

ANUJ KUMAR

Carnegie Mellon University, Human-Computer Interaction Institute,
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- RESEARCH INTERESTS Speech Recognition, Mobile Applications, Machine Learning, Novel Input and Interaction Techniques, Educational Game Design
- EDUCATION
- Carnegie Mellon University, USA** 2009-2014 (exp.)
PhD. in Human-Computer Interaction 3.9/4.0
Major: Computer Science, *Minors:* Behavioral Science, Design
- Carnegie Mellon University, USA** 2009-12
M.S. in Human-Computer Interaction 3.9/4.0
- Dhirubhai Ambani Institute of Information & Communication Technology, India** 2005-09
B. Tech. in Information and Communication Technology 9.42/10.00
- JOURNAL PAPERS **Anuj Kumar**, Florian Metze, and Matthew Kam. Enabling Rapid Development and Adoption of Speech User Interfaces. To appear in *IEEE Computer Outlook*, Jan 2014.
- REFEREED FULL-PAPERS **Anuj Kumar**, Florian Metze, Wenyi Wang, and Matthew Kam. Formalizing Expert Knowledge for Developing Accurate Speech Recognizers. In *Proc. of InterSpeech*, 2013 ([pdf](#)).
- Derek Lomas, **Anuj Kumar**, Kishan Patel, Dixie Ching, Meera Lakshmanan, Matthew Kam, and Jodi Forlizzi. The Power of Play: Design Lessons for Increasing the Lifespan of Outdated Computers. In *Proc. of ACM Conference of Human Factors in Computing Systems (CHI '13)*, ACM, New York, NY, USA, 2735-2744 ([pdf](#)).
- Anuj Kumar**, Tim Paek, and Bongshin Lee. Voice Typing: A New Speech Interaction Model for Dictation on Touchscreen Devices. In *Proc. of ACM Conference of Human Factors in Computing Systems (CHI '12)*, May 5-10, Austin, Texas, 2012. ([pdf](#))
- Anuj Kumar**, Pooja Reddy, Anuj Tewari, Rajat Agrawal, and Matthew Kam. Improving Literacy in Developing Countries Using Speech Recognition-Supported Games on Mobile Devices. In *Proc. of ACM Conference of Human Factors in Computing Systems (CHI '12)*, Austin, Texas, May 5-10, 2012. ([pdf](#))
- Anuj Kumar**, Anuj Tewari, Geeta Shroff, Deepti Chittamuru, Matthew Kam, and John Canny. An Exploratory Study of Unsupervised Mobile Learning in Rural India. In *Proc. of ACM Conference on Human Factors in Computing Systems (CHI '10)*, Atlanta, Georgia, April 10-15, 2010. **Best Paper Honorable Award** 🏆 ([pdf](#))
- Matthew Kam, Akhil Mathur, **Anuj Kumar**, and John Canny. Designing Digital Games for Rural Children: A Study of Traditional Village Games in India. In *Proc. of ACM Conference on Human Factors in Computing Systems (CHI '09)*, Boston, Massachusetts, April 4-9, 2009. **Best Paper Honorable Award** 🏆 ([pdf](#))
- Matthew Kam, **Anuj Kumar**, Shirley Jain, Akhil Mathur, and John Canny. Improving Literacy in Rural India: Cellphone Games in an After-School Program. In *Proc. of IEEE/ACM Conference on Information Communication Technology and Development (ICTD '09)*, Doha, Qatar, April 17-19, 2009. ([pdf](#))
- Matthew Kam, Aishvarya Agarwal, **Anuj Kumar**, Siddhartha Lal, Akhil Mathur, Anuj Tewari, and John Canny. Designing E-Learning Games for Rural Children in India: A

Format for Balancing Learning with Fun. In *Proc. of ACM Conference on Designing Interactive Systems (DIS '08)*, Cape Town, South Africa, February 25-27, 2008. ([pdf](#))

REFEREED
SHORT-PAPERS

Anuj Kumar, Pooja Reddy, and Matthew Kam. SMART: Speech-enabled Mobile Assisted Reading Technology, for word comprehension. In *Proc. of 15th International Conference on Artificial Intelligence in Education (AIED '11)*, New Zealand, June 29-July 1, 2011 ([pdf](#)).

Anuj Kumar, Anuj Tewari, Seth Horrigan, Matthew Kam, Florian Metze, and John Canny. Rethinking Speech Recognition on Mobile Devices. Position paper for Workshop on Intelligent User Interfaces for Developing Regions, to appear in *Proceedings of ACM Conference on Intelligent User Interfaces (IUI '11)*, Palo Alto, February 13-16, 2011. ([pdf](#)).

