Jeff Bigham  |  Associate Professor

**Crowd-Powered Conversational Assistants**
- Creating robust dialog systems using on-demand human computation
- Crowd-powered assistants that automate themselves over time

**Tools for Crowd Workers**
- Applying AI to amplify workers abilities, and help workers improve their skills and earnings

**Dyslexia Detection and Intervention**
- Using linguistics and human-computer interaction measures to detect dyslexia
- Building tools that help people with dyslexia read and write better

**Website**  ➤  http://www.cs.cmu.edu/~jbigham/

Yonatan Bisk  |  Assistant Professor

**RoboNLP**
- Can we learn language from robots?
- Can we control robots with language?

**Grounding / Multimodal**
- Can models capture both concrete and abstract thought?
- What knowledge about the world can’t be learned from text?

**Website**  ➤  https://yonatanbisk.com

Alan W Black  |  Professor

**Speech Synthesis**
- Enabling computers to speak in any style or language

**Speech-to-Speech Translation**
- Portable, real-time conversation cross-lingually
- Code-switching and low resource languages

**Spoken Dialog Systems**
- Making computers and machines communicate through speech

**Website**  ➤  https://www.cs.cmu.edu/~awb/

Ralf Brown  |  Principal Systems Scientist

**Information Extraction**
- Text normalization

**Language Identification**
- Identifying short texts in 1000+ languages

**Digital Forensics**
- Text extraction
- Reconstructing corrupted files

**Website**  ➤  http://www.cs.cmu.edu/~ralf/
Maxine Eskenazi  |  Principal Systems Scientist

**Intelligent Agents**
- Using deep learning (Natural Language Generation, Natural Language Understanding) for agents designed centered around the user

**Real World Intelligent Agents**
- Adapting agents to better serve real users such as for a senior travel assistant

**Intelligent Agent Research Platform**
- A platform available to researchers around the world with a portal they link their systems to so that they can gather real user data and assess their systems in one common environment.

**Website**  ►  http://www.cs.cmu.edu/~max/

Scott Fahlman  |  Professor Emeritus, LTI & CSD

**Symbolic Knowledge Representation and Reasoning**
- Ongoing research on the open-source Scone knowledge-base system
- Flexible, human-like, “good-enough” planning, integrated with world-knowledge

**Knowledge-Based Natural Language Understanding and Generation**
- Going all the way from text or speech to a useful representation of the knowledge
- Using context and background knowledge for disambiguate and fill in missing information

**Incrementally Constructed Networks for Deep Learning**
- Updating some old ideas about gradually building up neural networks to fit the task at hand

**Website**  ►  https://www.cs.cmu.edu/~sef/

Robert Frederking  |  Assoc. Dean, Doctoral Programs, SCS
& Chair, Graduate Programs, LTI

**Machine Translation**
- Speech translation
- Endangered language support

**Natural Language Applications**
- Information extraction from text

**Website**  ►  http://www.cs.cmu.edu/~ref/
Anatole Gershman | Distinguished Service Professor

**Information Extraction from Text**
- Conceptual dependency parsing
- Domain adaptation through interactive learning

**Conversational Systems**
- Task-specific and thematic chat bots

**Knowledge Representation and Reasoning Under Uncertainty**
- Fusion of prior and new information

**Website**
https://www.cs.cmu.edu/~anatoleg/

---

Alex Hauptmann | Research Professor

**Multimedia Analysis and Retrieval**
- Large scale analysis of internet and surveillance video
- Multimedia for healthcare
- Multimedia for human rights

**Website**
https://www.lti.cs.cmu.edu/AlexHauptmann

---

Eduard Hovy | Research Professor | On leave at DARPA

**Computational Semantics for Natural Language Processing**
- Machine learning and deep neural methods for in-depth semantic reading, including information extraction, event detection, entity detection and linking into Wikipedia, reference resolution, semantic typing, etc., in multiple languages.

