

Autonomous Robots

How are they programmed?

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Introduction

- Physical programming
- Psychological programming



Aibo The Dog



<https://www.notebookcheck.net/Limited-First-Litter-edition-of-Sony-a-robotic-dog-aibo-released-in-US.333218.0.html>

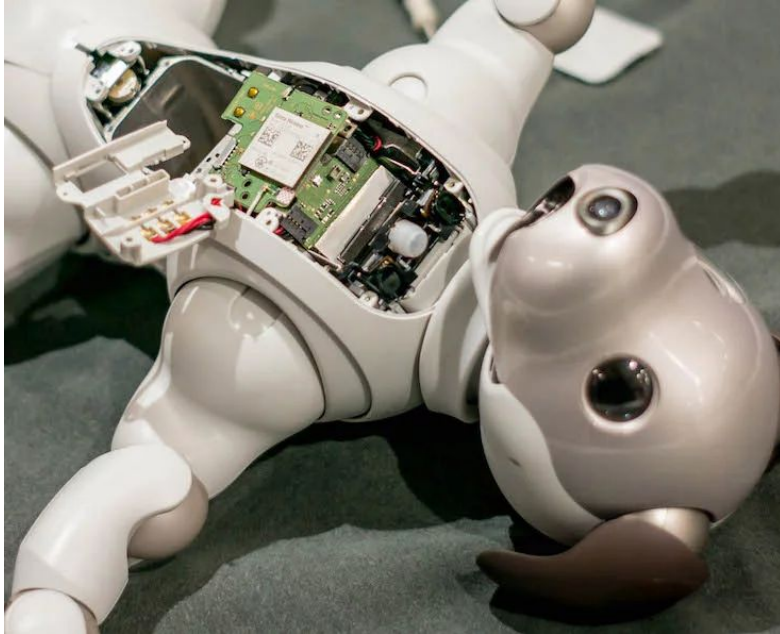
What is Aibo?

- Aibo, which means “pal” in Japanese, is a robotic pet created by Sony originally in 1993 as a research project.
- “The AIBO is able to develop from a newborn puppy to an adult with a personality shaped by the interaction with their owners and surroundings.” ([source](#))
- There are currently 4 generations of models, with the newest one having been released in January of 2018.
- This is the newest model since 2005.



Video of model ERS-1000, the newest version.

Features



<https://technabob.com/blog/2018/10/23/sony-aibo-robot-dog-teardown/>

- OLED eyes that can express emotions
- Qualcomm Snapdragon Processor
- Four microphones
- Range Sensor
- Understands commands
- Supports Wi-Fi and LTE connectivity
- Facial recognition
- Interaction history

Aibo's Hardware Through the Years [\(source\)](#)

	MUTANT Prototype	1998 Prototype	ERS-110	ERS-7	ERS-1000
Processor	IDT R3052 or R3071 ×2 @ 30 MHz	MIPS 64 Bit RISC Processor	64-bit RISC processor @ 50 MHz	MIPS R7000 @ 576 MHz	64-bit Quad-Core processor
RAM	8 MB	8 MB	16 MB	64 MB	
Camera	362 × 492 CCD camera	180,000 pixels	180,000 pixel color CCD camera (x 1)	CMOS Image Sensor 350,000 pixels	Front camera, SLAM camera
Wireless LAN	N/A	N/A	N/A	IEEE 802.11b (Integrated)	IEEE 802.11b/g/n (Integrated)

R-Code and Open-R Programming

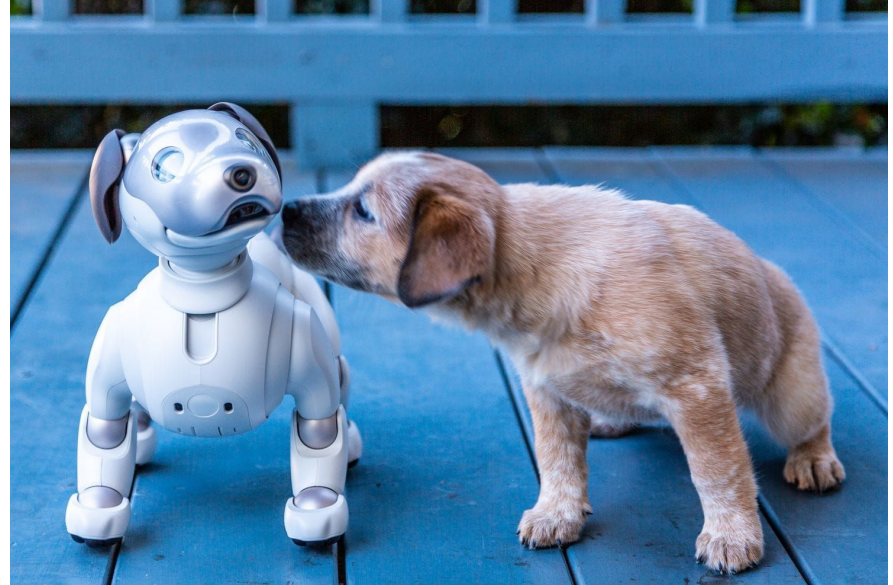
- Sony uses these two programming languages to program Aibo
- These programs are put on memory sticks
- In R-Code, you can
 - Switch Aibo's positions
 - Make Aibo walk
 - Verbal commands
 - Create motions
- Open-R is more object-focused programming
 - Focused on starting and stopping processes within Aibo
 - Also tracking sensor values

