

# Introduction to Artificial Intelligence

## IAI: IG.2410



# ABOUT ME



Universidad  
de **Granada**



UNIVERSITY OF CALIFORNIA  
**SANTA CRUZ**

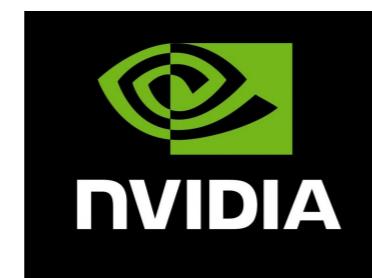


Women Techmakers

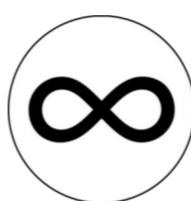


**Google**  
♀

**PHILIPS**



HEIDELBERG  
LAUREATE  
FORUM



Continual **AI**



**SILO.AI**

**STITCH FIX™**



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# Course Logistics

## Schedule

- Target: 2nd Year Ingenieur (35 students 2019).
- Thursdays 13:15-16:15. Salle: L306, @ ISEP (10 rue de Vanves, 92130 Issy les Moulineaux).
- Total: 42h (21 h de cours class magistral, 21h practices (TD). Optional: AI Project.

## Evaluation:

- No exam. Submission of electronic quizzes to be done and understood in class
- Optional:
  - Presenting weekly “Session” exercises during the lectures:
    - Work on it this week and at home, and present it to others in the whiteboard next week to collect extra points!
  - Independent work project
- Can always work in couples, but quizzes submission must be individual

## Tutorials (Both in Gradescope)

- Project 0 (P0): Unix & Python Tutorial Refresher:  
<https://docs.google.com/document/d/1VrJuvq3yNw09qr9NXSrVXovzbj-fT8X4qNkpFdWU9uY/edit?usp=sharing>
- Homework 0 (HW0): Math refresher (next week)

We sympathize with the **code of integrity**: <https://sa.berkeley.edu/conduct/integrity>

# Course Logistics

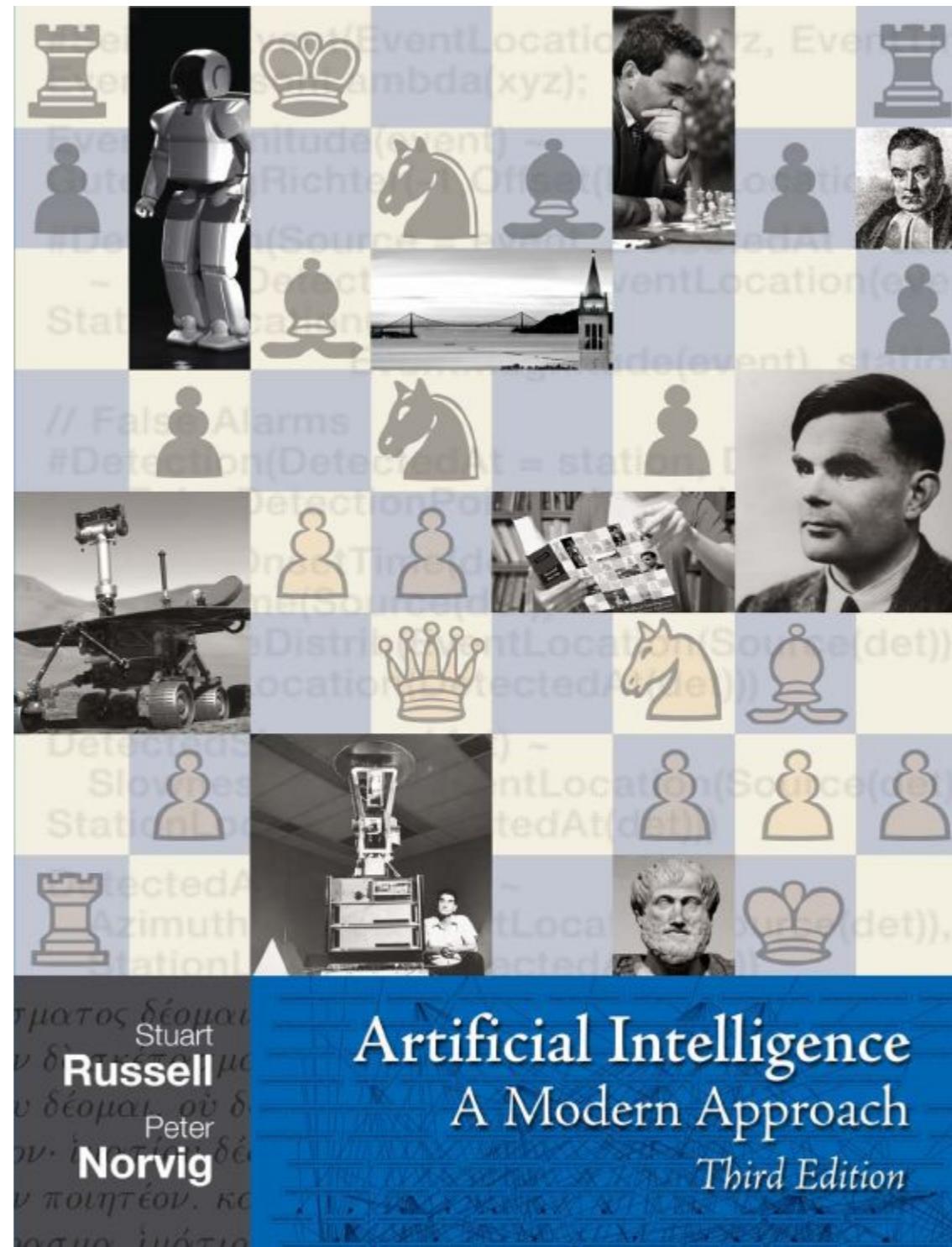
- Laptops in Lectures
  - Can easily distract students behind you
  - Please consider sitting towards the back if using your laptop in lectures

