Overview of Artificial Intelligence (AI) at NASA Goddard

Jacqueline Le Moigne

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What is Artificial Intelligence?

A few definitions:

- **Artificial Intelligence (AI)** covers the development of the framework and of the technologies that enable a machine to perceive, reason, plan, act and learn both rationally and humanly.
- **Machine Learning (ML)** covers the sub-field of AI dealing with a machine capable of learning rationally and humanly.
- **Deep Learning (DL)** is a sub-field of Machine Learning dealing with very large Artificial Neural Networks including larger numbers of layers and of neurons, trained with massive amounts of data.

From Terry Fong “Autonomy NASA Capability Leadership Team (CLT) Internal NASA Presentation”, Aug. 2018
Artificial Intelligence and Machine Learning


AI Strategy for NASA Applications at Goddard

- **Hardware and Software Infrastructure**
  - HW and SW Infrastructure
  - Novel HW investigation, e.g., Quantum and Neuromorphic Computing
  - Fast Access to Large Amounts of Data

- **AI Algorithm Development and Onboard Implementations**
  - AI Expertise
  - Conceptual Software & Algorithm Development
  - Onboard Implementations

- **Science Applications and Big Data Analytics**
  - Science Applications and Data Analytics
  - Algorithm Relevance and Validation
Business Insider: “Facebook’s chief scientist says that Silicon Valley needs to work more closely with academia to build the future of Artificial Intelligence”

- Facebook’s chief AI scientist, Yann LeCun, says that letting AI experts split their time between academia and industry is helping drive innovation.

- Writing for Business Insider, the executive and NYU professor argues that the dual-affiliation model Facebook uses boosts individual researchers and the industry at large.

- A similar model has historically been practiced in other industries, from law to medicine.

# Today’s Tour

<table>
<thead>
<tr>
<th>Time</th>
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| 1:30-2:50 p.m.  | Overview of AI at Goddard  
Jacqueline Le Moigne, assistant chief for technology, Software Engineering Division, NASA Goddard  
Detecting Wildfires in MODIS Data Using Deep Neural Networks  
James MacKinnon, computer engineer, NASA  
Virtual Reality for Science Applications  
Thomas G. Grubb, AR/VR product development lead, NASA |
| 2:50-3:05 p.m.  | Travel to Building 28                                               |
| 3:05-4:10 p.m.  | A Look at Learning in Earth Sciences  
Craig Pelissier, computational scientist, NASA  
Science Data Visualization  
Horace Mitchell, head, Scientific Visualization Studio, NASA; Craig Pelissier, computational scientist, NASA; Lori Perkins, computer engineer, Scientific Visualization Studio, NASA |
| 4:10-4:20 p.m.  | Travel to Building 29                                               |
| 4:20-4:45 p.m.  | Autonomous and Tele-Robotics for Satellite Servicing  
Brian Roberts, robotic technologist, Satellite Servicing Projects Division, NASA |
| 4:45-5:45 p.m.  | Depart NASA and head to the National Press Club                   |