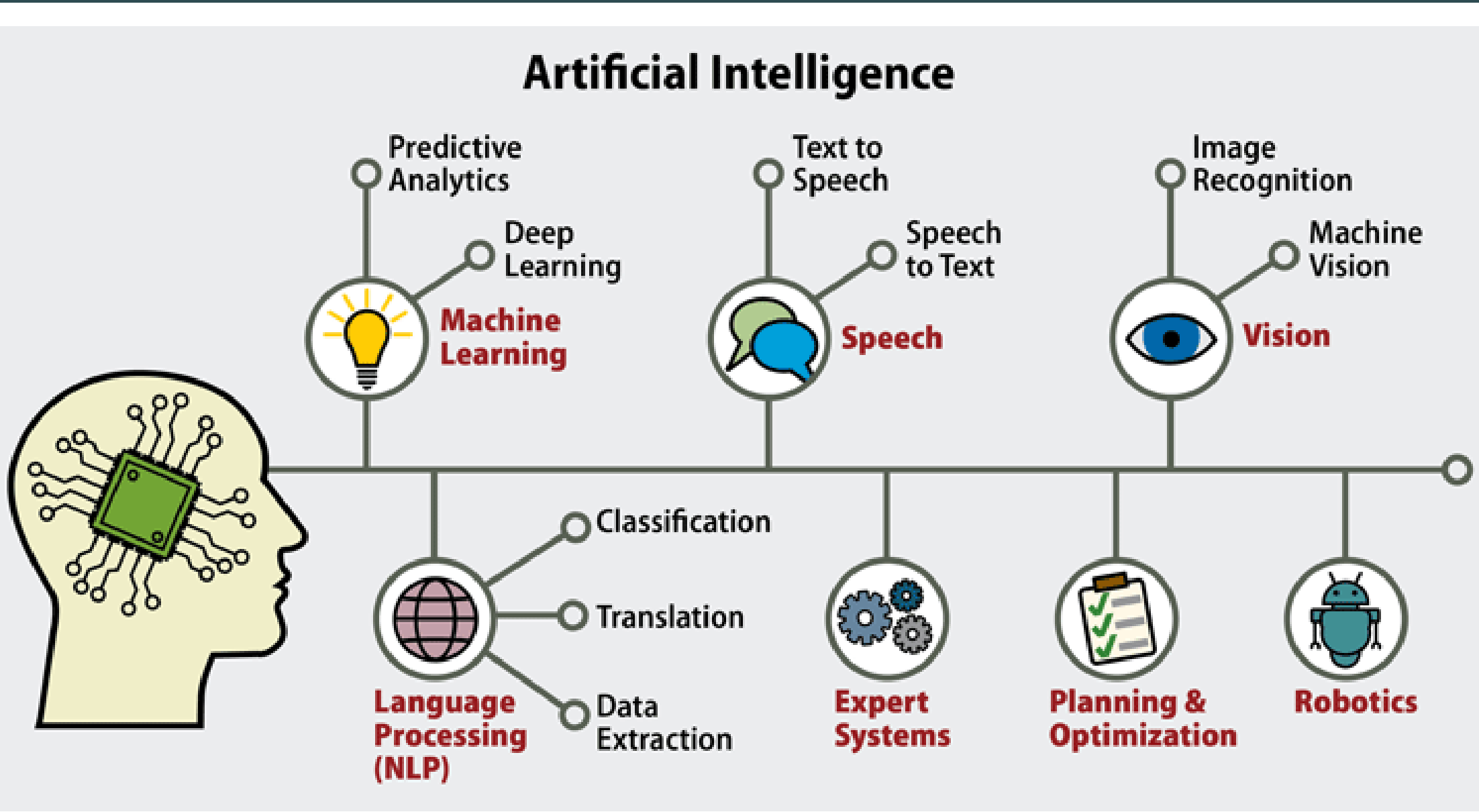
Introducción a la Robótica

Jorge Vásquez

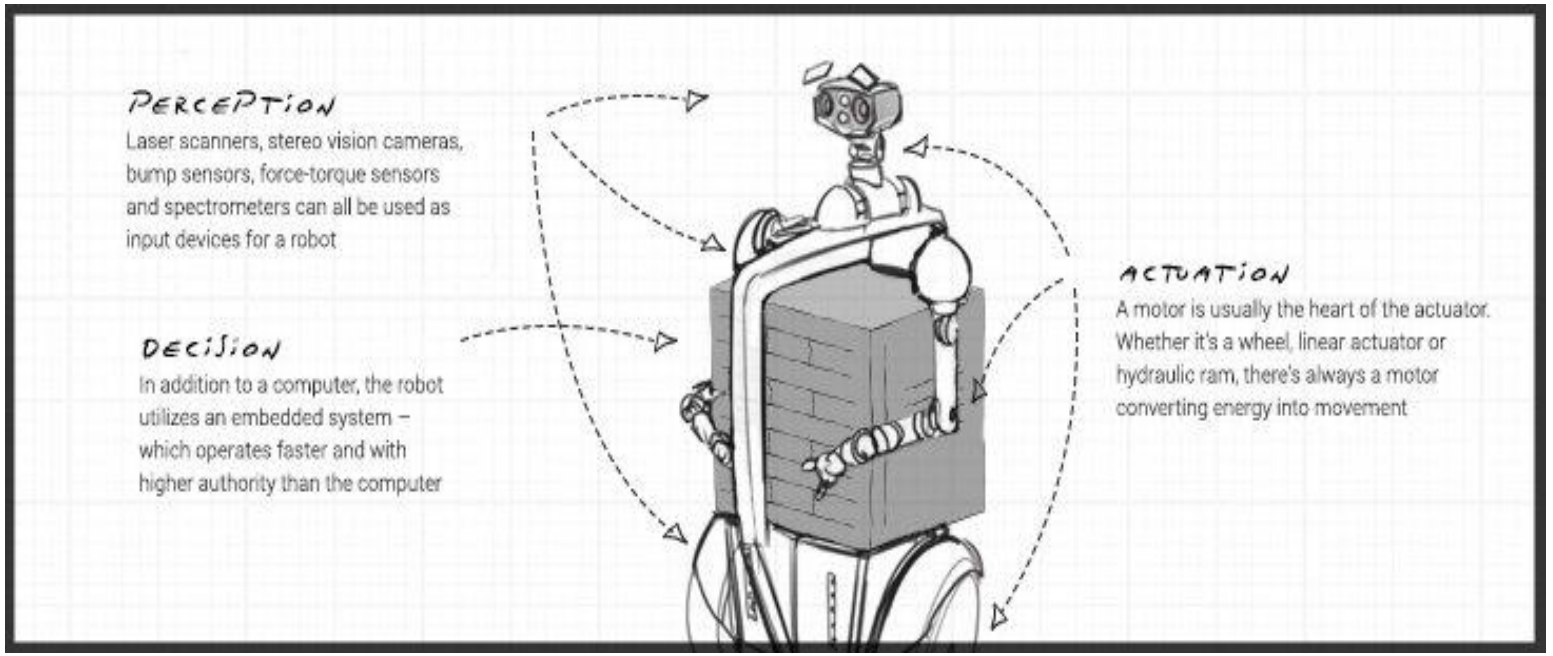
Robótica

- ✓ Tecnología
- ✓ Test Beds de IA

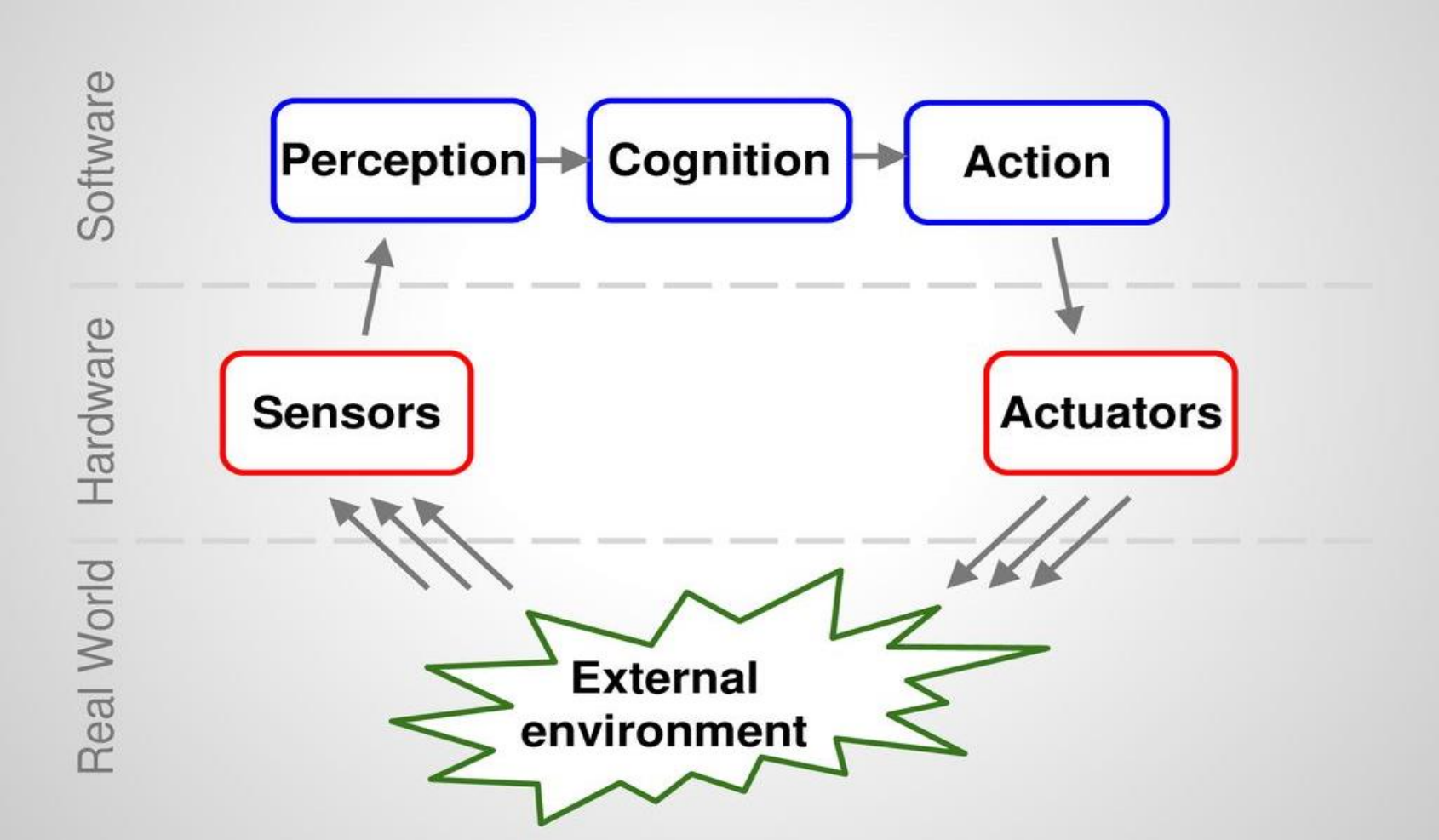

Artificial Intelligence
Predictive Analytics
Deep Learning
Machine Learning
Text to Speech
Speech to Text
Speech
Image Recognition
Machine Vision
Vision
Classification
Translation
Data Extraction
Language Processing (NLP)
Expert Systems
Planning & Optimization
Robotics

Robot

Robot


PERCEPTION
Laser scanners, stereo vision cameras, bump sensors, force-torque sensors and spectrometers can all be used as input devices for a robot
DECISION
In addition to a computer, the robot utilizes an embedded system – which operates faster and with higher authority than the computer
ACTUATION
A motor is usually the heart of the actuator. Whether it's a wheel, linear actuator or hydraulic ram, there's always a motor converting energy into movement

Robot


Software
Hardware
Real World
Perception
Cognition
Action
Sensors
Actuators
External environment