# Course Logistics

## TO-DOS

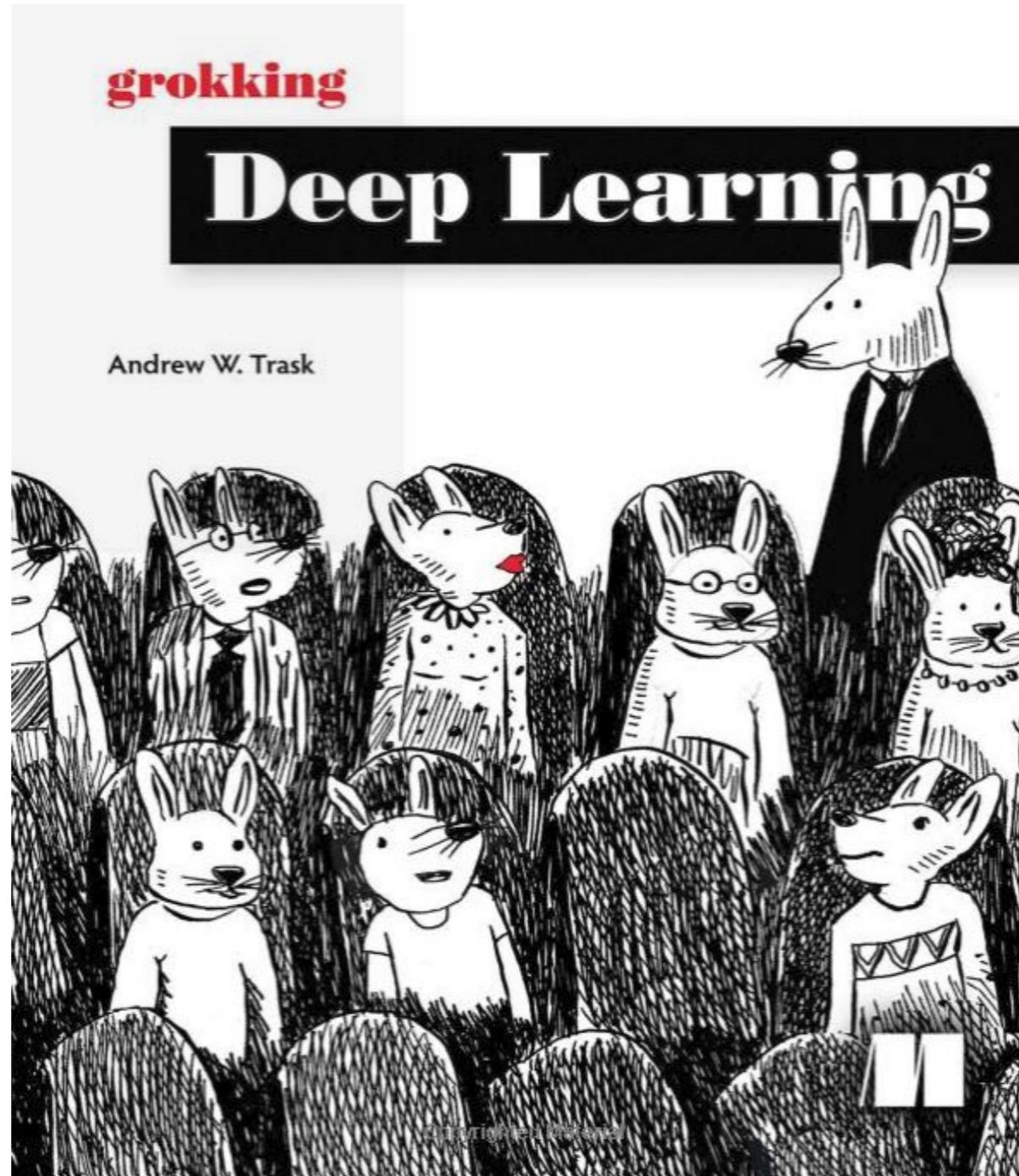
1. Install your favorite editor: Atom, Sublime, EMACS...
2. Gradescope:
  - a. Apply to get an account as student to <https://www.gradescope.com/> using the entry Code: MBKEVK
  - b. Join the course <https://www.gradescope.com/courses/37468>:
  - c. Submit Project 0 (Unix & Python Tutorial Refresher).

# Course Book



Not required, but for students who want to read more, it is available in your library: Stuart Russell & Peter Norvig, AI: A Modern Approach, 3rd Ed.  
<http://aima.cs.berkeley.edu>

# To get the basics of Deep Learning:



Grokking Deep Learning by Andrew Trask: <https://www.manning.com/books/grokking-deep-learning>  
Notebooks: <https://github.com/iamtrask/Grokking-Deep-Learning>

Very recommended to get the basis of deep learning before committing to learn any deep learning framework (basics in numpy).  
Ask me if you want a 40% discounted book

# What to expect?



# Course Logistics

## Course Topics

- Part I: Intelligence from Computation
  - Fast search / planning
  - Constraint satisfaction
  - Adversarial and uncertain search
- Part II: Intelligence from Data
  - Bayes' nets
  - Decision theory
  - Machine learning
- Throughout: Applications
  - Natural language, vision, robotics, games, ...

# Course Logistics

- Not a purely programming course, but rather an algorithms course
- You will learn:
  - General AI techniques for a variety of problem types
  - Learning to recognize when and how a new problem can be solved with an existing technique
  - How to find a good answer?
  - Why deep learning is used?
  - When is complexity an issue?

