

# Kurtis Heimerl

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## Interests

My research builds community-based systems for rural areas, with a specific focus on networking.

## Academic

<b>University of Washington</b> Assistant Professor Computer Networks and ICTD	2016
<b>University of California, Berkeley</b> Postdoctoral Researcher Advisors: Eric Brewer and Tapan Parikh	2014
<b>University of California, Berkeley</b> Doctor of Philosophy, Computer Science Thesis: <i>Community Cellular Networks</i> Advisors: Eric Brewer and Tapan Parikh	2013
<b>University of California, Berkeley</b> Master of Science, Computer Science Thesis: <i>Metamouse: Improving Sharing of Existing Educational Applications</i>	2009
<b>University of Washington</b> Bachelor of Science, Computer Engineering (Magna Cum Laude)	2007

## Current Research

### Community Cellular Networks

Investigating small-scale, locally owned cellular networks. Developed extensions to OpenBTS and OpenAirInterface to enable more local content in network. Conducted longitudinal deployment of both technologies in rural Papua, Indonesia and Aurora, Philippines. Demonstrated sustainability of locally-owned cellular in Papuan context, as well as value to local community. Study and deployments ongoing.

### Digital Financial Services

As part of a grant from the Gates foundation, we have begun a number of studies focused on improving access to financial services among the underbanked. My focus has been on the security and efficacy of Internet-like services such as the Interledger Protocol.

### Ecological Sustainability

Ongoing research into the use of community sensing devices for resilience in Arctic communities.

## Awards

<a href="#">UW College of Engineering "Early Career" Diamond Award</a>	2018
<a href="#">MIT Technology Review "35 under 35"</a>	2014
<a href="#">ISIF Asia Community Network Award</a>	2018
Best Paper at COMPASS 2020: Can Phones Build Relationships? A Case Study of a Kenyan Wildlife Conservancy's Community Development	2020
Diversity and Inclusion Award at CSCW 2019: Trust and Technology Repair Infrastructures in the Remote Rural Philippines: Navigating Urban-Rural Seams	2019
Best Student Paper at ASSETS 2019: Deep Learning for Automatically Detecting Sidewalk Accessibility Problems Using Streetscape Imagery	2019
Community Award at NSDI 2019: Scaling Community Cellular Networks with CommunityCellularManager	2019
Best Paper at DySPAN 2014: GSM Whitespaces: An Opportunity for Rural Cellular Service	2014

Community Award at NSDI 2013: Expanding Rural Cellular Networks with Virtual Coverage	2013
Best Paper at CHI 2012: Communitysourcing: Engaging Local Crowds to Perform Expert Work Via Physical Kiosks	2012
NSF Graduate Research Fellowship	2008
Bob Bandes Memorial Teaching Award (Honorable Mention)	2005

## Selected Press

<a href="#">Building a “cell tower in a box” to connect some of the billions of people lacking internet access</a> GeekWire	2018
<a href="#">Facebook Hires Founders Of Cellular-Network-In-A-Box Company Endaga</a> Tech Crunch	2015
<a href="#">Kurtis Heimerl: 35 Innovators under 35</a> MIT Technology Review	2014
<a href="#">New Eavesdropping Equipment Sucks All Data Off Your Phone</a> Newsweek	2014
<a href="#">Cellular’s Open Source Future is Latched to Tallest Tree in the Village</a> Ars Technica	2014

## Industry Experience

<b>Facebook</b> Endaga team and IP joined Facebook to continue their rural access initiatives.	Menlo Park, CA 2015-2017
<b>Endaga, Inc</b> Founder/CEO, focused on developing simple cellular networks that can be operated by anyone. Raised 1.2M seed round from investors such as Mitch Kapor, Jeff Hammerbacher, and Sanjit Biswas. Joined Facebook August 2015.	Oakland, CA 2014-2015
<b>Range Networks</b> Community Manager/Developer for open-source OpenBTS release.	San Francisco, CA 2011-2014
<b>Microsoft Research India</b> Intern assisting with SMS and voice technologies for the Digital Study Hall distance learning project.	Bangalore, India 2007
<b>Google.com</b> Intern developing additions to the Hadoop map-reduce framework.	Mountain View, CA 2007
<b>Amazon.com</b> Intern creating scalable, secure, and extensible service-oriented architecture components.	Seattle, WA 2005,2006

