

Robótica Móvel

História e Atualidades

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Grécia antiga

■ **Mitologia:** Hefesto

- Filho de Zeus e Hera
- Considerado o deus da tecnologia, dos ferreiros, metalurgia, ...
- Ilíada de Homero: constroi máquinas móveis (*servos mecânicos, autômatos*) de bronze para auxiliá-lo a se movimentar
- Talos: Gigante de bronze que deveria proteger a ilha de Creta

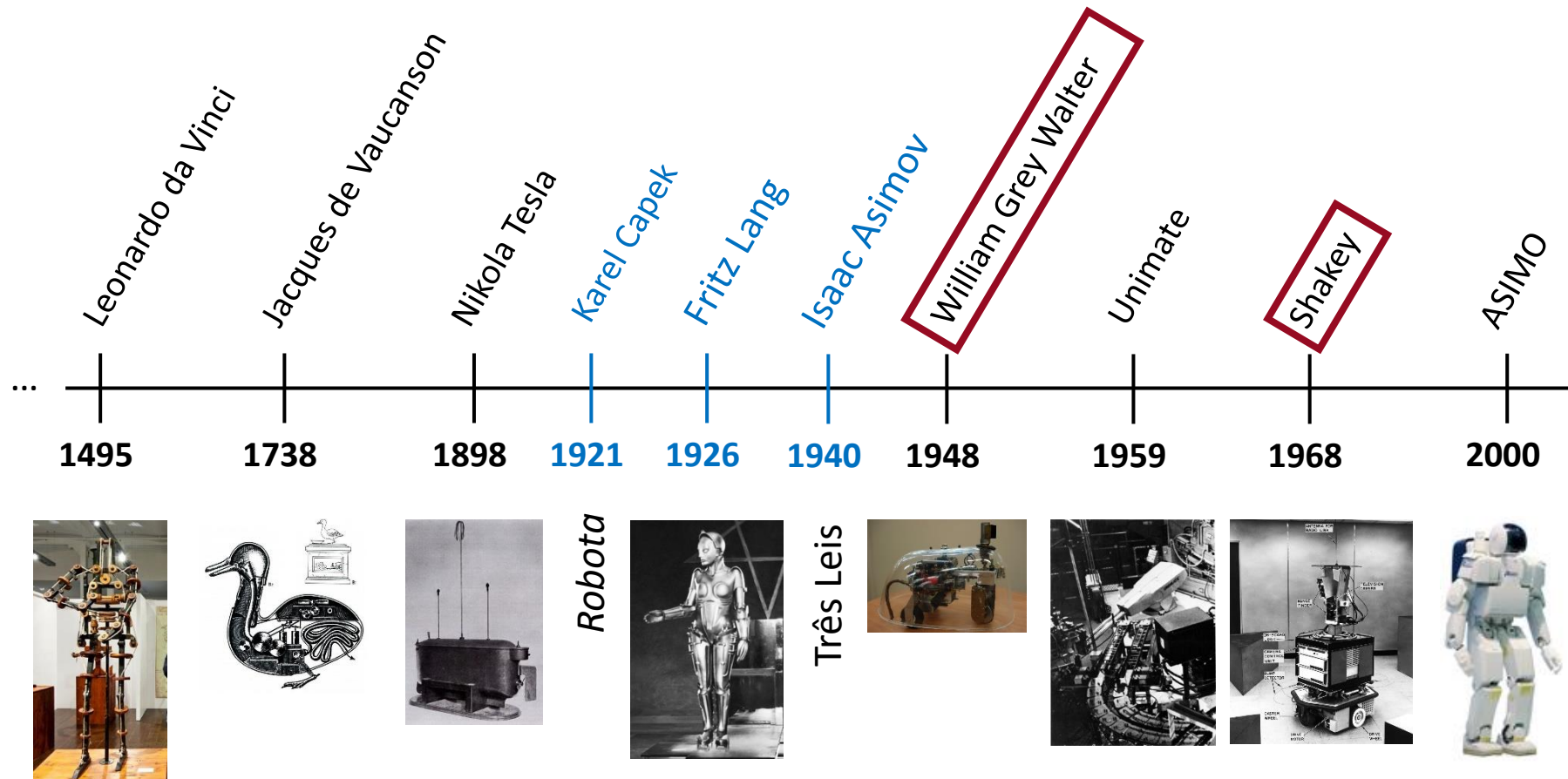
Grécia antiga

- **~322 A.C.: Aristóteles**

- Menciona a ideia de ter máquinas com capacidade para trabalhar sozinhas (ou com comandos) executando tarefas de rotina

