

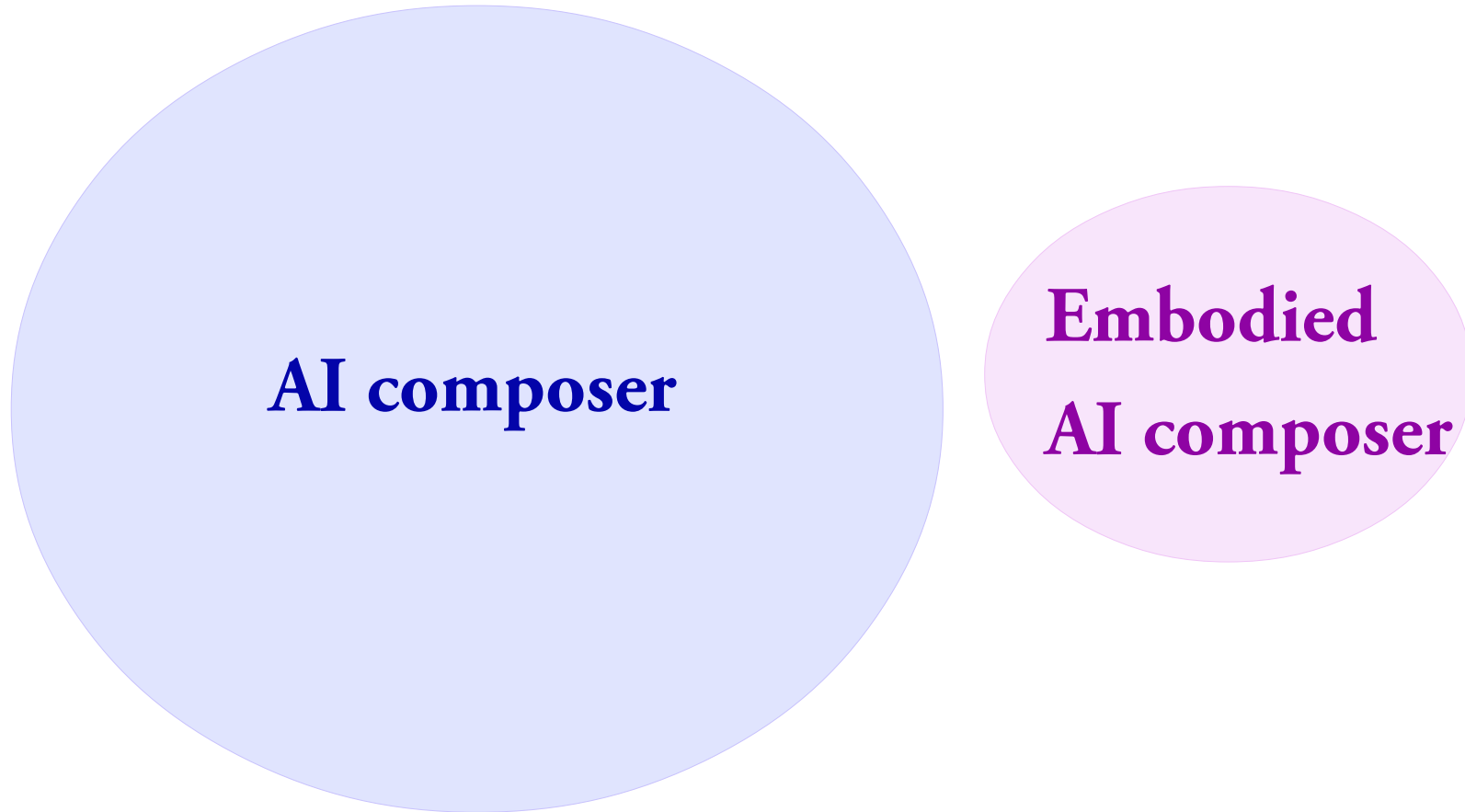
AI composition and physicality

from Virtual Composer-Singer
to Music Robots all over the world

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AI composer & Embodied AI composer