## Peer-reviewed Conference or Journal Publications

<a href="#">Accept the Risk and Continue: Measuring the Long Tail of Government https Adoption</a> Sudheesh Singanamalla, Esther Jang, Richard Anderson, Tadayoshi Kohno, <b>Kurtis Heimerl</b> . <i>The 20th ACM Internet Measurement Conference (IMC)</i> 2020
<a href="#">Can Phones Build Relationships? A Case Study of a Kenyan Wildlife Conservancy’s Community Development</a> Matt Ziegler, Morgan Wack, Nancy Ingutia, Ian Muiruri, Nicholas Njogu, Kennedy Muriithi, William Njoroge, James Long, and <b>Kurtis Heimerl</b> . <i>The Third ACM Conference on Computing &amp; Sustainable Societies (COMPASS)</i> 2020 ( <b>Best Paper</b> )
<a href="#">Connecting Isolated Communities: Quantitative Evidence on the Adoption of Community Cellular Networks in the Philippines</a> Niall Keleher, Mary Claire Barela, Joshua Blumenstock, Cedric Festin, Matthew Podolsky, Erin Troland, Arman Rezaee, and <b>Kurtis Heimerl</b> . <i>Eleventh International Conference on Information and Communication Technologies and Development (ICTD)</i> 2020
<a href="#">Trust and Technology Repair Infrastructures in the Remote Rural Philippines: Navigating Urban-Rural Seams</a> Esther Han Beol Jang, Philip Garrison, Ronel Vincent Vistal, Maria Theresa D. Cunanan, Mia Theresa Perez, Philip Martinez, Matthew William Johnson, John Andrew Evangelista, Syed Ishtiaque Ahmed, Josephine Dionisio, Mary Claire Aguilar Barela, <b>Kurtis Heimerl</b> . <i>Proceedings of the ACM on Human-Computer Interaction: Vol. 3, Issue CSCW, Article 99</i> 2019
<a href="#">Deep Learning for Automatically Detecting Sidewalk Accessibility Problems Using Streetscape Imagery</a> Galen Weld, Esther Jang, Aileen Zeng, Anthony Li, <b>Kurtis Heimerl</b> , Jon Froehlich. <i>21st International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS)</i> 2019 ( <b>Best Student Paper</b> )
<a href="#">Experiences: Design, Implementation, and Deployment of CoLTE, a Community LTE Solution</a> Spencer Sevilla, Matthew Johnson, Pathirat Kosakanchit, Jenny Ting Liang, <b>Kurtis Heimerl</b> . <i>The 25th Annual International Conference on Mobile Computing and Networking (MobiCom)</i> 2019

### **An Assessment of SMS Fraud in Pakistan**

Fahad Pervaiz, Rai Shah Nawaz, Muhammad Umer Ramzan, Maryem Zafar Usmani, Shrirang Mare, **Kurtis Heimerl**, Faisal Kamiran, Richard Anderson, Lubna Razaq. *The Second ACM Conference on Computing & Sustainable Societies (COMPASS)* 2019

### **Scaling Community Cellular Networks with CommunityCellularManager**

Shaddi Hasan, Mary Claire Barela, Matthew Johnson, Eric Brewer, **Kurtis Heimerl**. *16th USENIX Symposium on Networked Systems Design and Implementation (NSDI)* 2019 (**Community Award**)

### **Fresh Insights: User Research Towards a Market Information Service for Bihari Vegetable Farmers**

Matthew Ziegler, Lokesh Garg, Shailesh Tiwary, Aditya Vashistha, **Kurtis Heimerl**. *Tenth International Conference on Information and Communication Technologies and Development (ICTD)* 2019

### **Designing Sustainable Rural Infrastructure Through the Lens of OpenCellular**

Kashif Ali, **Kurtis Heimerl**. *Communications of the ACM*, August 2018

### **ThinSIM-based Attacks on Mobile Money Systems**

Rowan Phipps, Shrirang Mare, Peter Ney, Jennifer Rose Webster, **Kurtis Heimerl**. *First ACM conference on Computing & Sustainable Societies (COMPASS)* 2018

### **Crowdsourcing Rural Network Maintenance and Repair via Network Messaging**

Esther Jang, Mary Claire Barela, Matt Johnson, Philip Martinez, Cedric Festin, Maragaret Lynn, Josephine Dionisio, **Kurtis Heimerl**. *ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)* 2018

### **An Investigation of Phone Upgrades in Remote Community Cellular Networks**

Kushal Shah, Philip Martinez, Emre Tepedelenlioglu, Shaddi Hasan, Cedric Angelo Festin, Joshua Blumenstock, Jo Dionisio, **Kurtis Heimerl**. *International Conference on Information and Communication Technologies and Development (ICTD)* 2017

### **Towards Building a Community Cellular Network in the Philippines: Initial Site Survey Observations**

Mary Claire Barela, Mae Sincere Blanco, Philip Martinez, Miguel Carlo Purisima, **Kurtis Heimerl**, Matthew Podolsky, Eric Brewer, Cedric Angelo Festin. *International Conference on Information and Communication Technologies and Development (ICTD)* 2016

### **A Longitudinal Study of Local, Sustainable, Small-Scale Cellular Networks**

**Kurtis Heimerl**, Shaddi Hasan, Kashif Ali, Eric Brewer, Tapan Parikh. *Information Technologies & International Development (ITID)* 2015

### **Analysis of Smartphone Adoption and Usage in a Rural Community Cellular Network**

**Kurtis Heimerl**, Anuvind Menon, Shaddi Hasan, Kashif Ali, Eric Brewer, Tapan Parikh. *International Conference on Information and Communication Technologies and Development (ICTD)* 2015

### **Rescue Base Station**

Ibrahim Ghaznavi, **Kurtis Heimerl**, Umar Muneer, Abdullah Hamid, Kashif Ali, Tapan Parikh, Umar Saif. *5th Annual ACM Symposium on Computing for Development (DEV)* 2014

