

*Master AI-Vic*

# **Artificial Intelligence & Advanced Visual Computing**

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## **Intelligent Systems operating on their own**

- To achieve challenging tasks : decision, creation...
- Based on two complementary approaches
  - Modeling knowledge & reasoning mechanisms
  - Learning from examples

Deep learning, Reinforcement learning

## **At the fence between Computer Science and Applied Math**

- Need for excellent students (X, ENS, foreign universities)
- With both theoretical & *strong programming backgrounds*

# Artificial Intelligence...

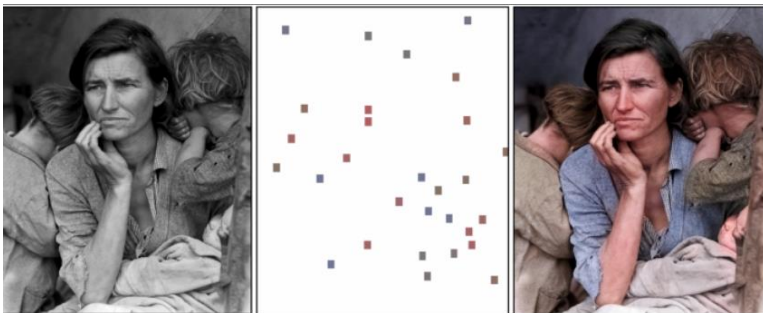
## Coupling with Visual Computing

### Master in Computer Science (stepping away from MVA)

- Combination of a priori knowledge & machine learning
- Verification of rules, proofs of convergence...

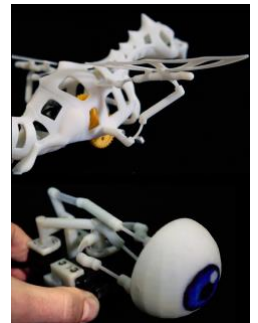
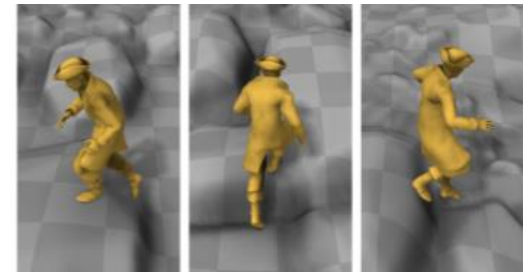
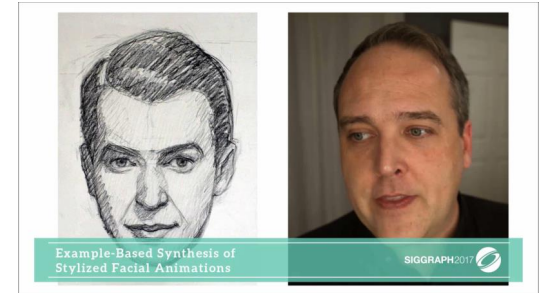
### Visual Computing : Processing multimedia contents

- Analyzing & editing masses of online contents (sound, video, 3D)
- Great domains to illustrate AI methods!
- Brings challenges (editing tasks) & solutions (artificial examples)



## Examples of applications

- Processing audio-visual contents
  - Select & edit media (education, culture)
- Controlling vehicles & drones
  - Adapting to dynamic environment + obeying specified rules
- Synthesizing virtual actors
  - Communication, serious games, movies
- Designing, fabricating, controlling soft robots
  - From personal assistance to micro-surgery
- Data analysis in high dimension + statistical learning
  - Decision making for finance, banking, insurance...



AI-Vic

## Year 1 : curriculum

# Artificial Intelligence & Advanced Visual Computing

**Based on track "Images, vision et apprentissage" in third year at I'X**

September – December :

Machine Learning I (INF554)

Constraint-based Modeling and Algorithms for Decision Making Problems (INF555)

+ *two courses among* :

- Digital representation (INF574)
- Signal Processing (MAP555)
- Image Analysis (INF573)

January – March:

Machine Learning II (MAP569)

Algorithmic geometry (INF562)

Computer animation (INF585)

Image synthesis (INF584) or Statistics in action (MAP566)

April – August:

Long-term internship



## Year 2 : curriculum

# Artificial Intelligence & Advanced Visual Computing

September : Refreshers (Statistic or Informatic)

September – December :

Deep learning

Data analysis: topology in high dimensions

Computer vision, images & video processing

Advanced 3D graphics: smart geometry

Natural language and speech processing

January – March:

Reinforcement learning

Socio-emotional embodied conversational agents

Immersion and interaction with virtual worlds

Robot motion planning, verification and control of hybrid systems

Soft robots: simulation, fabrication, and control



## Year 2 : curriculum

# Artificial Intelligence & Advanced Visual Computing

Weekly seminar : Law, ethics & recent technical advances

- Key-note talks from both institutional and industrial partners.

