

# High Tech Aging: improving Lives Today

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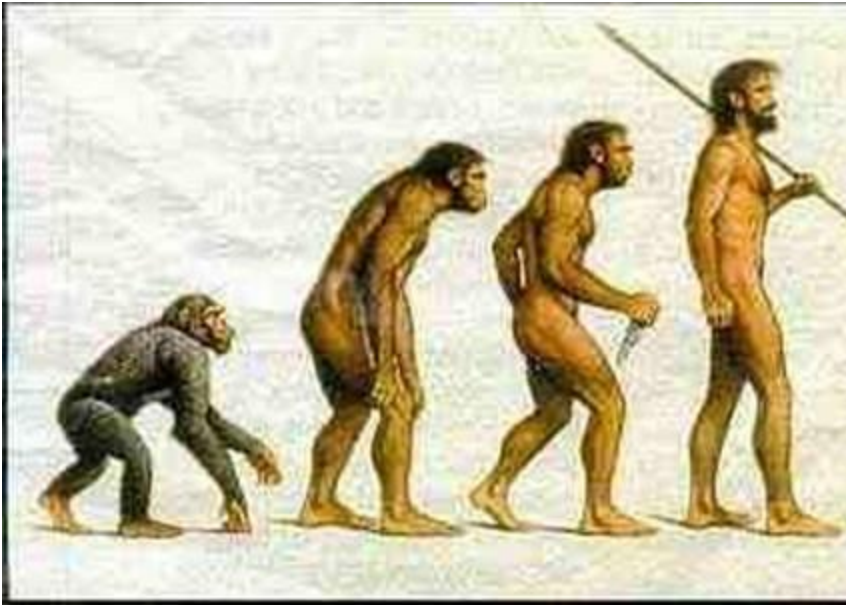
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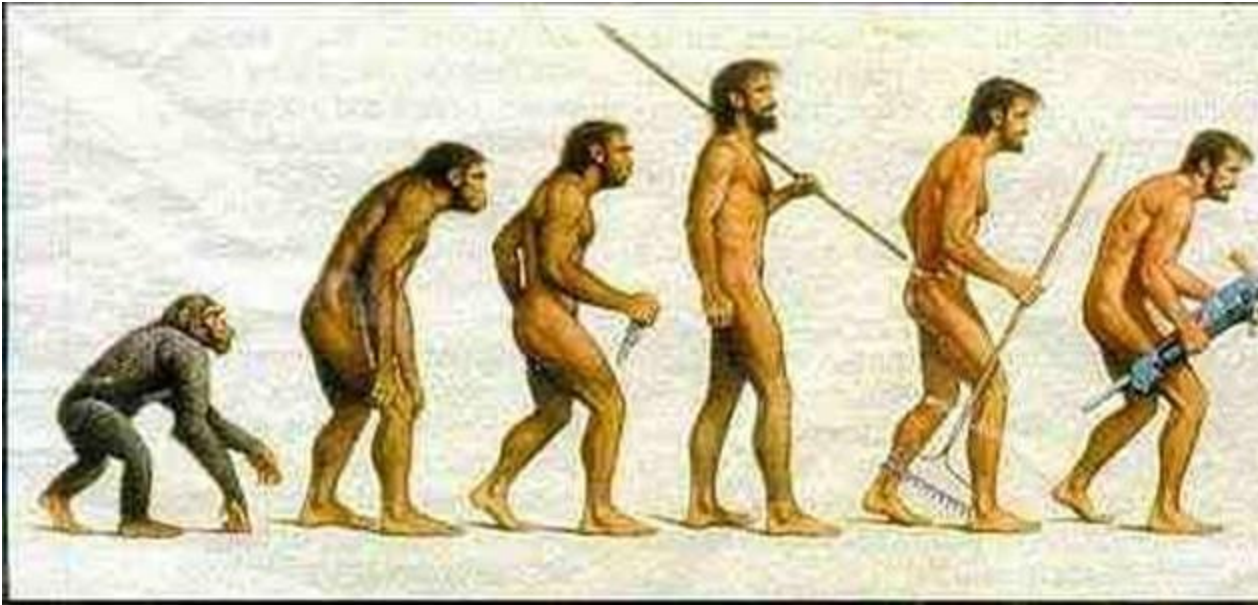
# Empowering Human Capacity