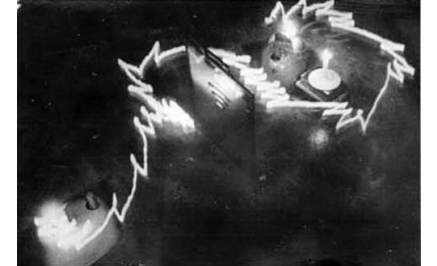
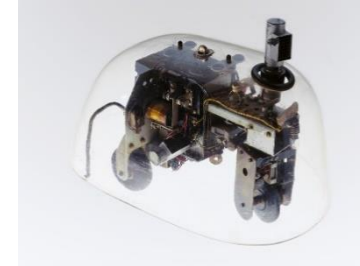
“If every tool, when ordered, or even of its own accord, could do the work that befits it... then there would be no need either of apprentices for the master workers or of slaves for the lords.”

História



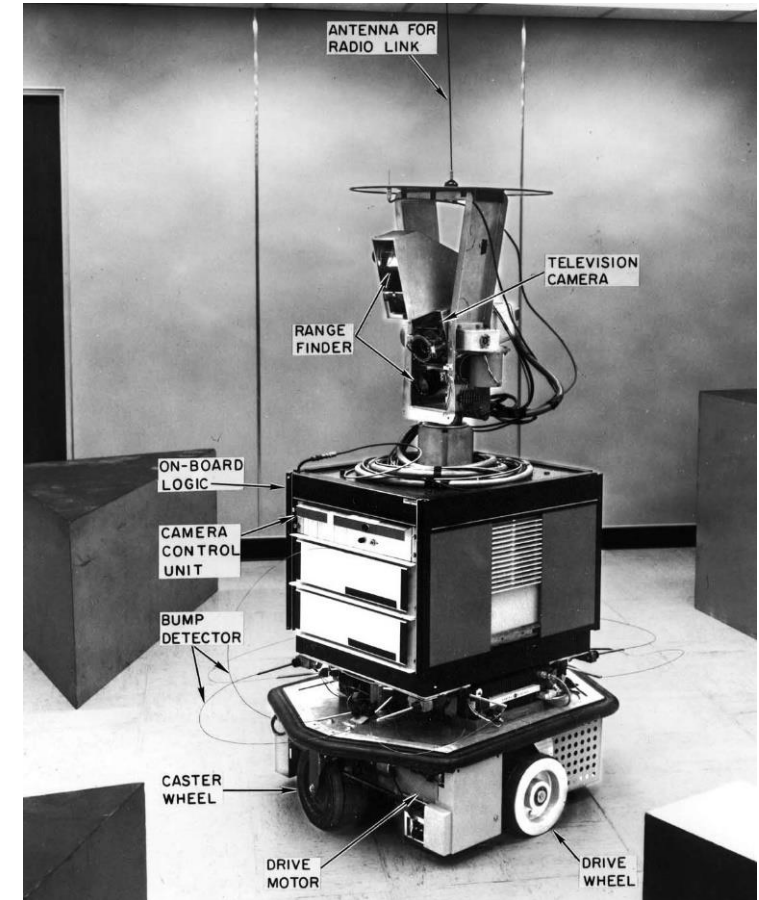
<https://www.thomasnet.com/articles/automation-electronics/history-of-robotics/>

- **1948:** William Grey Walter
 - *Machina speculatrix (Tortoise)*
 - Tarefa: buscar de fontes de luz
 - Sensores: Fococélulas e contato
 - Atuadores: Motores/rodas



História

- **1968:** Stanford Research Institute
 - *Shakey*
 - Primeiro robô móvel
 - *Pensar e agir*
 - Sensores
 - Câmera
 - Profundidade
 - Contato