Matthew Kam, Siddharth Bhagwani, **Anuj Kumar**, Siddhartha Lal, Akhil Mathur, Anuj Tewari, and John Canny. The Social Complexities of User-Centered Design in ICTD: Experiences from Four Schools in India's Villages and Slums. In *Proc. of IEEE/ACM International Conference on Information and Communication Technologies and Development (ICTD '07)*, Bangalore, India, December 15-16, 2007. ([pdf](#))

Anuj Tewari, **Anuj Kumar**, Akhil Mathur, Siddhartha Lal, Aishvarya Agarwal, Matthew Kam, and John Canny. Mobile Games for Learning English in Rural India: Designing Cellphone Games Informed by Traditional Games. *Digital Games Research Association (DIGRA '07)*, Japan, 2007. Presented as a poster.

PATENTS

Anuj Kumar, Chris Kau, and Barton Smith. A System to Facilitate Social Introductions in Everyday Settings. IBM Research. Patent Pending. 2012.

CONFERENCE
PRESENTATIONS

Anuj Kumar, Pooja Reddy, and Matthew Kam. Probing the Role of Different Types of Productive Vocabulary Training on Word Recognition Skills Using Cellphone Games in Rural India. To present at *American Association for Applied Linguistics (AAAL '12)*, Boston, March 2012. **Best Student Paper at AAAL, 2012.** 

Anuj Kumar, Pooja Reddy, and Matthew Kam. Productive Oral Vocabulary Knowledge in Word Reading: An Intervention Study using Cellphone Games in Rural India. *American Association for Applied Linguistics (AAAL '11)*, Chicago, March 2011.

Anuj Kumar, Pooja Reddy, and Matthew Kam. Using Mobile Phones to Investigate the Effect of Productive Lexical Processing on Word Recognition in Rural India. *Second Language Research Forum (SLRF '10)*, Maryland, October 2010.

RESEARCH &
EXPERIENCE

IBM RESEARCH

Legends – A Mobile for Everyday Social and Business Introductions
Mentors: Dr. Barton Smith and Chris Kau

San Jose, CA
June '12 – Aug '12
Objective-C

- Designed, developed, and deployed an iPhone application that recommends commonalities between two strangers and facilitates serendipitous introductions by analyzing various types of social network data e.g. from LinkedIn and Facebook.

MICROSOFT RESEARCH

Voice Typing – A Real-Time Speech Recognition Software
Mentors: Dr. Tim Paek and Dr. Bongshin Lee

Redmond, WA
May '11 – Aug.'11
C#, C

- Designed, developed, and deployed a real-time speech recognition software that can transcribe user's speech "as they speak" i.e. in real-time.
- Investigated different styles for interaction and error correction for real-time editing.
- Improved efficiency of dictation software by 29%.

CARNEGIE MELLON UNIVERSITY

A Speech Toolkit for Non-Speech Experts – Thesis topic
Mentors: Prof. Florian Metze and Dr. Matthew Kam

Pittsburgh, PA
Aug.'12 – present
C, C++, Python, Praat

- Designing and developing a rapid-prototyping toolkit for non speech-experts to explore the design space of speech applications, specifically to:
 - o perform automatic analysis of recorded speech to identify typical error patterns using graphical visualizations,
 - o perform automatic analysis of the user's acoustic context,
 - o recommend adaptation steps for improving speech recognition accuracy, and
 - o visualize performance differences between different system configurations.

CARNEGIE MELLON UNIVERSITY

Emotion Recognition in Interactive Voice Response Systems

Pittsburgh, PA

Aug.'11 – Dec.'11

Mentors: Prof. Dan Siewiorek and Prof. Asim Smailagic

C#, Matlab

- Designed and developed an airline reservation IVR system that detected user emotions (e.g. angry vs. neutral) using only audio features from 1-2 seconds of audio, as typical to IVR systems. It used these emotions to influence dialog flow decisions.

CARNEGIE MELLON UNIVERSITY

SMART: Speech-enabled Mobile Assisted Reading Technology

Pittsburgh, PA

Mar.'10 – Sept.'11

Mentors: Dr. Matthew Kam and Prof. Jack Mostow

ActionScript 3.0, Python

- Designed, developed, and deployed 2 speech-recognition games on Nokia smartphones to improve reading skills of early-age English Language Learners in underdeveloped areas of United States and India.
- Led to over 100% relative reading improvements with just 30 minutes of gameplay.