Sensores

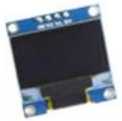
LOBOT

Color sensor

Ultrasound module

Infrared obstacle Avoidance module

Photosensitive sensor



OLED Display module

Accelerometer

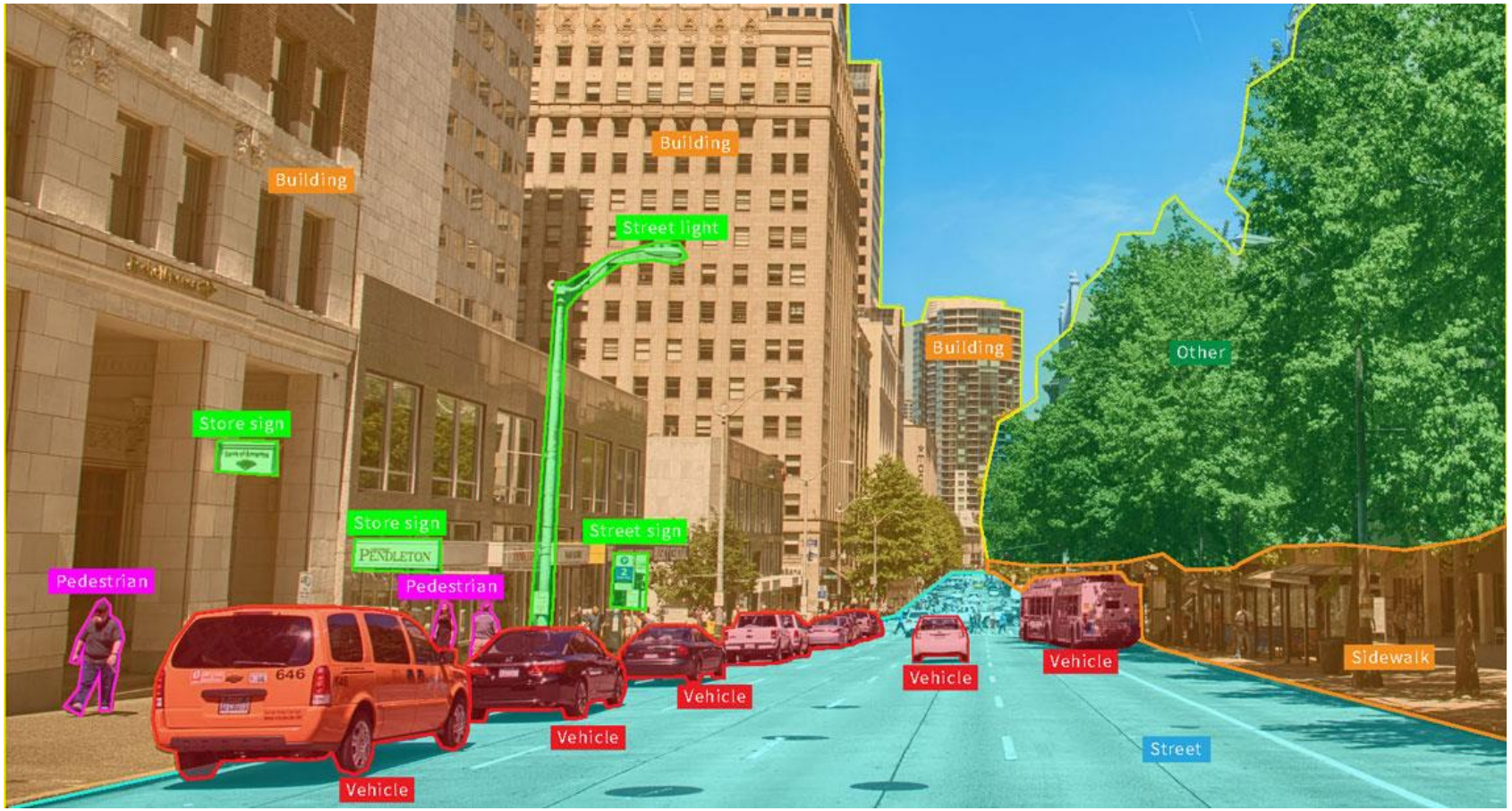
Infrared remote control and receiver

Color/ gesture/light sensor