### **Thomas Bayes**

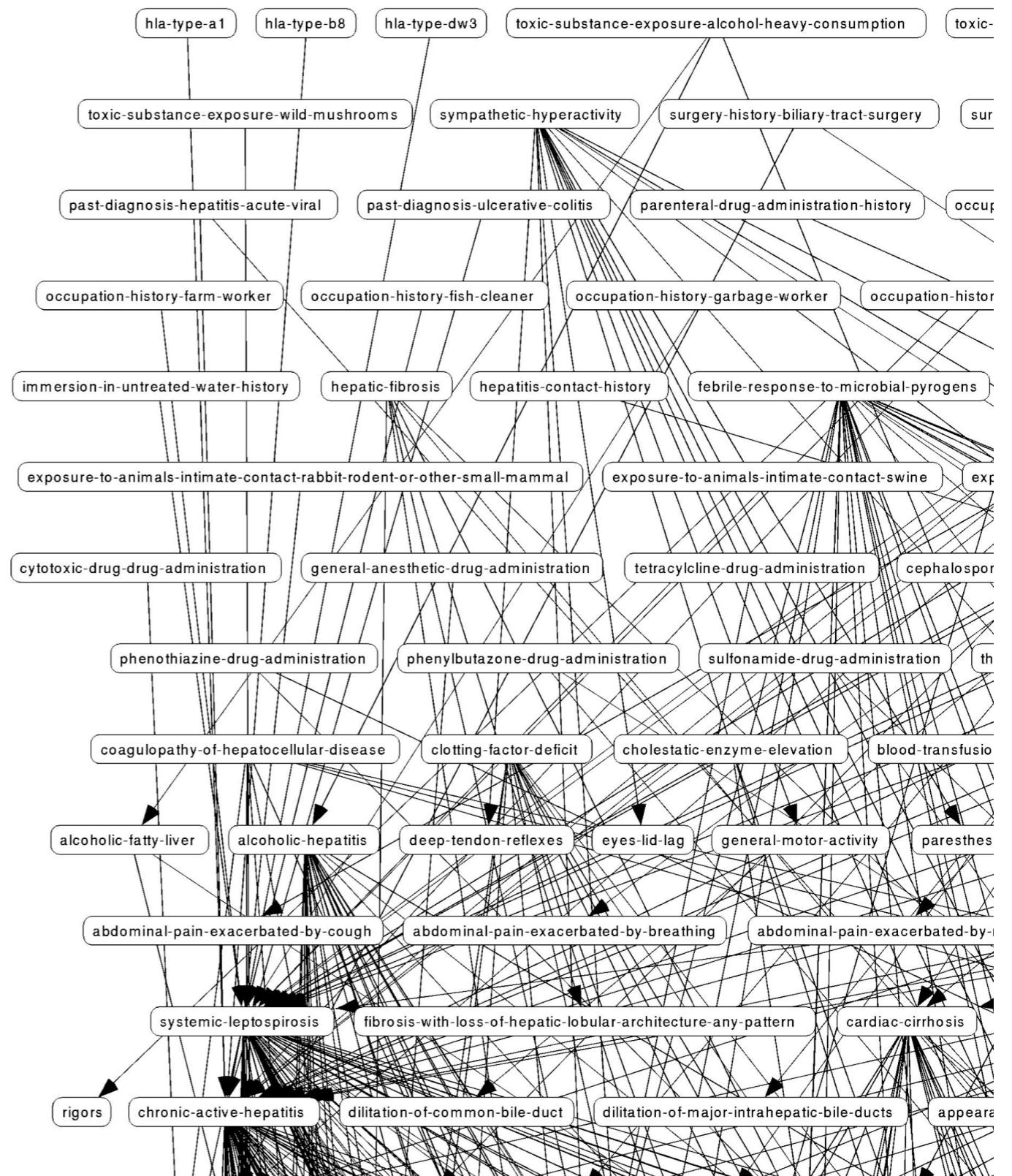
Thomas Bayes (1702--1761), whose ideas about probability as a measure of belief underlie much of modern AI technology



## **Alan Turing (1912-1954)**

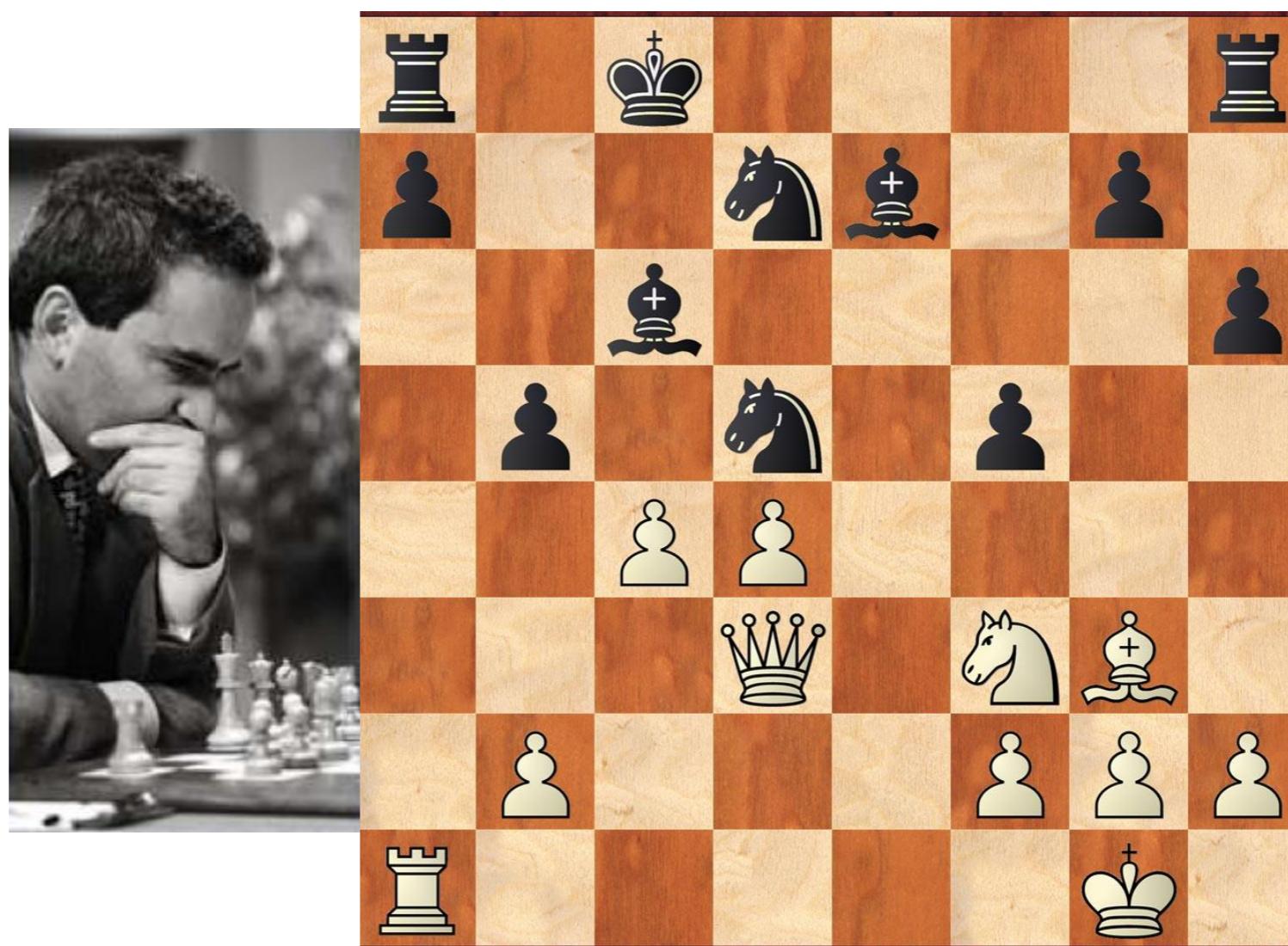
Alan Turing, who described the Turing Test and did fundamental work in Artificial Intelligence and the theory of computation. (Photo from Time Life/Getty.)