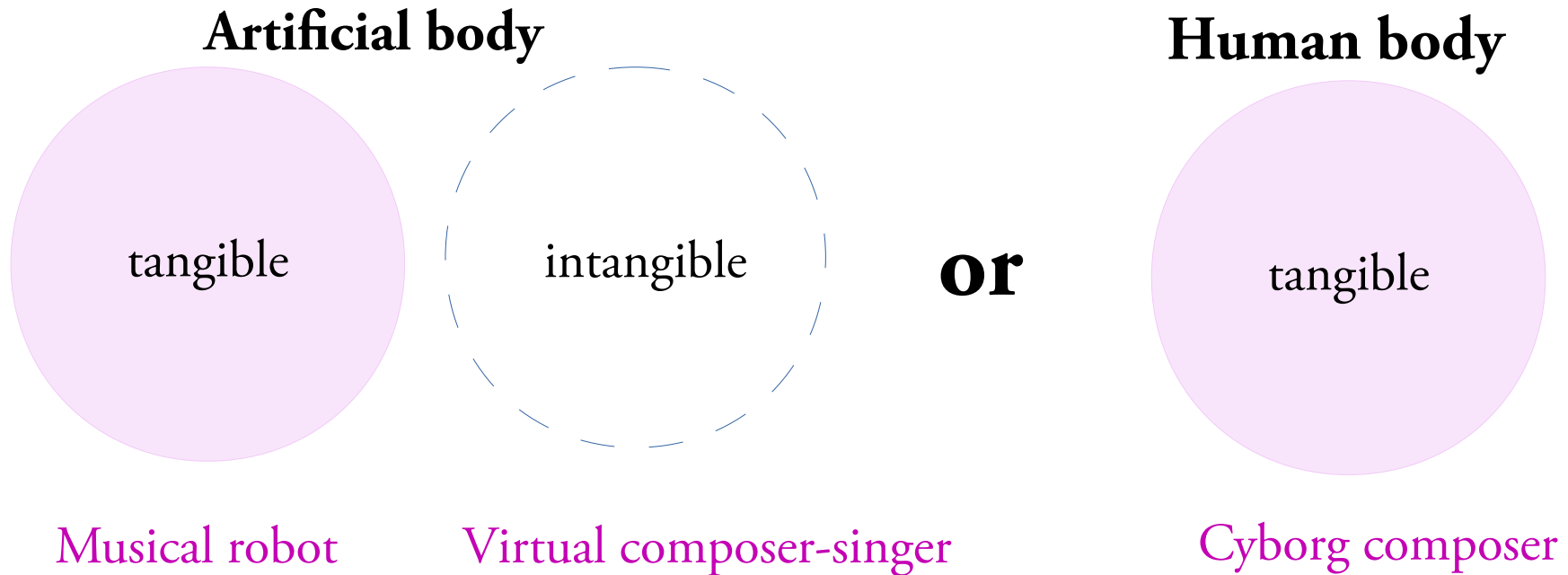


AI composer = artificial brain

AI composition system

- Magenta (Google)
- Flow Machines (Sony CSL)
- Amper Music (Amper Music)
- Jukedeck (Jukedeck)
- Orpheus (University of Tokyo)
- BrAIIn Melody (COI Osaka University)

Embodied AI composer = artificial brain + body



3 types of Embodied AI composer

1. AI & tangible artificial body

(e.g. Musical robot)

2. AI & intangible artificial body

(e.g. virtual composer-singer)

3. AI & human body

(e.g. Cyborg composer)

1.

AI & tangible artificial body

History of Musical Robots

all over the world

the world's first
programmable robot

12c -19c.: Musical automaton

12c.: Musical robot band by Al-Jazari in Turkey

18c.: *The Musician* by Pierre Jaquet-Droz (watchmaker) in Switzerland

2007-2017: Robot band *Compressorhead* in Germany

2015: *Myon* stars on Berlin opera stage (Humboldt University in Germany)