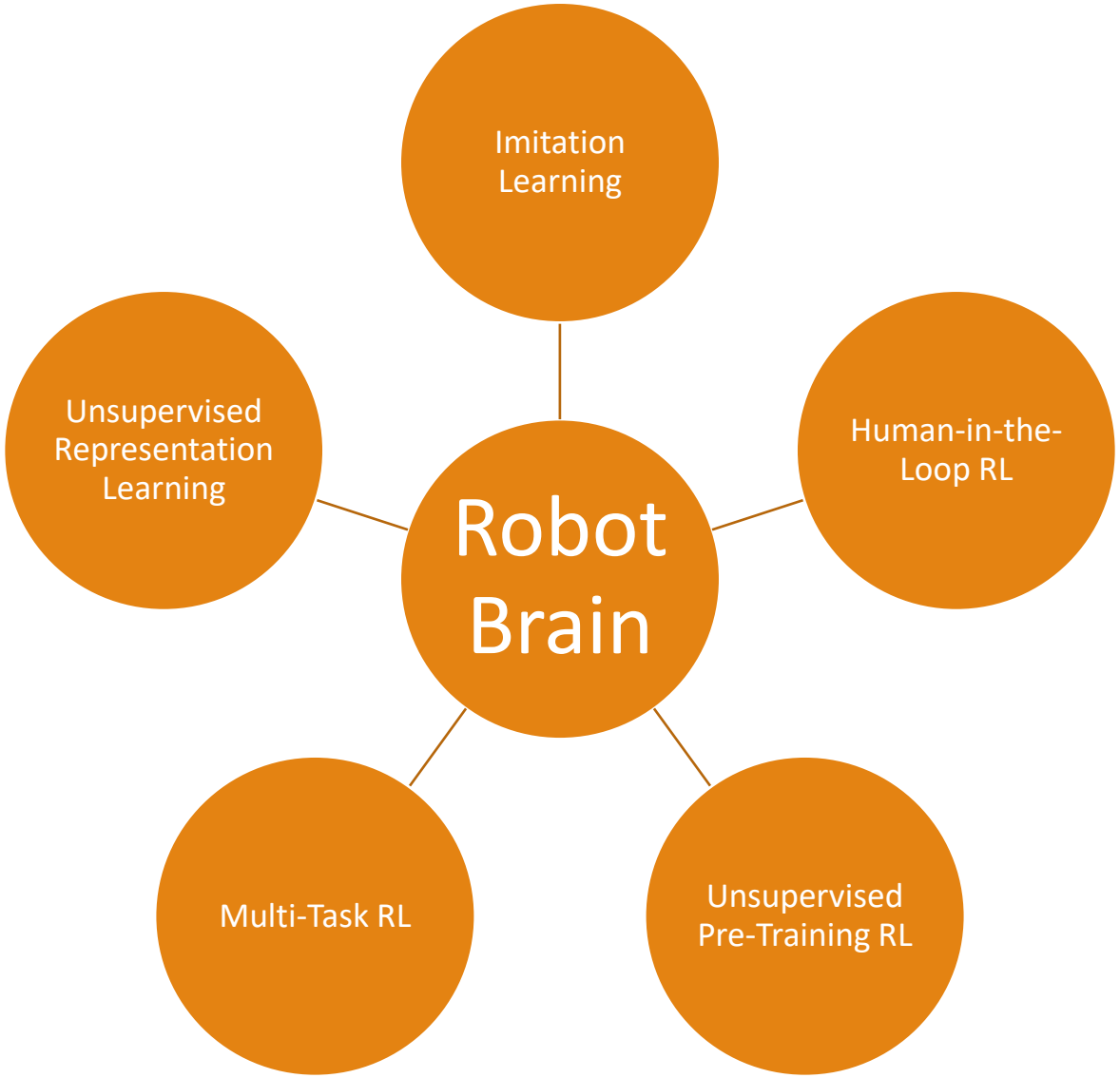
Sound sensor

Tracking sensor

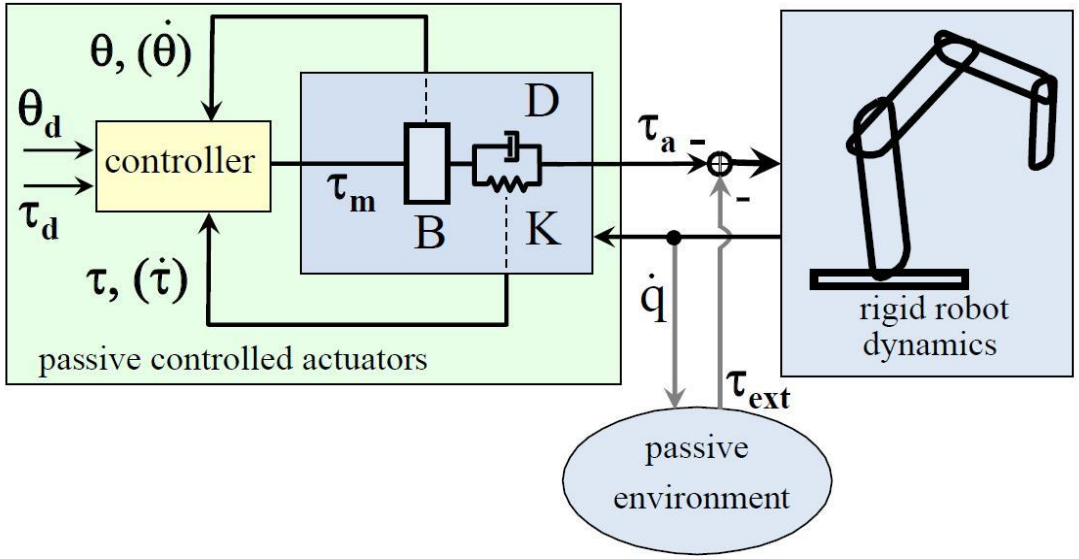
Percepción

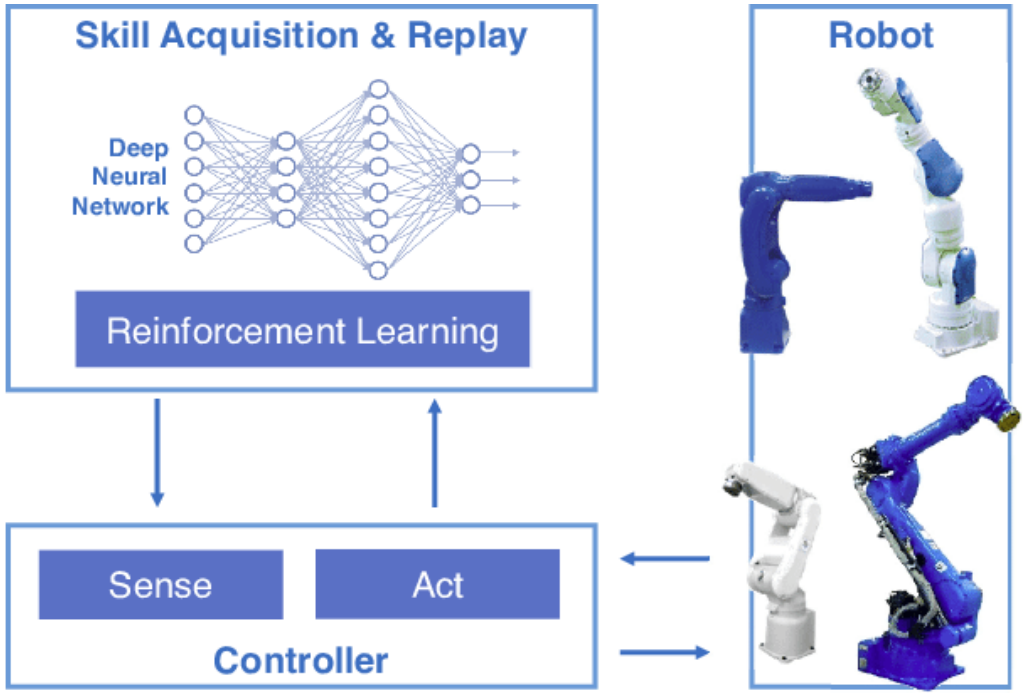

Building
Building
Street light
Building
Other
Store sign
Store sign
Street sign
PENDLETON
Pedestrian
Pedestrian
Vehicle
Vehicle
Vehicle
Vehicle
Vehicle
Sidewalk
Street