## Part of the CPSC medical diagnostic expert system (1993)

## The Final Position from Game 6 of Kasparov vs. Deep Blue, 1997



# **AI in Real Life**

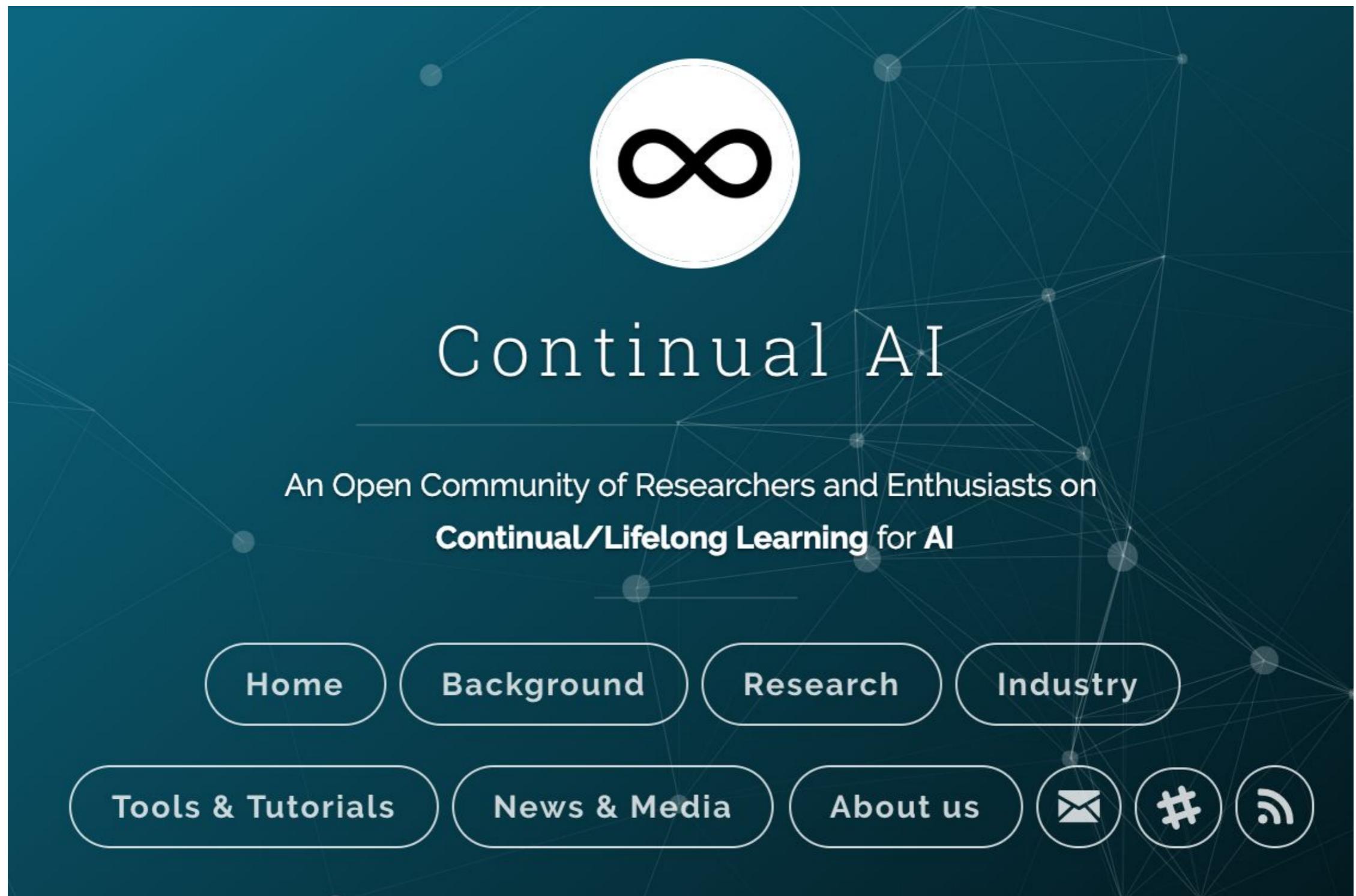
# AI in Real Life

- State of the art
- Current projects at ENSTA ParisTech
- PFE/Internship positions available
  - Send single pdf with CV+grades