A long project :

- Industrial partners can propose real-world subjects
- Students will work on these from September to February (one day per week)
- Restitution in front of the companies and the professors of the program.

Long-term internship (starting in april)

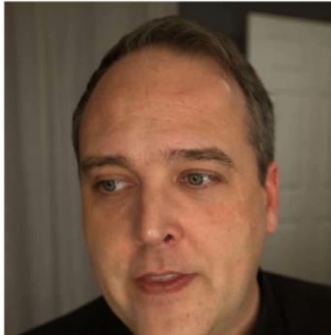
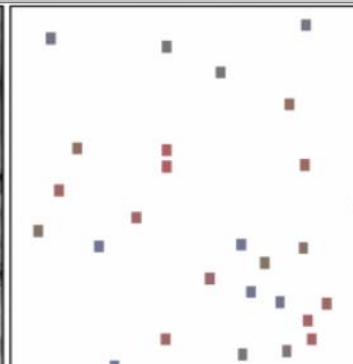
- 6 months in a research lab (either in public institutions or private companies)



AI-VIS

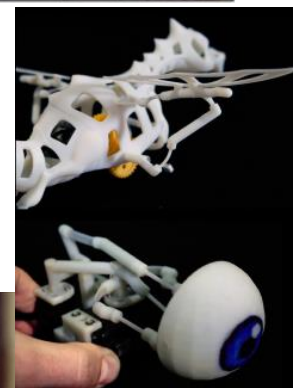
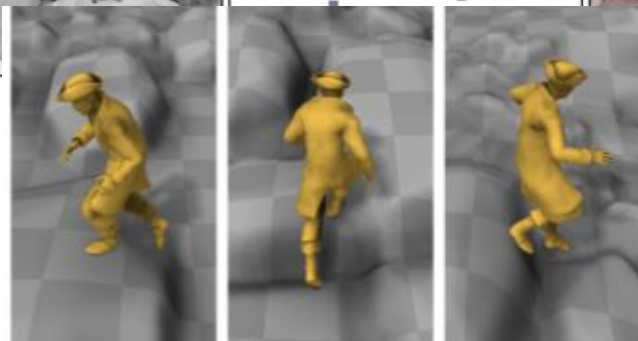
# Artificial Intelligence & Advanced Visual Computing

## Siggraph & Siggraph Asia 2017



Example-Based Synthesis of Stylized Facial Animations

SIGGRAPH2017



Synthesizing Obama: Learning Lip Sync from Audio SIGGRAPH2017



## Career outcomes

# Artificial Intelligence & Advanced Visual Computing

Upon graduation, students are expected to pursue with a PhD thesis or to join a company directly. Here is a non-exhaustive list of industries that are interested in the profile of students in AI:

- [Digital applications for smartphones, computers, or personal assistants](#) (Google, Facebook, Shazam, Apple, Snap);
- [Control of autonomous vehicles, drones and robots](#) (Valeo, Audi, Google, BMW);
- [Virtual reality, image & video editing, design and simulation of 3D virtual worlds](#) (Ubisoft, Dassault systems, Microsoft, Adobe, Sony, Nintendo)
- [E-commerce and online advertisement](#) (Criteo, Amazon, Google, Teads, Cdiscount, FNAC, eBay)
- [Financial, banking and insurance sector](#) (BNP Paribas, Société Générale, Barclays, HSBC, AXA).

++ Many start-ups not listed here.

**Deadlines for application procedure :**

**May 6, 2018**

**on**

**<https://portail.polytechnique.edu/graduatedegree/master/artificial-intelligence-advanced-visual-computing>**

**More information on the scientific content :**

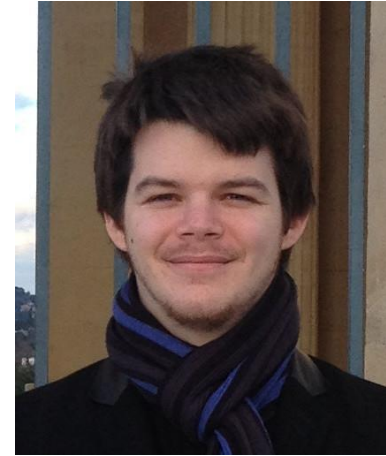
**<http://www.lix.polytechnique.fr/Labo/Marie-Paule.Cani/MasterAI/doku.php?id=curriculum>**

### Contact

For questions regarding the scientific content :

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For questions regarding the application process :

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