Cognición - Aprendizaje



Control - Action





Actuadores

"Classic" DC motor

Geared DC motor

Pneumatic & Hydraulic

Industrial servo

Stepper motor

Entornos

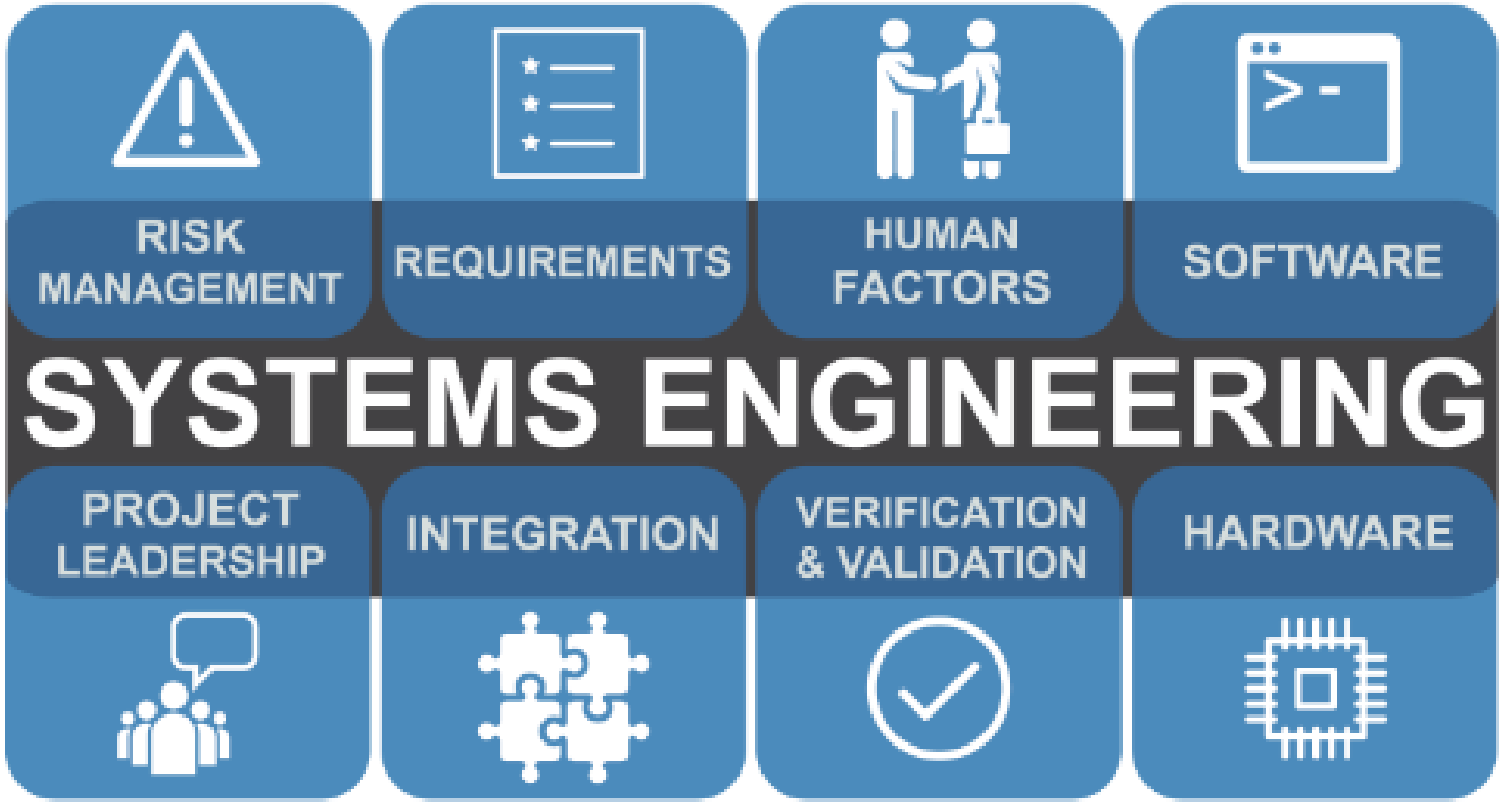
Wheeled Robots

Aerial Robots

Marine Robots

Aproximaciones

Robots son sistemas...