– We have evolved and progressed



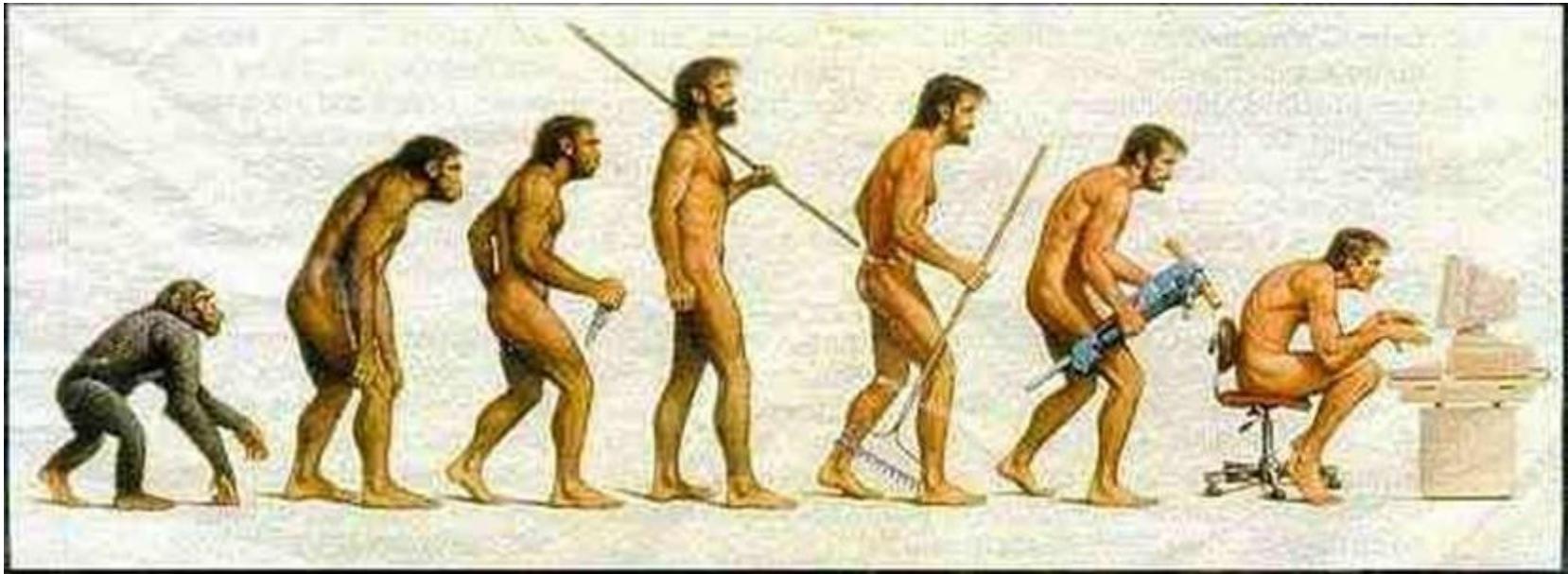
# Empowering Human Capacity

- We have evolved and progressed.
- We have invented and discovered.



# Empowering Human Capacity

- We have evolved and progressed.
- We have invented and discovered.
- **We are empowered...**



Bruce Goldman, College of Liberal Arts and Sciences, University of Connecticut

# Empowering Human Capacity

**Leonardo da Vinci (1452-1519)** created the **robotic knight** capable of independent motion - sitting down, standing up, moving its head and lifting its visor.



**Denis Diderot (1713-1784)** formulates in his *Pensées philosophiques* :  
"If we find a parrot who could answer to everything, I would claim it to be an intelligent being without hesitation"



# Empowering Human Capacity

Creating Artificial Intelligence to empower humanity?



## Can a machine think? Turing Test (1950)

Put a machine and a human in a room and send in written questions. If we cannot tell which answers are from the machine or the human, the machine is thinking...

# What first passed the Turing Test and is it enough?

- The first was **ELIZA**, a program written by the American Computer scientist, **Joseph Weizenbaum (1976)**

```
> Hello, I am Eliza.  
* I am afraid.  
> How long have you been afraid?  
* Since midterms.  
> Tell me more...  
* I am afraid that I will fail  
my course.  
> Do you enjoy being afraid that  
you will fail your course?
```

- BUT anything like human intelligence must be able to engage with the **real world, with social interaction**, and the Turing Test doesn't test for that..

