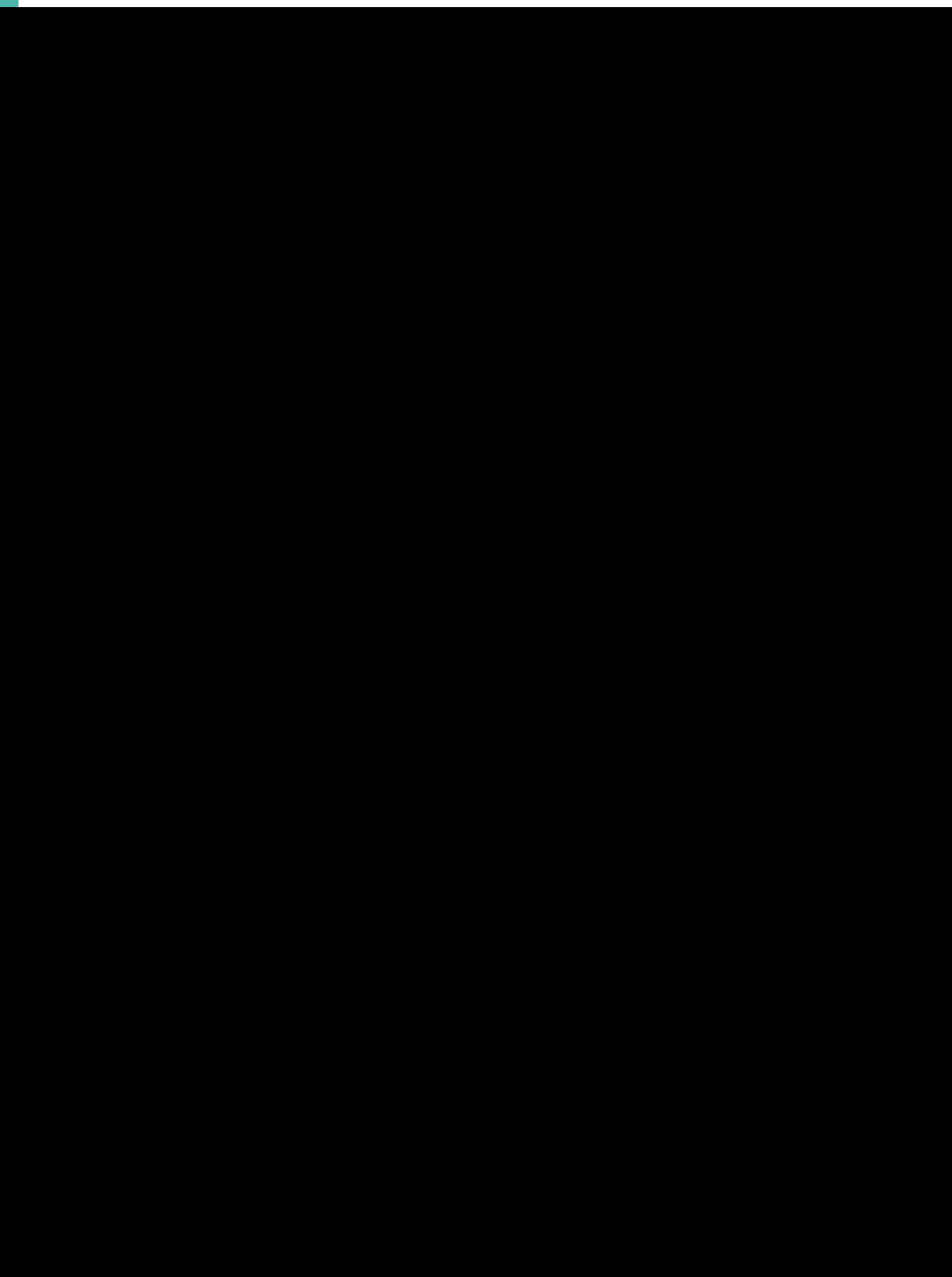
First officially enrolled AI powered virtual student
Hua Zhibing - Tsinghua University, China

NOT RANKED YET



https://www.youtube.com/watch?v=fXLIDHJ3sUo&t=2s

Dance



Q&A

- What thoughts do you have about continuing research and development into artificial intelligence and humanoid robots?
- How do you foresee human interactions with robots?

Further Reading/Sources

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