Robots son sistemas mecátronicos

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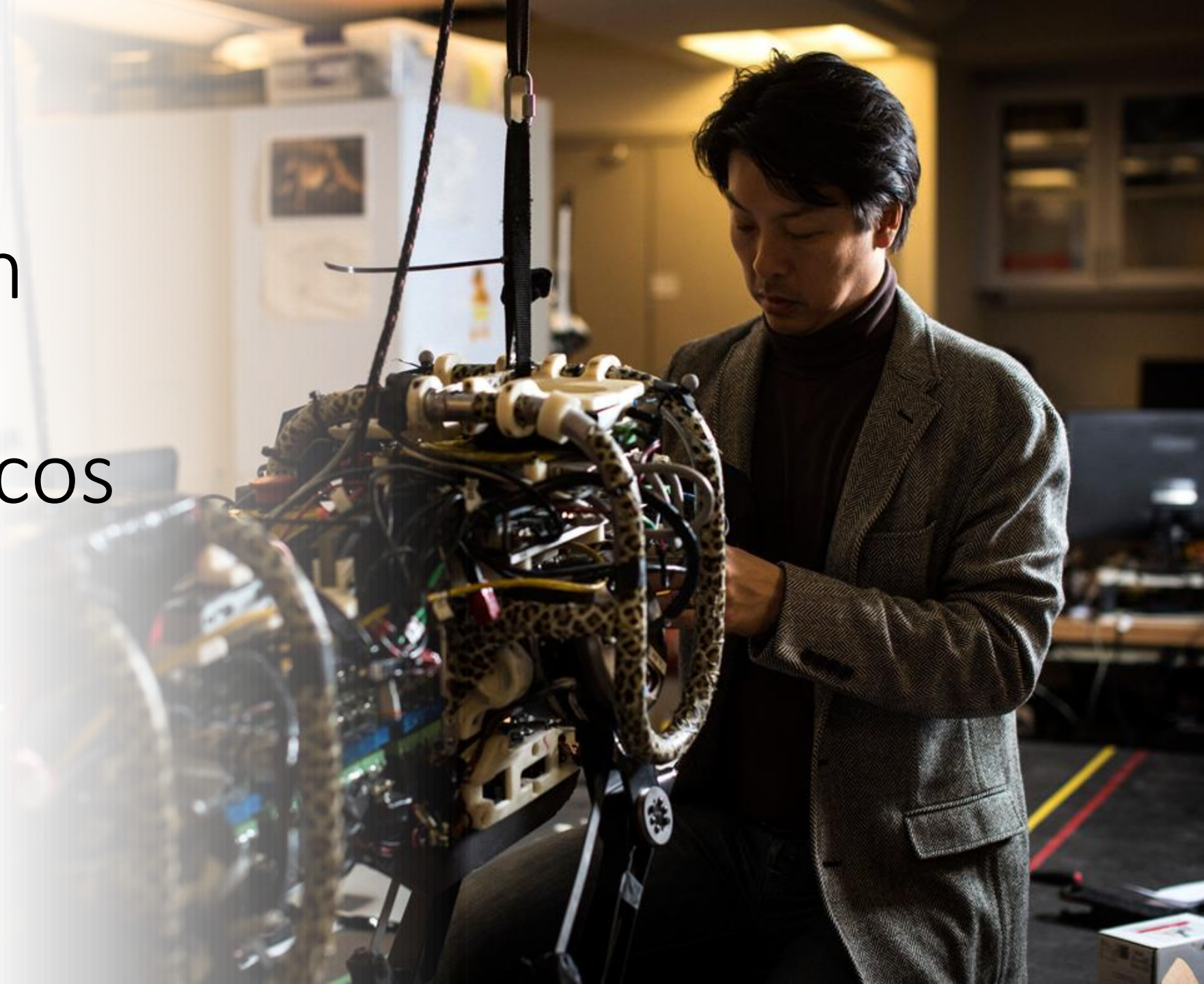
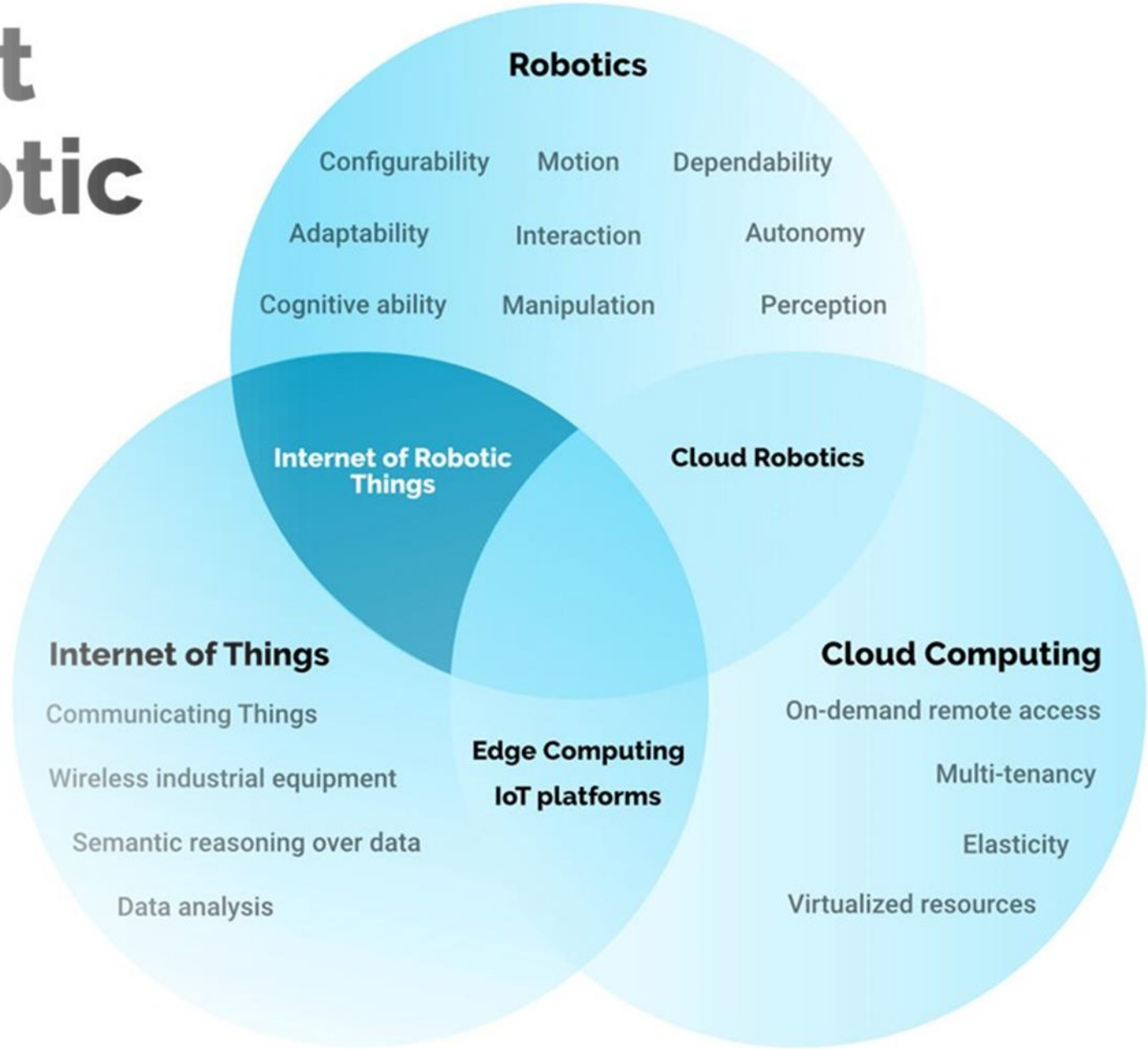