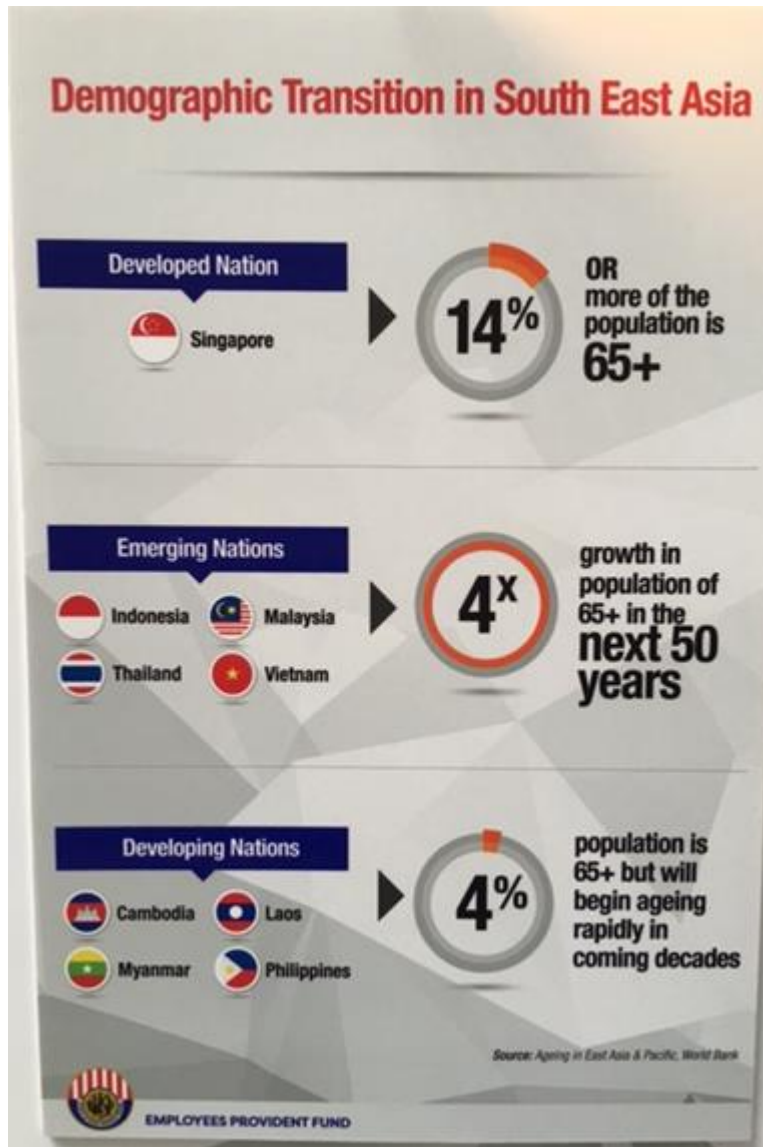


# Empowering Human capacity today?

- Hardware/software tools allowing to **capture, understand, produce a lot of signals**: speech, sounds, gestures, shapes, forces etc...
- **Generate Big Data** that allows us to **analyse and model** events or **predict** the future using deep learning



# Today Societal Problems



- Even far away, people would like to live and to act together
- In most cities, aged people with special needs often feel lonely and are alone



# One Solution: social robots

## Paro robot baby seal

- Designed by [Takanori Shibata](#) and produced in 2002
- Responds to petting through tactile sensors by **moving its tail**
- responds **to sounds** and can **learn a name**
- can **show emotions** such as surprise, happiness and anger.



# Early models of nursing-care assistant robots

-- Physically support



**Robot that can lift up or set down a real human from or to a bed or wheelchair.**

**RIBA robot** (Robot for Interactive Body Assistance)

T. Mukai, S. Hirano, H. Nakashima, Y. Kato, Y. Sakaida, S. Guo, and S. Hosoe, "Development of a nursing-care assistant robot riba that can lift a human in its arms," in 2010 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pp. 5996–6001, Oct 2010.

# Social service robots

Care-o-bot robot equipped with the latest state-of-art industrial components. Experience in a senior home in Germany

- range and image sensors for object learning and detection in real-time 3D environment