Fonte: <http://www.ai.sri.com/shakey/>
<https://youtu.be/GmU7SimFkpU>

História

- **1970: Stanford University**
 - *Stanford Cart*
 - Teleoperação (Terra/Lua)
 - Seguir linhas utilizando uma câmera
 - Sensoriamento 3D
 - 1 metro / 15 minutos



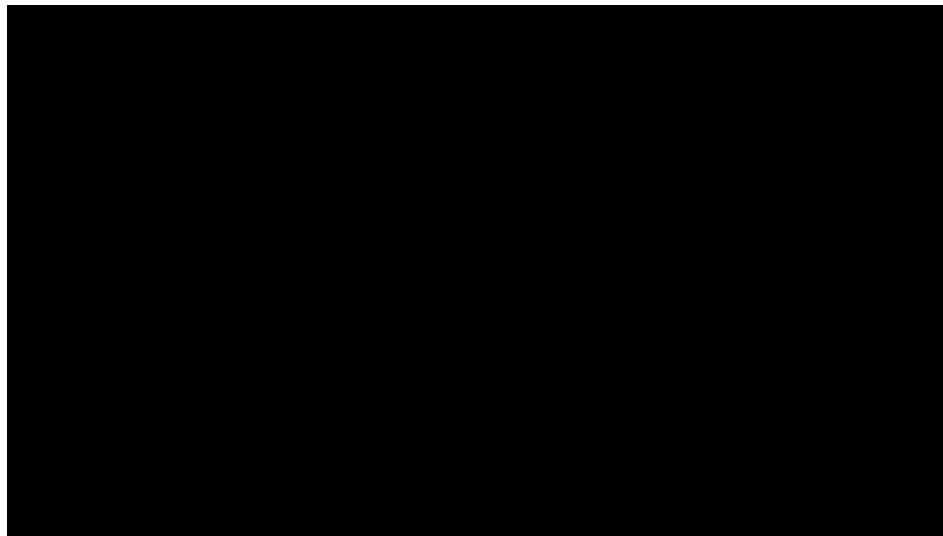
<https://news.stanford.edu/2019/01/16/stanfords-robotics-legacy/>

Atualmente



Atualmente

Humanoides



<https://youtu.be/8psxACU1oSc>
https://youtu.be/Bmg1bk_Op64

Atualmente

Boston Dynamics



<https://youtu.be/cNZPRsrwumQ>



https://youtu.be/Ve9kWX_KXus

Atualmente

Boston Dynamics



<https://youtu.be/rVlhMGQgDkY>

Atualmente

Boston Dynamics



<https://youtu.be/-7xvqQeoA8c>

Atualmente

Boston Dynamics

2012-2015: DARPA Robotics Challenge



<https://youtu.be/g0TaYhjpOfo>

2021



<https://youtu.be/fn3KWM1kuAw>

Atualmente

DARPA Grand Challenge

- **2004:** Mojave Desert, USA, 240 km
 - Sandstorm (CMU): 11,78 km
- **2005:** Mojave Desert, USA, 240 km
 - Stanley (Stanford): 6:54 hrs
 - Sandstorm e Highlander (CMU): 7:05 e 7:14 hrs



Sandstorm 2004



Stanley 2005

Atualmente

DARPA Grand Challenge



<https://youtu.be/IPG0hzoKIto>

Atualmente

DARPA Urban Challenge

- **2007:** George Air Force Base, USA, 96 km
 - Boss (CMU): 4:10 hrs
 - Junior (Stanford): 4:29 hrs
 - Odin (VT): 4:36 hrs
- Mais fácil ou mais difícil que o anterior?
 - Por que?
 - Desvio de obstáculos → Regras de trânsito

Atualmente

DARPA Urban Challenge



Atualmente

DARPA Urban Challenge



<https://youtu.be/tXuC6gUO4mY>



<https://youtu.be/njwx7jskDPo>

Atualmente

DARPA Urban Challenge

The New York Times

Self-Driving Uber Car Kills Pedestrian in Arizona, Where Robots Roam

By Daisuke Wakabayashi

March 19, 2018

The Guardian

Self-driving Uber kills Arizona woman in first fatal crash involving pedestrian

Tempe police said car was in autonomous mode at the time of the crash and that the vehicle hit a woman who later died at a hospital

Sam Levin and Julia Carrie Wong in San Francisco

Mon 19 Mar 2018 22:48 GMT

DRIVERLESS CAR SAFETY —

Report: Software bug led to death in Uber's self-driving crash

Sensors detected Elaine Herzberg, but software reportedly decided to ignore her.