Los robots son sistemas ciber-físicos…



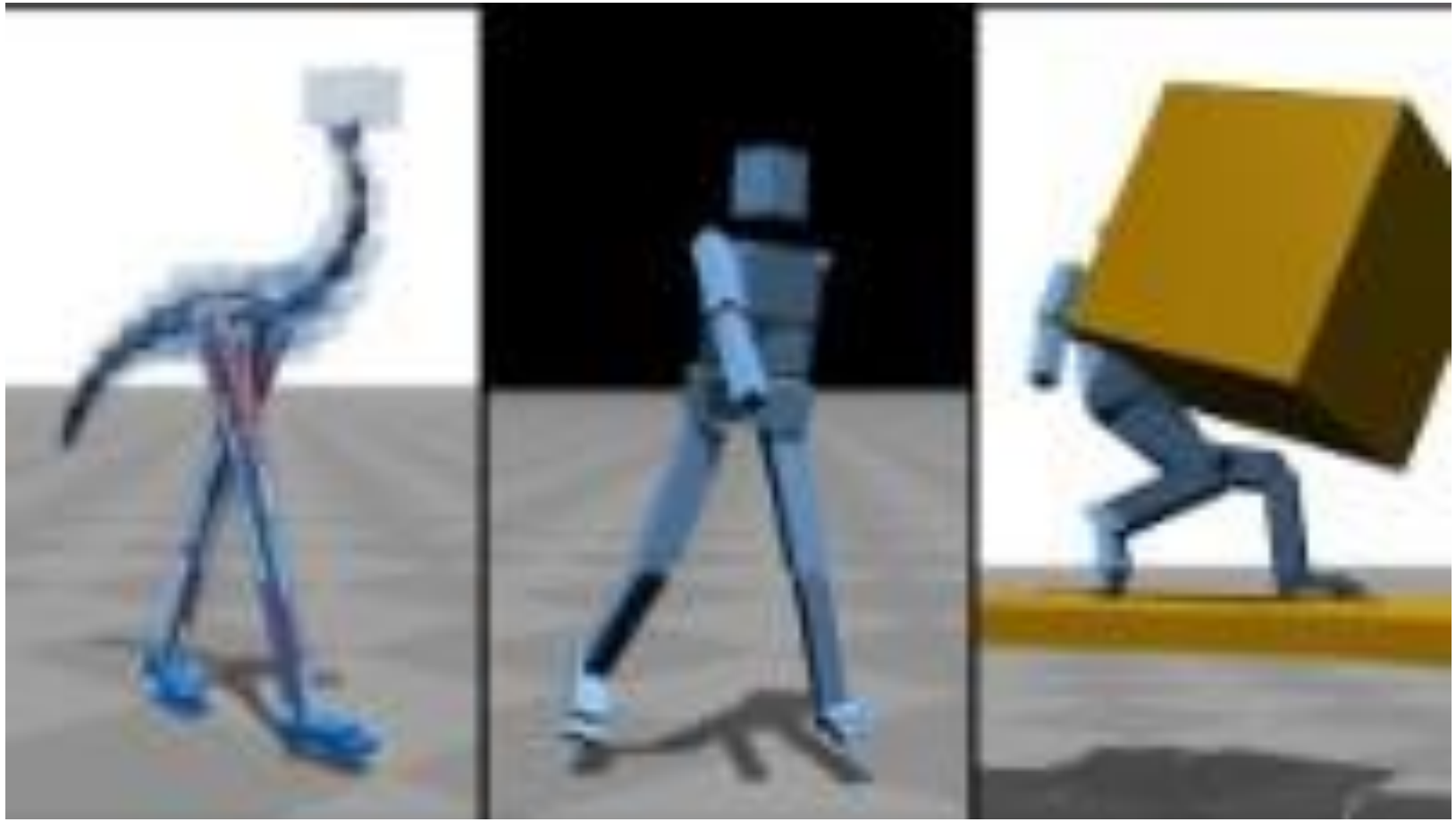
Los robots
son sistemas
inteligentes…

ÁREAS DE INVESTIGACIÓN

Habilidades menores y razonamientos de alto nivel

Habilidades de bajo nivel (Low-level skills)