Example of R-Code ([source](#))

```
:START
  CALL:1001
DO
  WAIT:1
  IF:AU_Voice:=:1:THEN
    WAIT:1
    SWITCH:AU_Voice_ID
    CASE:1:CALL:1003
    CASE:6:CALL:1005
    CASE:ELSE:CALL:1007
    CALL:1001
  ENDIF
  WAIT:1000
```

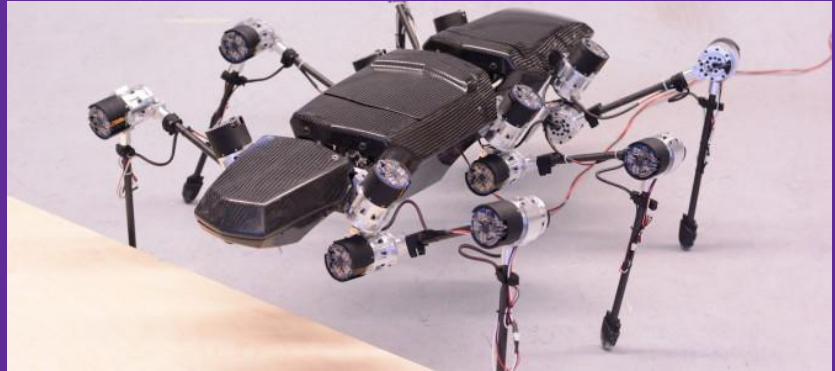
Behavioral Functions of Aibo

- Aibo can learn and react to its owner's behaviors and actions.
 - If the owner is having a bad day, Aibo can detect it using facial recognition and pattern detection.
- Aibo can handle up to 30 commands
 - These commands are entirely customizable too.
- Takes photos and videos through its camera in its nose.
- Adapts to its environment and surroundings.



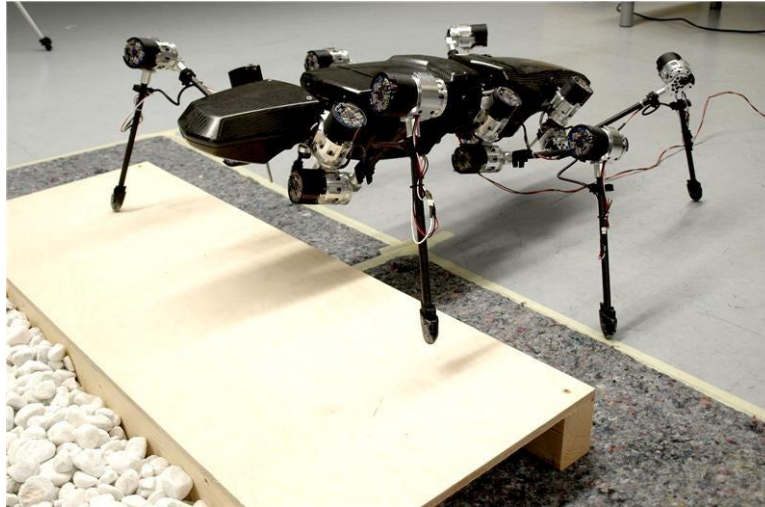
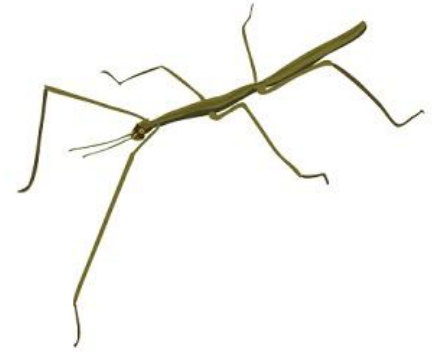
https://www.washingtonpost.com/technology/2018/09/18/aibo-robot-dog-will-melt-your-heart-with-mechanical-precision/?utm_term=.8de619fc8bbe

Hector



About Hector

- Designed like a stick insect
- “Free gait” movement
- Interacts with obstacles
- Purpose: to study the movement of insects and animals



The Psychology Behind Hector

Does Hector have a consciousness?

Past

- Reactive system

Present/Future

- Imagined scenarios
- “Inner mental states”



How do robots affect the psychological state of humans?

Aibo

- Children's interactions
- New York Times mini-documentary: Aibo funeral

Other

- Robot scared of being shut down



Question

Would you ever purchase a robot dog for your child in place of a real dog? Why or why not?

Any other questions?

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