TIMOTHY B. LEE - 5/7/2018, 7:12 PM



Enlarge / NTSB officials inspecting the vehicle that killed Elaine Herzberg in a March crash in Arizona.

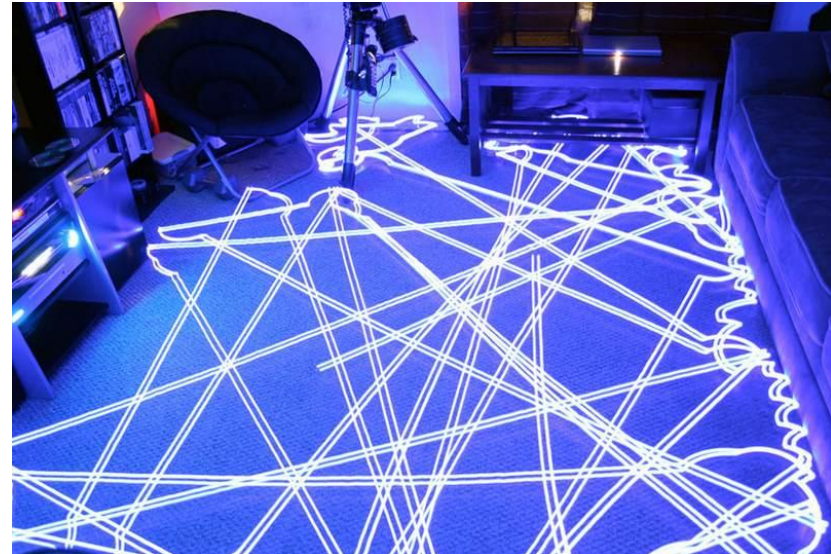
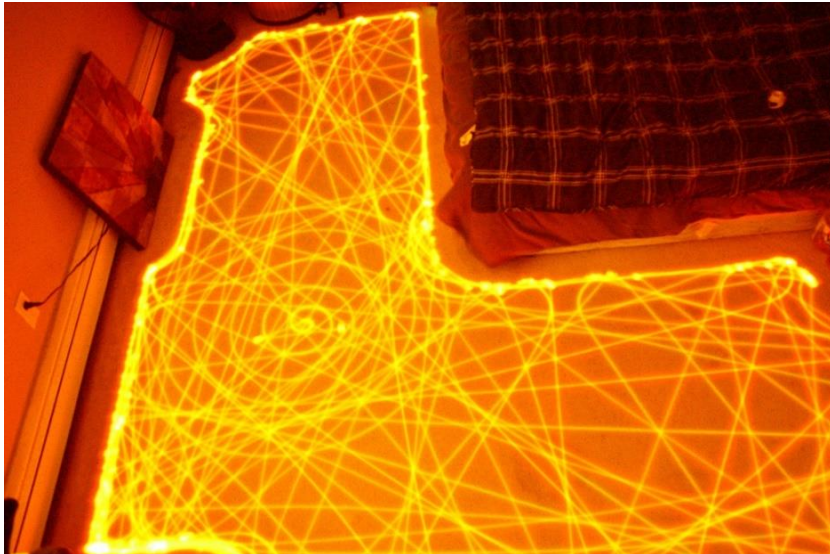
<https://www.nytimes.com/2018/03/19/technology/uber-driverless-fatality.html>

<https://www.theguardian.com/technology/2018/mar/19/uber-self-driving-car-kills-woman-arizona-tempe>

<https://arstechnica.com/tech-policy/2018/05/report-software-bug-led-to-death-in-ubers-self-driving-crash/>