UNIVERSITY OF CALIFORNIA, BERKELEY

Mobile Immersive Learning for Literacy in Emerging Economies

Berkeley, CA

May '07 – May '10

Mentors: Prof. John Canny and Dr. Matthew Kam

ActionScript 2.0/3.0, J2ME

- Designed literacy games for second language acquisition on low-end mobile phones.
- Prototyped over 12 successful game designs.
- Led and participated in 6 field studies spread over 12 months.
- Analyzed quantitative and qualitative results to iterate game designs.
- Increasing responsibilities over time from developer to researcher to project lead.
- Published over 5 papers in top HCI conferences.
- Improved vocabulary learning by 150 words/year with just 2½ hrs gameplay per-week.

FELLOWSHIPS & AWARDS	Qualcomm Innovation Fellowship finalist	2012
	CMU/HCII Departmental Fellowship	2009-14
	Best Paper Honorable Mention, ACM CHI	2010
	Best Paper Honorable Mention, ACM CHI	2009
	Microsoft Research Imagine Cup, in top 8 national teams	2008
	IBM INVITE, 1 st prize	2007
	Red Hat Challenge, 3 rd prize internationally	2007

MEDIA COVERAGE

Television

- **ABC.** 2009. "India's Cell Phone Tutors" ([video](#))
- **CBC.** 2008. "Cell Phone: The Ring Heard Around the World" ([video](#))

Print

- **Scope, MIT.** 2010. "Learning to Read and Write by Gaming" ([article](#))
- **Communications of the ACM.** 2010. "Cellphone Serves as Learning Platform for the Developing World" ([article](#))
- **Times of India.** 2009. "Angrezi, the Phoney Way" ([article](#))
- **Ahmedabad Mirror.** 2009. "Becoming Literate, One Cellphone at a Time" ([article](#))

SERVICE

Program Committee Member

ACM Conference on Intelligent User Interfaces (IUI) 2013

Reviewer

ACM Conference on Human-Factors in Computing Systems (CHI) 2011-present

	ACM Conference on Intelligent User Interfaces (IUI)	2012
	ACM Conference on Designing Interactive Systems (DIS)	2012
	ACM Conference on HCI with Mobile Devices and Services (Mobile HCI)	2011
	IFIP TC13 Conference on Human-Computer Interaction INTERACT	2011

TEACHING	Designing Human-Centered Systems	2013
	Teaching 46 undergraduate students methods applicable to design in HCI	
	User-Centered Research and Evaluation, CMU	2011
	Taught 20 Master's students methods applicable to design & research in HCI	
	Introduction to Programming, DA-IICT	2008
	Taught 60 undergraduate students concepts related to programming in C	

GRANTS WRITTEN	National Science Foundation IIS, \$500k, pending	2013
	National Science Foundation EAGER, \$100k, successful	2012
	National Science Foundation HCC, \$500k, unsuccessful	2011-12
	Institute of Education Sciences, \$1m, unsuccessful	2010-11

SKILLS

Development: C++, C, Objective-C, C#, Java, Python, ActionScript 3.0, JMP, JSON, SQL, Speech Recognition Technologies (Sphinx, Kaldi), Praat

Research: Quantitative and Qualitative Data Evaluation, Contextual Inquiry, Focus Groups, Discount Usability Methods, Log Analysis, Wizard-of-Oz, Survey Designs, Lab and Field Evaluations

GRADUATE COURSES	Computer Science	Human-Computer Interaction Core
	- Applied Machine Learning,	- HCI Process and Theory,
	- Speech Recognition,	- Computer Science in HCI,
	- Mobile and Pervasive Computing,	- Social Science Perspective in HCI,
	- Advanced Speech Lab,	- Design Perspective in HCI,
	- Rich Interaction in Virtual Worlds	- Cognitive Science Perspective in HCI
	Design	Behavioral Science
	- Understanding Creative Process,	- Applied Research Methods
	- Design Fundamentals	

REFERENCES

Florian Metz (fmetze@cs.cmu.edu)
Assistant Research Professor
Language Technologies Institute and interACT,
School of Computer Science, Carnegie Mellon University

Matthew Kam (mkam@air.org)
Senior Technology Strategist
American Institute for Research

Dan Siewiorek (dps@cs.cmu.edu)
Buhl University Professor
Electrical and Computer Engineering and Computer Science
School of Computer Science, Carnegie Mellon University

Tim Paek (timpaek@microsoft.com)
Senior Researcher
Microsoft Research, Redmond