# AI in Real Life



# AI in Real Life: ContinualAI.org



The image shows the homepage of the ContinualAI.org website. The background is a dark teal color with a faint, light-colored network graph overlay. At the top center is a white circle containing a black infinity symbol. Below it, the word "Continual" is written in a large, white, sans-serif font, followed by "AI" in a slightly smaller size. Underneath this, a subtitle reads "An Open Community of Researchers and Enthusiasts on Continual/Lifelong Learning for AI". At the bottom, there are two rows of white, rounded rectangular buttons. The top row contains four buttons labeled "Home", "Background", "Research", and "Industry". The bottom row contains three buttons labeled "Tools & Tutorials", "News & Media", and "About us", followed by three circular icons with symbols: an envelope, a hashtag, and a Wi-Fi signal.

An Open Community of Researchers and Enthusiasts on  
**Continual/Lifelong Learning for AI**

Home      Background      Research      Industry

Tools & Tutorials      News & Media      About us

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# AI in Real Life: lazarilloproject.github.io

Lazarillo Project

LEADERBOARD

CONTRIBUTORS

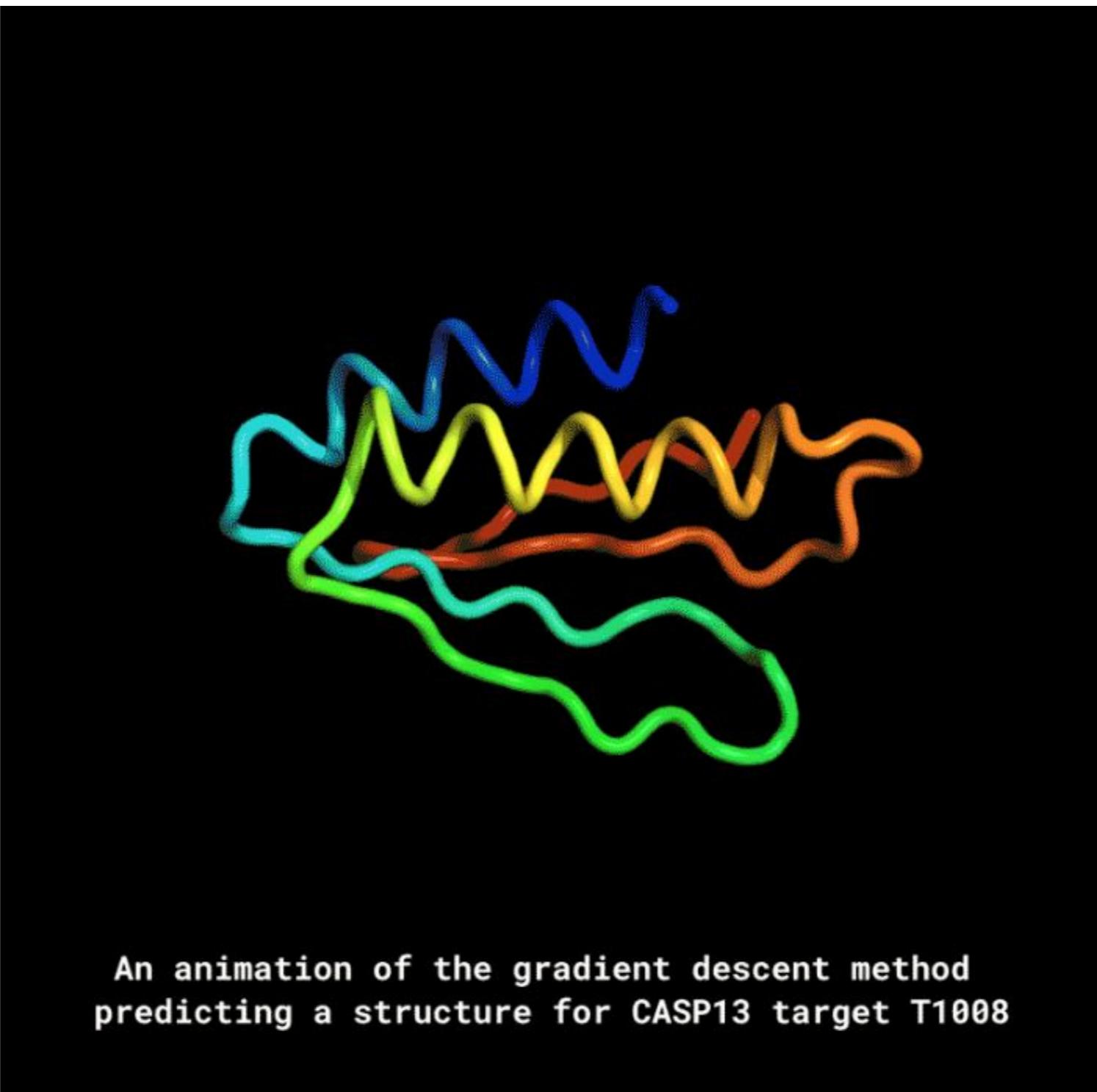


## Objective of Lazarillo Project

The aim is building, annotating and create a dataset, the “ImageNet” for the blind, i.e., a dataset of images taken from a wearable camera (or phone if preferred) by visually impaired people, that can later facilitate image captioning and question answering to help them be more independent in their daily lives. The aim of project Lazarillo is developing this mobile application that has as end-user the visually impaired.

Once enough data has been collected, the application will help describe, with text or speech, the surroundings to the blind person, in the most needed times, or in most beautiful moments. We think people who can benefit the most from AI are people with special needs, and that is the motivation to build datasets and models that can make cities more visible simply by touching a button of a wearable camera or phone. Its activation will translate the scene into a vocal description, helping to give the blind person context about the environment around him, or even answer questions posed by the user.