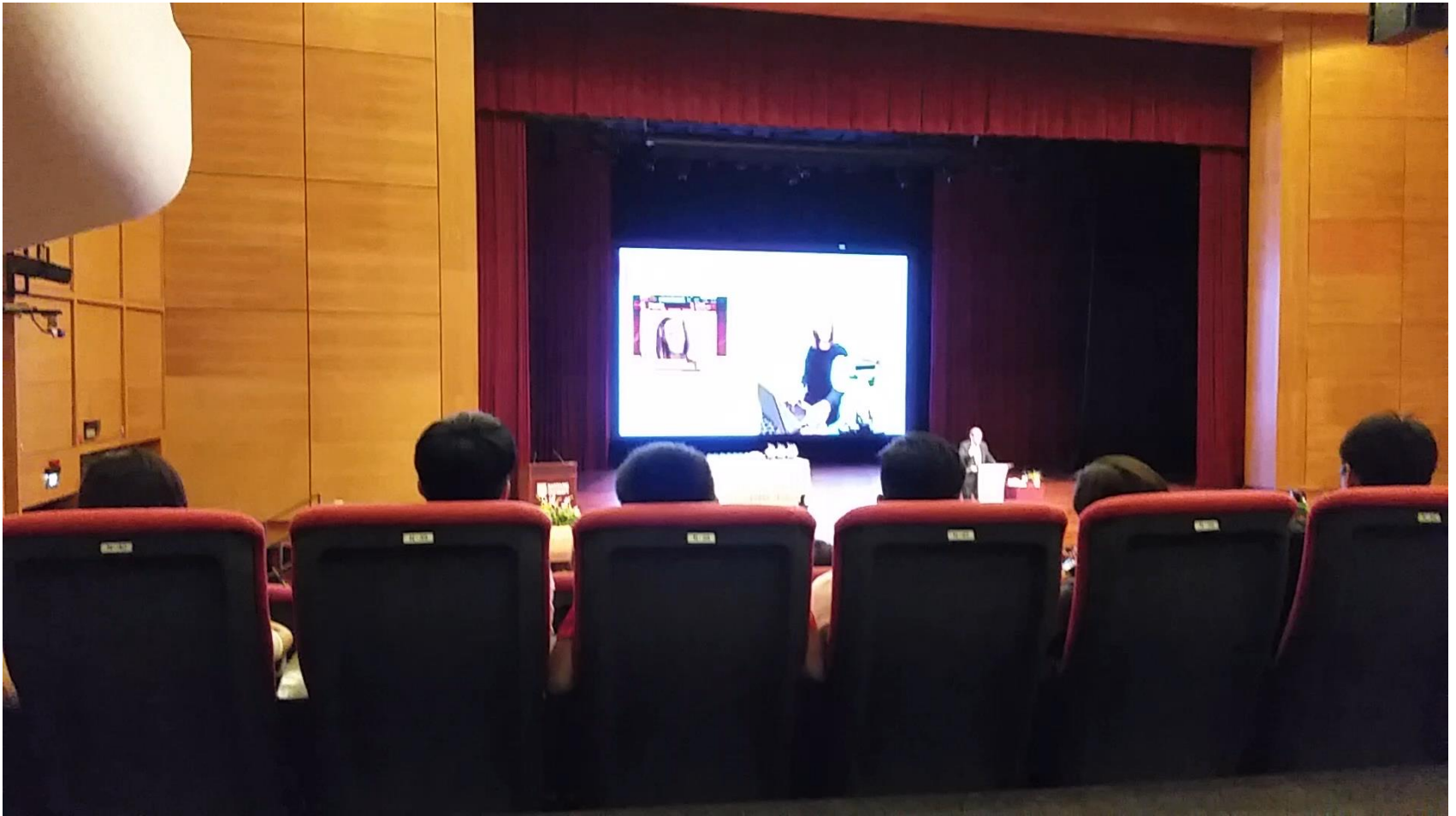


# Our humanoid social robot Nadine



Nadine has a total of 27DoF for facial expressions and upper body movements. Nadine can speak, display emotions and natural gestures. She can recognize people.

# Nadine and Edgar presented by NTU President



# Challenges in autonomous behavior generation

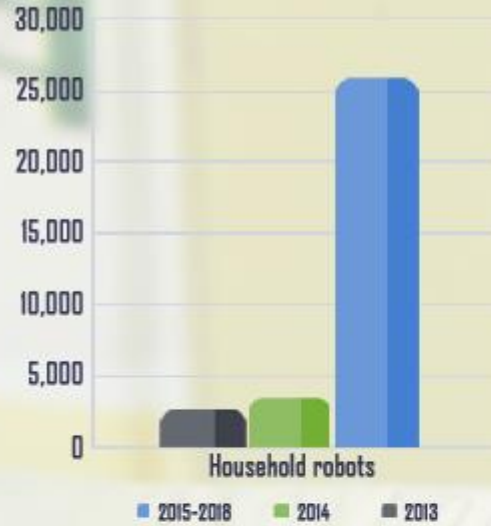
## Augmented/Artificial intelligence (AI) :

**Nadine should be aware of the situation of all other people and the environment and be able to collaborate and interact in an intelligent way (augmented AI)**





Service robots for personal/domestic use.  
Units sales Forecast 2015-2018, 2014 and 2013



Source: International Federation of Robotics, "World Robotics 2015 Service Robots"



# Real-time interaction with Nadine in telepresence environment

- Real-time interaction with Nadine in video telepresence



[1] Demo was showed at Swissnex Singapore End of Year Party 2013

# Nadine singing at Swissnex Party