**Social Media Analysis**
- Latent analysis methods to discover interesting features of events and users of social media

**Text Mining and Summarization**

**Website**
https://www.cs.cmu.edu/~hovy/

---

Lori Levin | Research Professor

**Multilingual Natural Language Processing**
- Using linguistics and language typology to improve performance of corpus-based methods
- Low resource languages

**North American Computational Linguistics Olympiad (NACLO)**
- High school students learn about human language and computation by solving puzzles

**Website**
http://www.cs.cmu.edu/~lsl/
Teruko Mitamura  |  Research Professor & Director, MIIS Program

**TEXT ANALYSIS**
- Events: Definition, detection, coreference, sequence, linking and representation
- Annotation on event and entity mentions and linking

**QUESTION ANSWERING**
- Question answering on various domains
- Question generation and answering from text

**COMPUTER-ASSISTED LANGUAGE LEARNING**
- Intelligent reading system for English

Website  ➤  http://www.cs.cmu.edu/~teruko/

---

Louis-Philippe Morency  |  Associate Professor

**HUMAN COMMUNICATION DYNAMICS**
- Analyze, recognize and predict subtle human communicative behaviors during social interactions

**MULTIMODAL MACHINE LEARNING**
- Learning probabilistic and neural models from heterogenous, contingent and asynchronous data

**HEALTH BEHAVIOR INFORMATICS**
- Technologies to support clinical practice during diagnosis and treatment of mental health disorders

Website  ➤  https://www.cs.cmu.edu/~morency/

---

David R. Mortensen  |  Systems Scientist

**LOW-RESOURCE AND MULTILINGUAL NLP**
- Named entity recognition
- Linguistic resources
- Feature engineering

**COMPUTATIONAL LINGUISTICS**
- Computational phonology
- Computational morphology
- Linguistic typology

**HUMAN-IN-THE-LOOP COMPUTATION**

Website  ➤  http://www.cs.cmu.edu/~dmortens/

---

Graham Neubig  |  Assistant Professor

**MULTILINGUAL LANGUAGE PROCESSING**
- Machine translation
- Syntactic and Semantic Analysis
- Cross-lingual Learning

**NATURAL LANGUAGE INTERFACES TO COMPUTERS**
- Natural Language to Code Generation
- Question Answering and Information Extraction
- Modeling Human-Computer or Human-Human Interaction

**MACHINE LEARNING FOR NATURAL LANGUAGE PROCESSING**
- Neural Network Models for NLP
- Unsupervised and Semi-supervised Learning

Website  ➤  http://www.phontron.com/
Alex Rudnicky  |  Research Professor Emeritus

**Conversational Systems**
- Proactive learning through spoken interaction between agents and humans
- Agents that engage in social, non-goal directed interaction

**Spoken Language Systems**
- Dialog system architectures and dialog management
- Spoken language understanding and situational awareness
- Speech recognition for interactive systems

**Website**  ➤  http://www.cs.cmu.edu/~air/

Carolyn P. Rosé  |  Professor LTI & HCII

**Text Mining/ Computational Sociolinguistics**
- Modeling social processes in discourse
- Deep learning of rhetorical structure
- Social Media Analysis
- Medical NLP

**Dialogue Agents**
- Reinforcement Learning for Adaptable Dialogue Agents
- Dialogue agents for Learning, Health, and Wellbeing

**Computer-Supported Collaborative Learning**
- Architectures for supporting online collaboration
- Social Recommendation Algorithms
- Learning in Massive Open Online Courses

**Website**  ➤  http://www.cs.cmu.edu/~cprose/

Bhiksha Raj  |  Professor

**Audio Analysis**
- Audio content analysis, with applications to acoustic intelligence, surveillance, content-based retrieval
- Never ending learner of sound: a self-updating audio-content index for the web
- Signal enhancement and separation algorithms

**Privacy Preserving Signal Processing**
- Algorithms to preserve user privacy in speech & audio applications
- Secure cloud computing techniques