# AI in Real Life: AlphaFold



An animation of the gradient descent method  
predicting a structure for CASP13 target T1008

Protein folding algorithms outperforming many well-known pharmaceutical companies (DeepMind)  
<https://deepmind.com/blog/alphafold/>

# AI in Real Life: Ethics

≡ TIME

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HEALTH • SEX

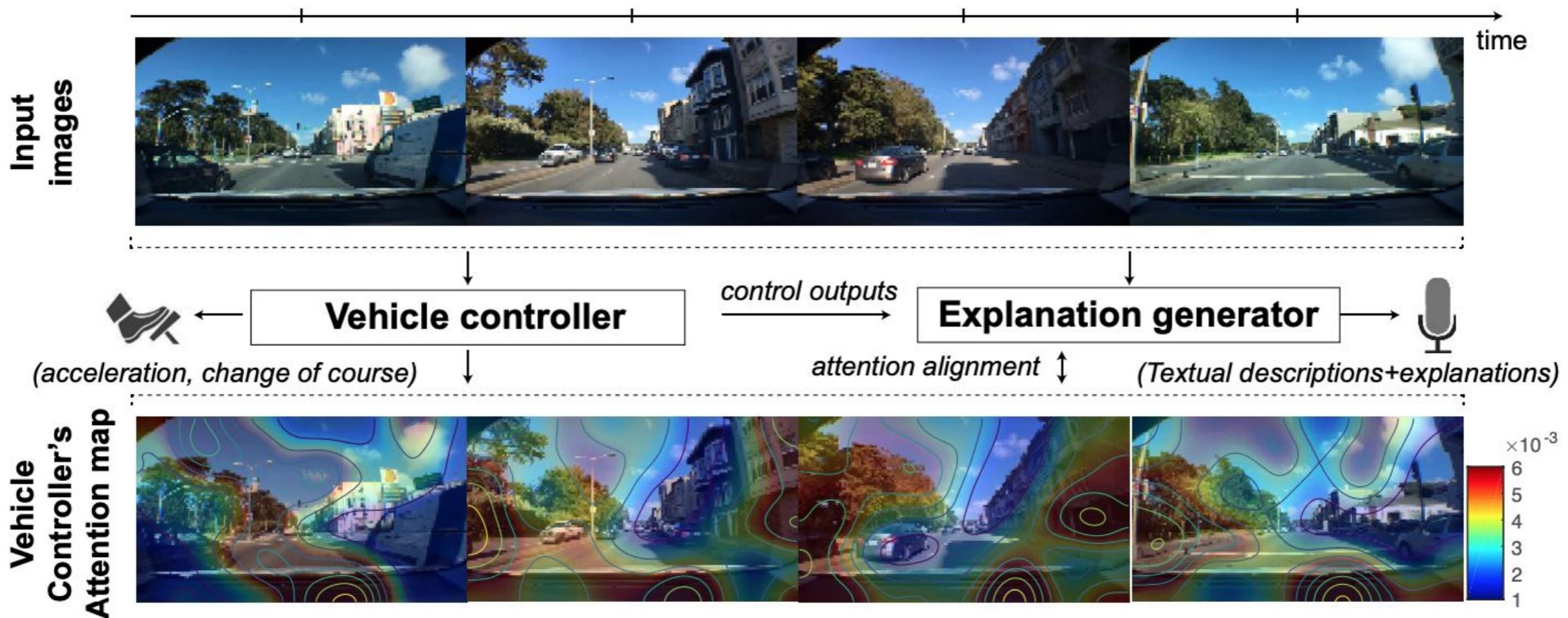
## Condoms That Change Color In Contact with STD Win Tech Award



# AI in Real Life

- Human explanations, Berkeley DeepDrive eXplanation ([BDDX](#)) dataset for explainable-deep-driving.