2017: *YuMi*, swiss robot conductor makes opera debut



History of Musical Robots

Japan

1984 :
WABOT-2

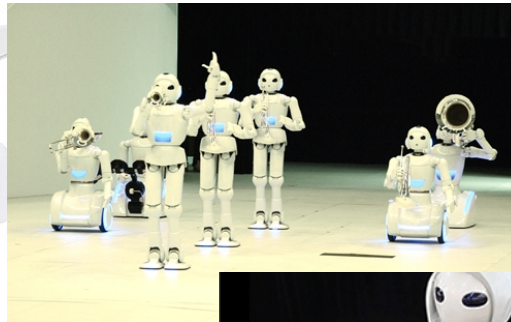


17c -19c :
Karakuri
puppet



2005 :
idog

2005 :
Toyota Partner Robot



2013 :
Z-MACHINES



2019 :
Android conductor
Alter 3



Robot/Music/Dance

- Miim

Humanoid robot / Vocaloid / Choreonoid

https://www.aist.go.jp/aist_e/list/latest_research/2010/20101105/20101105.html

- V-SidoxSongle

music-synchronized robot control system



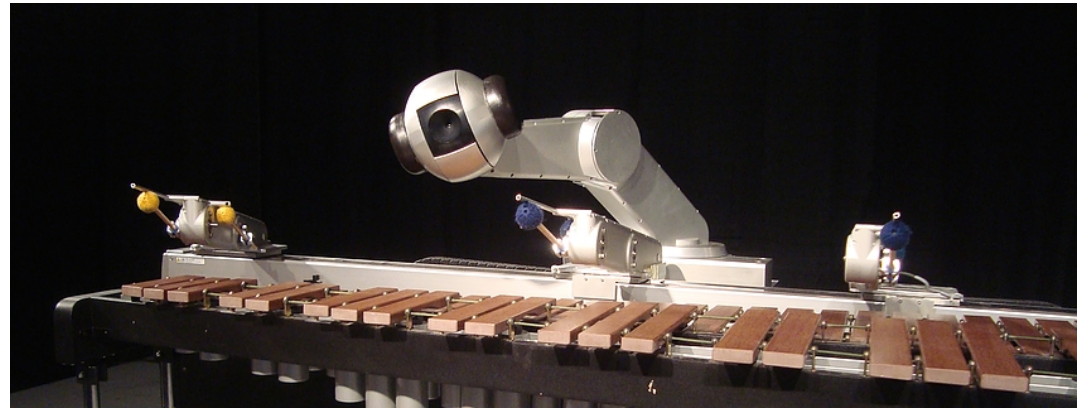
Shimon, the robotic marimba player

- created by Gil Weinberg

(Georgia Tech's Robotic Musicianship group)

- AI-powered robot can now compose music
- 2006: Haile, robot percussionist
- <https://www.shimonrobot.com/video>

the world's first
improvising robot



2.

AI & intangible artificial body

Virtual singer

2003: VOCALOID

2007: Character Vocal Series (VOCALOID)

Hatsune Miku, Kagamine Rin and Len

(2009: Megurine Luka)

2015: AI rinna

2019: AI rinna became singer [com/wat](https://www.youtube.com/watch?v=...)

2019: Hibari (VOCALOID: AI) (4K 3D hologram)
performed for the Kōhaku Uta Gassen



VOCALOID:AI

2019: AI Hibari (VOCALOID:AI) (4K 3D hologram)

sang for Kōhaku Uta Gassen.

<https://www.youtube.com/watch?v=nOLuI7nPQWU>



Virtual Composer-Singer

2017: VOCALOID (YAMAHA) & Clova (LINE)
started to develop new products and service.
(composer-singer)

3.

AI & human body

Machine Learning Keyboard

AWS DeepComposer

- launched in December 2019, by Amazon Web Service
- the world's first machine learning-enabled keyboard

<https://aws.amazon.com/deepcomposer/>



Body composition

Transform a Dancer into a Pianist

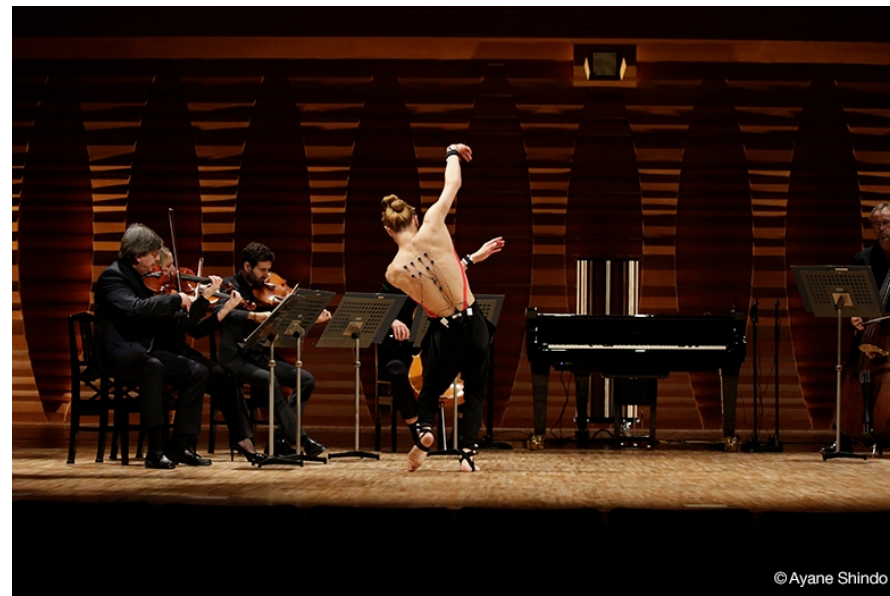
in 2017 by COI Tokyo University of the Arts & Yamaha

https://no.yamaha.com/no/news_events/2018/20180131_yamaha_ai_transforms_a_dancer_into_a_pianist.html

1. Dancer's movements are translated into sensor signals

2. AI on the system creates suitable melody data (MIDI)

3. Player piano Yamaha Disklavier performs with the musical data



Human Augmentation

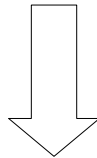
- Robotized human & musical instrument
 - by Yoichi Ochiai
- Human with artificial body parts & musical instrument
 - Skywalker Hand (ultrasonic waves & deep learning)
by Gil Weinberg
 - Mind-controlled robotic arm
by Johns Hopkins University Applied Physics Lab

Conclusion

AI composer

**Embodied
AI composer**

Humanized robot, Virtual human and Robotized human would unify the roles of composer/musician/dancer/poet.



In future...

**Embodied
AI composer**

Thank you for your attention.