**Speech Processing**
- Robust speech recognition and core speech recognition technologies

**Deep Neural Networks**
- Novel applications of deep networks and algorithms for practical deployment of deep networks

**Website**  ➤  https://www.lti.cs.cmu.edu/people/15564/bhiksha-raj

Eric Nyberg  |  Professor & Director, MCDS Program

**Open Advancement of Question Answering**
- Software architectures and algorithms for real-world QA applications (e.g., Jeopardy! Challenge, BioASQ, LiveQA)

**Machine Reading**
- Mixed-initiative information extraction, logical form creation and inference for automatic knowledge-base construction in any domain

**Interactive Analytic Learning**
- Reducing cost of training high-quality analytics for new domains

**Website**  ➤  http://www.cs.cmu.edu/~ehn/
**Michael Shamos**  |  Distinguished Career Professor & Director, MSAII program

**Mathematical Discovery**
- Mathematics as a language
- Automated discovery of mathematical relationships via AI
- Mathematical searching

**AI Law**
- Development of meaningful AI regulations

[Website](http://euro.ecom.cmu.edu/shamos.html)

---

**Rita Singh**  |  Associate Research Professor

**Speech and Audio Processing**
- Acoustic sensing and interpretation
- Voice forensics
- Computational forensics

[Website](http://mlsp.cs.cmu.edu/people/rsingh/index.html)

---

**Richard Stern**  |  Professor

**Robust Speech Recognition**
- Physiologically- and perceptually-motivated feature extraction
- Microphone-array processing
- Application of deep learning approaches

**Auditory Perception**
- Spatial hearing
- Application of robust recognition techniques to the hearing impaired

**Music Information Retrieval**
- Score following and musical training
- Content analysis of musical performance

[Website](https://users.ece.cmu.edu/~rms/)

---

**Emma Strubell**  |  Assistant Professor

**Efficient NLP/ Green AI**
- How to obtain state-of-the-art model accuracy while reducing computation, memory, carbon footprint?
- Which model parameters, training examples and necessary/sufficient for learning effective models?
- How to set up parameter learning, model architecture to facilitate efficient inference?

**Robust out-of-domain/out-of-distribution performance**
- Transfer learning, learning from few examples, weak supervision
- How to effectively integrate structured information / priors alongside distributed representations?
- How to represent world/ common sense knowledge?

**Practical structured interfaces for natural language texts**
- Representations that facilitate learning/inference as well as analysis by end-users

[Website](http://strubell.github.io/)
**Alex Waibel**  |  Professor  
*Speech-to-Speech Translation*  
*Neural Network / Deep Learning and Language Processing*  
*Machine Learning*  
*Machine Translation*  
*Speech Processing*  
*Multimodal and Multimedia*

Website  ➤  https://www.cs.cmu.edu/~ahw/

---

**Shinji Watanabe**  |  Associate Professor  
*Speech Recognition and Understanding in Adverse Environments*  
• Far-field speech recognition  
• Multi-speaker speech recognition  
• Speaker diarization  
• Speech enhancement and separation  
• Audio scene analysis  

*Deep Learning for Audio, Speech, and Language Processing*  
• End-to-end speech recognition, speech synthesis, and speech translation  
• End-to-end integration of audio, speech, and language processing modules

Website  ➤  https://sites.google.com/view/shinjiwatanabe

---

**Yiming Yang**  |  Professor  
*Graph-based Machine Learning*  
• Frameworks and algorithms for prediction and reasoning over heterogeneous graphical data and related text  

*Scalable Spatiotemporal Modeling*  
• Developing neural network algorithms/architectures for leveraging short/long and multi-granularity dependence structures for time series analysis, event modeling and trajectory prediction  

*Extreme-scale Text Categorization*  
• Developing state-of-the-art algorithms for document classification against millions of categories with predefined or automatically induced hierarchies or graphical dependency structures

Website  ➤  http://www.cs.cmu.edu/~yiming/