J. Kim, A. Rohrbach, T. Darrell, J. Canny, Z. Akata



*Example of textual descriptions + explanations:*

**Ours:** “The car is driving forward + because there are no other cars in its lane”

**Human annotator:** “The car heads down the street + because the street is clear.”

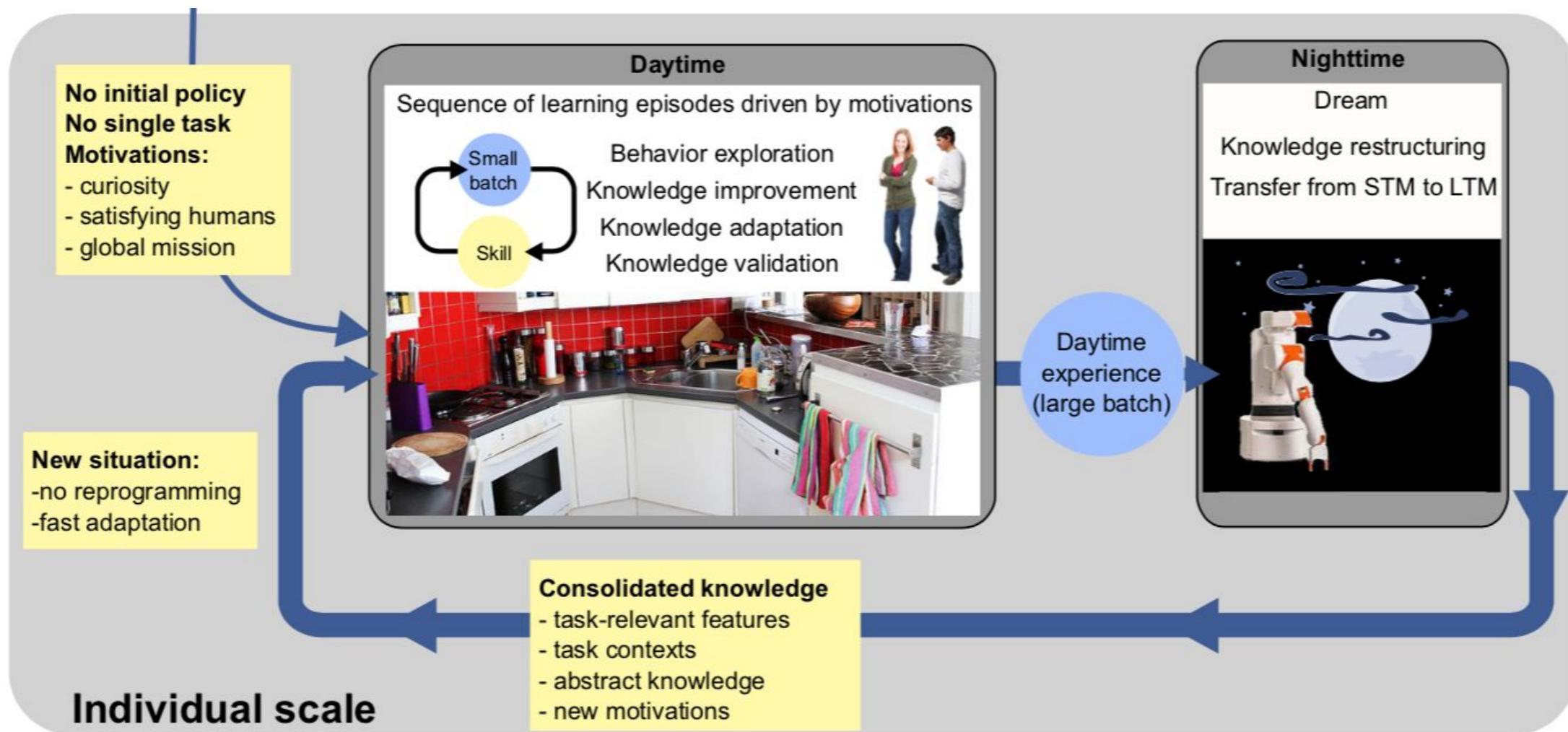
# DREAM Project:

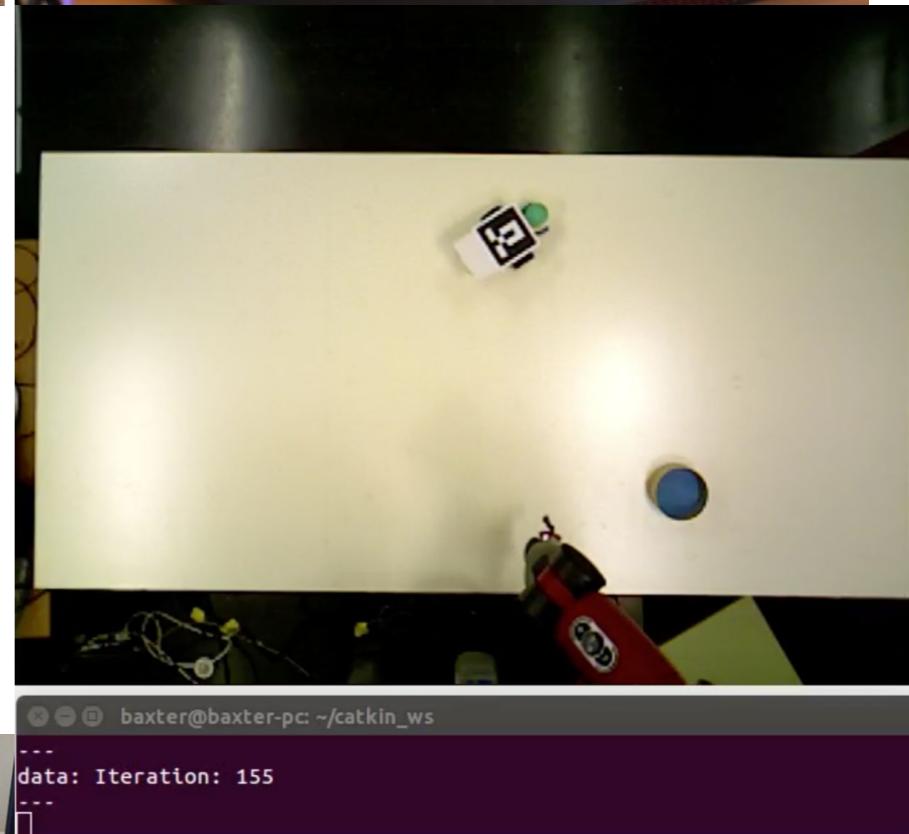


Rethink robotics' Baxter

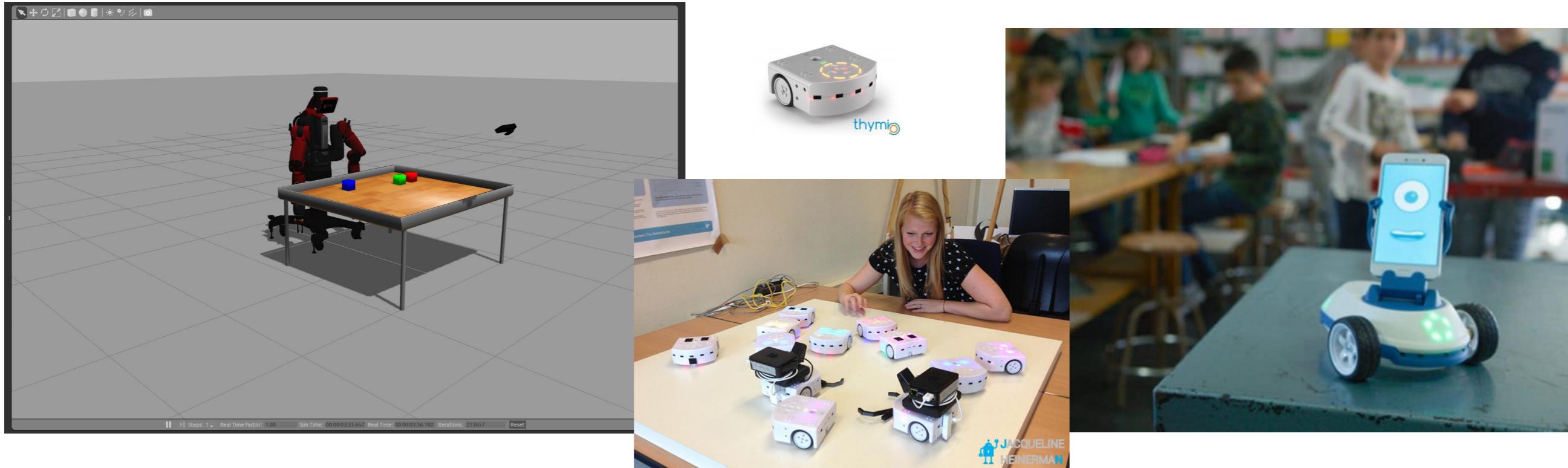


- Learning and adapting in open-ended domains
- Knowledge compression, consolidation, and transfer
- Artificial curiosity and representation redescription





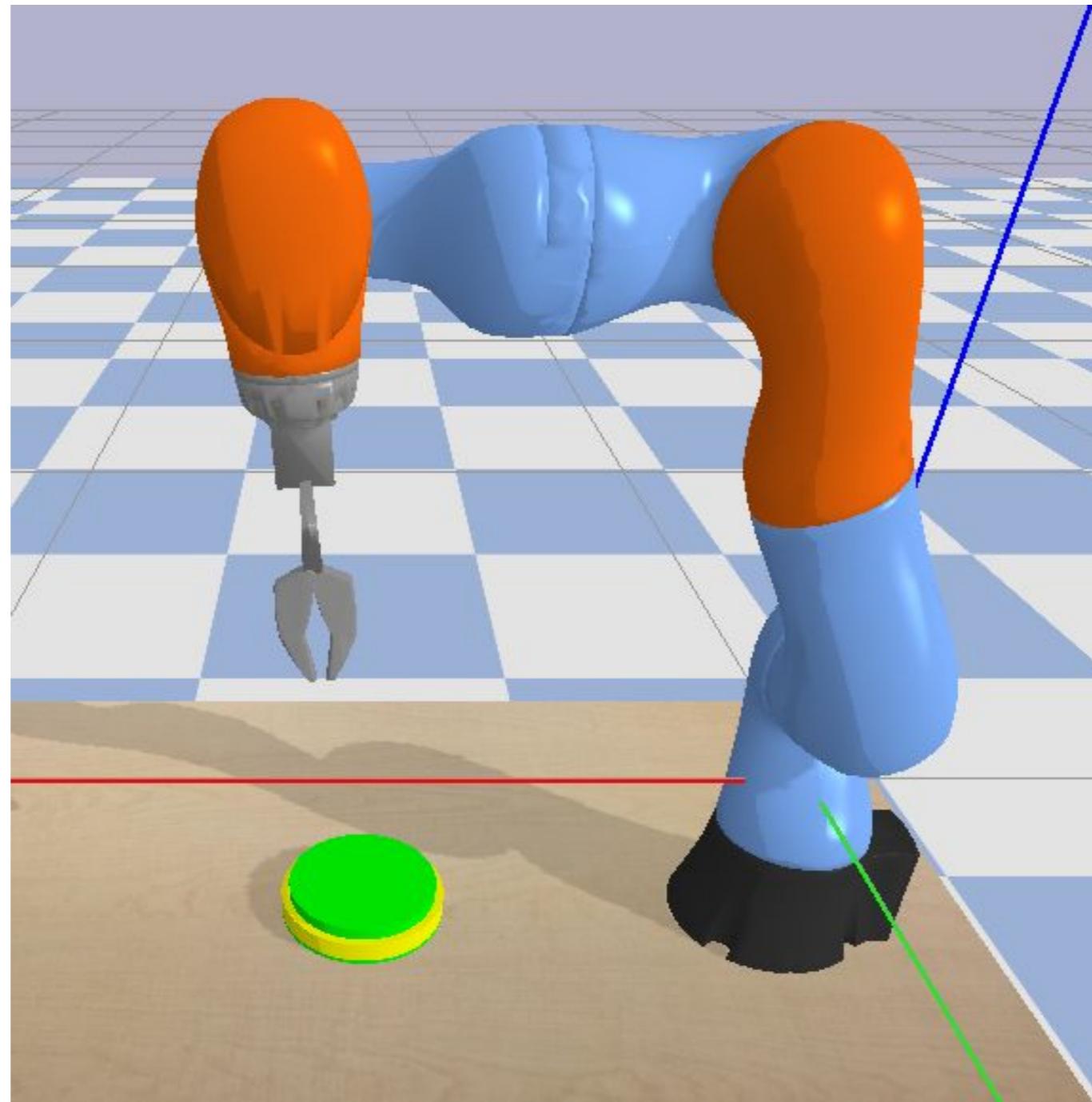
# Baxter, Thymios and Robobo within [www.robotsthatdream.eu](http://www.robotsthatdream.eu) project



IDEA: Getting the robot to perform different tasks without the need to change its program.

# S-RL Toolbox: SRL for RL in Robotics

<https://www.youtube.com/watch?v=qNsHMklsqJc&feature=youtu.be>



## Other projects



- Learning to drive with SRL?
  - Problems: Autonomous boats, wave detection: larger dimensionality-related states
- Can it be done in a unique space or in a blended one?
  - If blended, how and when to merge state spaces?



# Homework this week: Python Refresher (Project 0)

- <https://docs.google.com/document/d/1VrJuvq3yNw09qr9NXSrVXovzbj-fT8X4qNkpFdWU9uY/edit?usp=sharing>
- Submit to Gradescope before next week class starts.
- Next week practical: Math refresher (Homework HW0)



# You want to read more? [Feb'2019]

## AAAI Conference Report

### Most-cited scholars over time