Atualmente

Domésticos



Atualmente

Domésticos



https://youtu.be/qHEJhJ_CuOQ

Atualmente

Logística



<https://youtu.be/JXkMevbjga4>

Atualmente

Drones



<https://youtu.be/44KvHwRHb3A>

Construction with Quadrotor Teams

Quentin Lindsey, Daniel Mellinger, Vijay Kumar
GRASP Lab, University of Pennsylvania

https://youtu.be/W18Z3UnnS_0

Atualmente

Drones

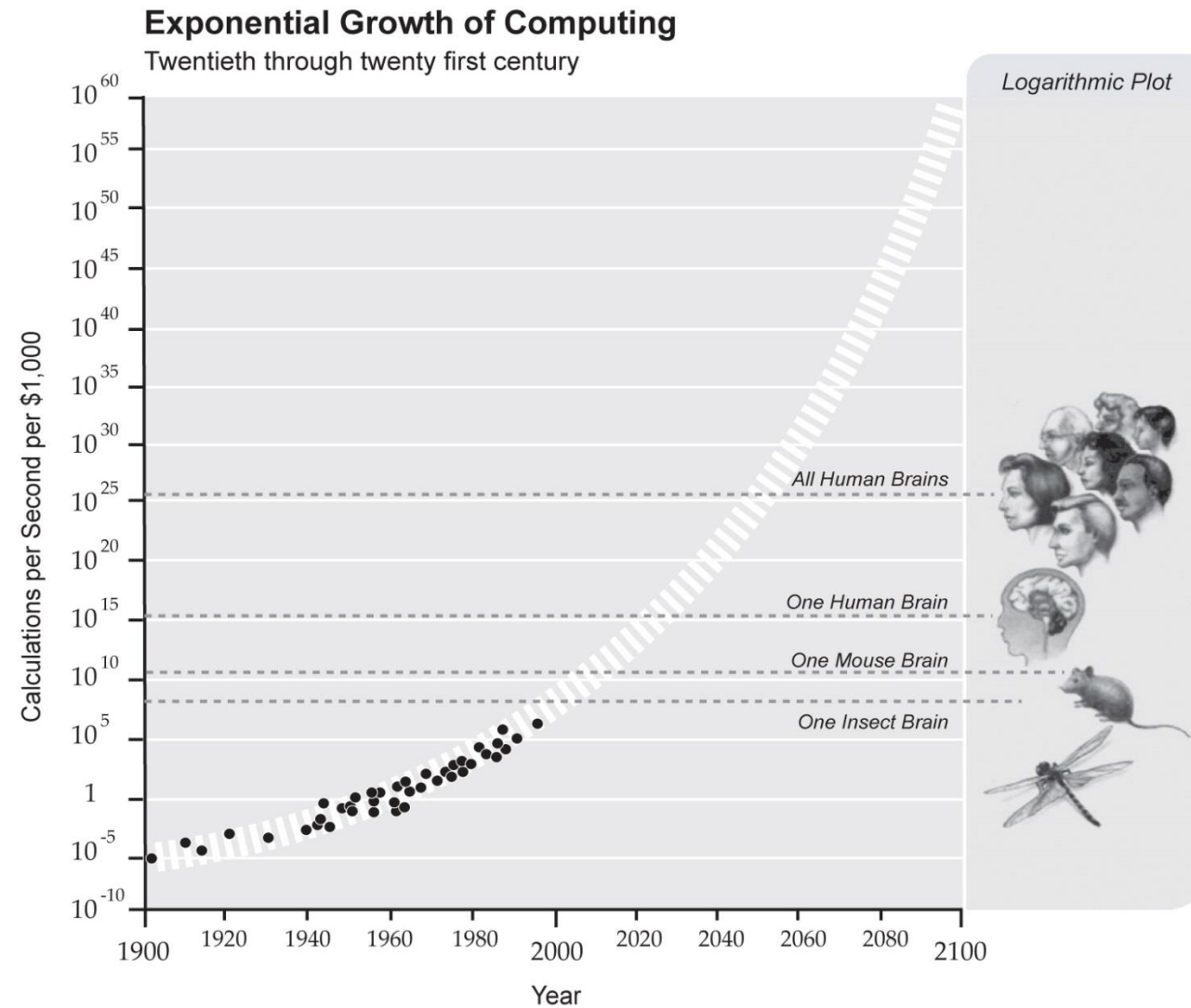
Building a rope bridge
with flying machines



GRAMAZIO
KOHLER
RESEARCH
E EA

ETH zürich

<https://youtu.be/CCDluZUfETc>



Fonte: <http://www.singularity.com/charts/page70.html>

Futuro?