Bipedal Locomotion

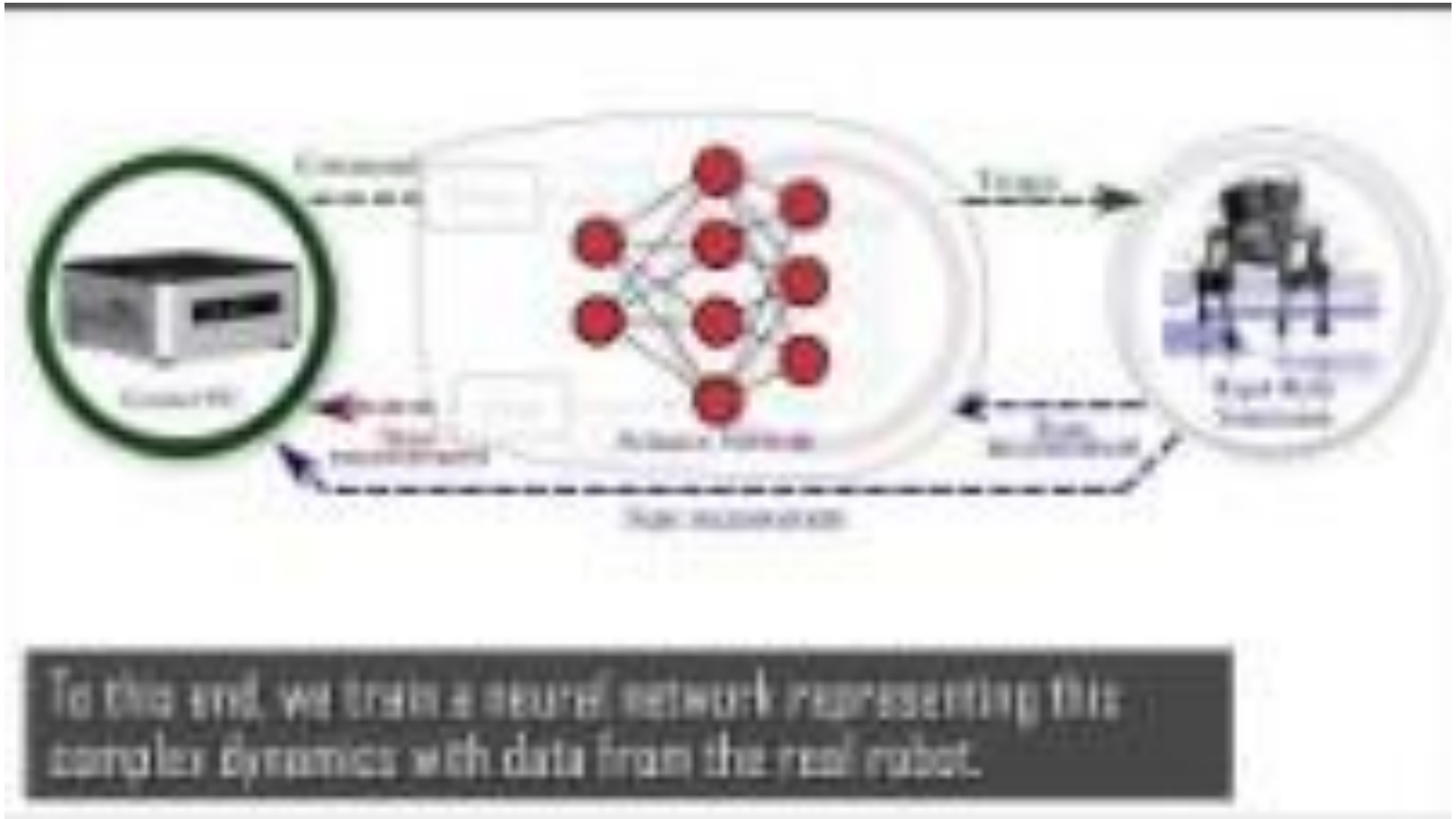


Flexible Muscle-Based Locomotion for Bipedal Creatures

4-Legged Robots – Control

Learning a Contact-Adaptive Controller for Robust, Efficient Legged Locomotion

4-Legged Robots – Aprendizaje



Learning agile and dynamic motor skills for legged robots

Drifting – Control

Locally Weighted Regression Pseudo-Rehearsal for Online Learning of Vehicle Dynamics,

Manipulation

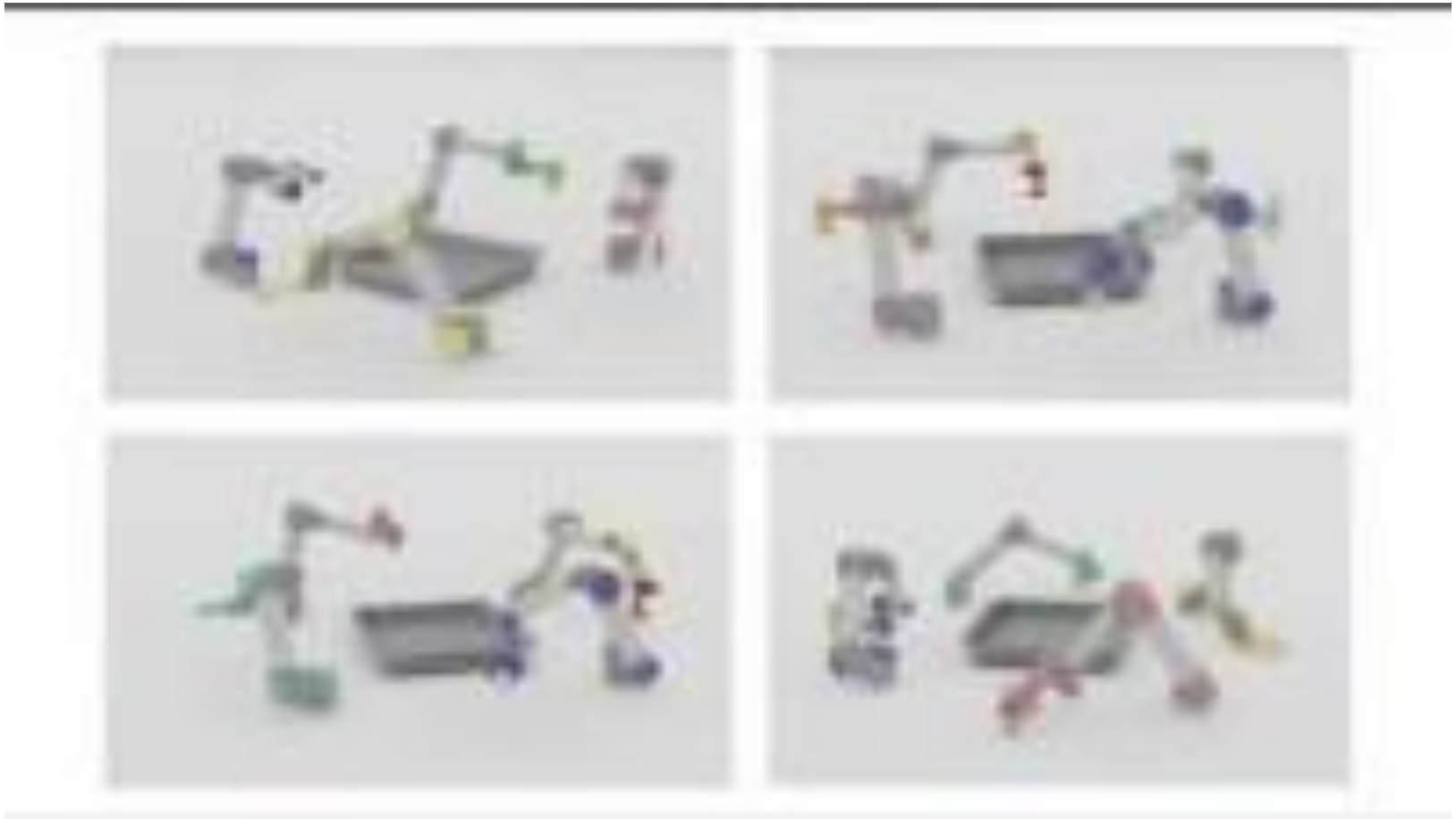
Deep Dynamics Models for Learning Dexterous Manipulation

Sim2Real Transfer

Fast Online Adaptation in Robotics through Meta-Learning Embeddings of Simulated Priors

Razonamiento de Alto nivel (High-level reasoning)

Multi-agent Coordination



Learning a Decentralized Multi-arm Motion Planner

Autonomous Driving

Learning by cheating

Mechanical Search

Visuomotor Mechanical Search: Learning to Retrieve Target Objects in Clutter

Uso de Herramientas

KETO: Learning Keypoint Representations for Tool Manipulation

Navegación

What Should I Do Now? Marrying Reinforcement Learning and Symbolic Planning

Razonamiento a horizontes lejanos

A Long Horizon Planning Framework for Manipulating Rigid Pointcloud Objects

Comportamientos previos (Behavioral Priors)

Parrot: Data-Driven Behavioral Priors for Reinforcement Learning

Industrias

Agricultura

Minería

Salud

Inspección

Industrial Inspection Robot

Defensa