Vision 2020+
New company setup

Operating Companies

Siemens Mobility
Smart Infrastructure
Digital Industries
Gas and Power*

Strategic Companies

Siemens Gamesa*
Siemens Healthineers

Service Companies (Financial Services, Global Business Services, Real Estate Services)

Corporate Development (e.g., IoT Services, Corporate Technology, Next47, Portfolio Companies)

Governance units

*Partial spinoff of Siemens Energy planned; transfer of majority stake in SGRE (67%) to new company planned
The focus areas of our research and development

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<th>Additive manufacturing</th>
<th>Autonomous robotics</th>
<th>Blockchain applications</th>
<th>Connected (e)mobility</th>
<th>Connectivity and Edge</th>
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<td>Cybersecurity</td>
<td>Data analytics, artificial intelligence</td>
<td>Distributed energy systems</td>
<td>Energy storage</td>
<td>Future of automation</td>
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<td>Materials</td>
<td>Power electronics</td>
<td>Simulation and digital twin</td>
<td>Software systems and processes</td>
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Research and Development in Digitalization and Automation
AI at Siemens wt 200+ researchers and many BU colleagues

Connectivity and Edge Devices
Devices become intelligent and connected

Data Analytics and Artificial Intelligence
Making automated decisions

Software Systems and Processes
Managing the SW Life-cycle

Simulation and Digital Twin
Expanding the Digital Twin

Future of Automation
From automated towards autonomous systems

Autonomous Robotics
Controlling pervasive robotics

Connected (e)Mobility
Mobility is electric, connected, autonomous

Blockchain Applications
Recording Transactions

Cybersecurity
Enabling Digitalization
AI is deployed in a broad range of use cases across verticals

- Optimize & Analyze processing time and quality
- Teaching trams to drive autonomously
- Increase profitability of 3D printing
- Robust Gas Turbine Control
Use cases with flexible deployment scenarios

- **Device**
  
  ML & distributed analytics – intelligent grid controller

- **Edge**
  
  Teaching trams to drive autonomously

- **Cloud**
  
  Online simulation during operation

- **Cloud/Edge**
  
  Optimize operation of gas turbines (< 15-20% NOx)

- **Data Center**
  
  Subways learn to adapt to delays and to operate energy efficient

- **Edge**
  
  Robots solve handling tasks independently

- **Device**
  
  Telescopic buffer system

- **Cloud/Edge**
  
  Availability guarantee for train service

- **Cloud/Edge**
  
  Detect, track, classify and count vehicles.

- **Cloud**
  
  Robots solve handling tasks independently
Research Trends and Challenges in AI & Deep Learning
Capturing all complexity and the unknown unknowns

AI & Data Scarcity
Deal with insufficient and unlabeled data?

Directions:
- Active & Transfer learning
- Learn from rich simulations
- Learn generative models
- Prior knowledge induction
- Industry embeddings model

AI & Companion
How to augment and who supports whom?

Directions:
- Models of people & tasks
- Model of complementarily
- Process digitize + automate
- Context-aware decisions
- Multi-modal interaction

AI & Society
Provide explain- and responsibility?

Directions:
- Trust and safety
- Fairness and transparency
- Ethical / legal autonomy
- Jobs and economy
- Explainable models

AI & Open World
Reliable predictions of unknown unknowns?

Directions:
- Expanded real-world testing
- Algorithmic + API portfolios
- Failsafe designs
- Robustness + Trustworthy
- Merging sim + real world

Eric Horvitz: AI, People, and the Open World, ACM 2017
Lakkaraju et al: Identifying Unknown Unknowns in the Open World: Representations and Policies for Guided Exploration, AAAI 2017
The Siemens AI Residency Program

Topic Sweetspot
- Significant Siemens Problem
- Radical Solution
- Breakthrough Technology

<Technology} for {Application}>

Project Setup
- Duration: 6-12 months
- Location: Siemens AI Lab

Project Mentor
- Topic ownership
- AI Lab representation
- Use case validation
- BU alignment

Research Lead
- Post-doc position
- Full-time @ AI Lab
- Expert qualification
- Application-minded

Students
PhDs

AI Lab
Community
- Enablers
- Universities
- Startups

Goals & Output
Direct validation of applied research within 12 months:
- BU attention with pitch opportunities
- Research publications
- Patents
- Demonstrators

Let’s solve fundamental problems for fundamental impact.
The Siemens AI Residency Program

TRUSTWORTHY PREDICTIONS IN DYNAMIC ENVIRONMENTS

AUTOMATED CONFIGURATION OF PERCEPTION SYSTEMS

CONTINUOUS LEARNING WITH NEUROMORPHIC AI

How certain is the model?

- Availability of necessary objects
- Object positions