### **GSM Whitespaces: An Opportunity for Rural Cellular Service**

Shaddi Hasan, **Kurtis Heimerl**, Kate Harrison, Kashif Ali, Anant Sahai, Eric Brewer. *IEEE Dynamic Spectrum Access Networks (DySPAN)* 2014 (**Best Paper Award**)

### **An Experiment in Reducing Cellular Base Station Power Draw With Virtual Coverage**

**Kurtis Heimerl**, Shaddi Hasan, Kashif Ali, Tapan Parikh, Eric Brewer. *4th Annual ACM Symposium on Computing for Development (DEV)* 2013

### **Local, Sustainable, Small-Scale Cellular Networks**

**Kurtis Heimerl**, Shaddi Hasan, Kashif Ali, Eric Brewer, Tapan Parikh. *International Conference on Information and Communication Technologies and Development (ICTD)* 2013

### **Expanding Rural Cellular Networks with Virtual Coverage**

**Kurtis Heimerl**, Kashif Ali, Joshua Blumenstock, Brian Gawalt, Eric Brewer. *10th USENIX symposium on Networked Systems Design and Implementation (NSDI)* 2013 (**Community Award**)

### **Convergence of Position Auctions under Myopic Best-Response Dynamics**

Matthew Cary, Aparna Das, Benjamin Edelman, Ioannis Giotis, **Kurtis Heimerl**, Anna Karlin, Scott Kominers, Claire Mathieu, Michael Schwarz. *Transactions on Economics and Computation (TEAC)* 2013

### **Communitysourcing: Engaging Local Crowds to Perform Expert Work Via Physical Kiosks**

**Kurtis Heimerl**, Brian Gawalt, Kuang Chen, Tapan Parikh, Björn Hartmann. *Annual conference on Human Factors in Computing Systems (CHI)* 2012 (**Best Paper Award**)

### **A Case Study on Designing Interfaces for Multiple Users in Developing Regions**

**Kurtis Heimerl**, Janani Vasudev, Kelly Buchanan, Tapan Parikh, Eric Brewer. *1st Annual ACM Symposium on Computing for Development (DEV)* 2010

### **Metamouse: Improving Multi-user Sharing of Existing Educational Applications**

**Kurtis Heimerl**, Janani Vasudev, Kelly Buchanan, Tapan Parikh, Eric Brewer. *International Conference on Information and Communication Technologies and Development (ICTD)* 2010

### **Greedy Bidding Strategies for Keyword Auctions**

Matthew Cary, Aparna Das, Benjamin Edelman, Ioannis Giotis, **Kurtis Heimerl**, Anna Karlin, Claire Mathieu and Michael Schwarz. *ACM Conference on Electronic Commerce (EC)* 2007

## Book Chapters

### **Connecting Communities through Mobile Networks: The VBTS-CoCoMoNets Project**

Mary Claire Barela, Josephine Dionisio, **Kurtis Heimerl**, Manuel Victor Sapidula, and Cedric Angelo Festin. *Global Information Society Watch 2018: Community Networks* 2018

### **Building Community LTE Networks with CoLTE**

Spencer Sevilla, Pathirat Kosakanchit, Matthew Johnson, **Kurtis Heimerl**. *The community network manual : how to build the Internet yourself* 2018

## Workshop Papers

### **Title: Hanging Gardens of Babylon: Reframing Urban Agriculture as an Opportunity for Social Engagement**

Joseph Breda, Esther Jang, **Kurtis Heimerl**, and Shwetak Patel. *Self-Sustainable CHI* 2020

### **dLTE: Building a more WiFi-like Cellular Network (Instead of the Other Way Around)**

Matthew Johnson, Spencer Sevilla, Esther Jang, **Kurtis Heimerl**. *HotNets 2018: Seventeenth ACM Workshop on Hot Topics in Networks* 2018

### **Unplanned Obsolescence: Hardware and Software After Collapse**

Esther Jang, Matt Johnson, Edward Burnell, **Kurtis Heimerl**. *Proceedings of the 2017 Workshop on Computing Within Limits* 2017

### **The Village Base Station**

**Kurtis Heimerl**, Eric Brewer. *4rd ACM Workshop on Networked Systems for the Developing World (NSDR)*, 2010

### **Message Phone: A User Study and Analysis of Asynchronous Messaging in Rural Uganda**

**Kurtis Heimerl**, RJ Honicky, Eric Brewer, Tapan Parikh. *3rd ACM Workshop on Networked Systems for the Developing World (NSDR)*, 2009

### **Metamouse: Multiple Mice for Legacy Applications**

**Kurtis Heimerl**, Divya Ramachandran, Joyojeet Pal, Eric Brewer, Tapan Parikh. *Proceedings of the 27th international conference extended abstracts on Human factors in computing systems (CHI Extended Abstracts)* 2009

## Demonstrations

### **DEMO: CoLTE, An All-in-One Community LTE Network**

Spencer Sevilla, Matthew Johnson, Pathirat Kosakanchit, Jenny Ting Liang, **Kurtis Heimerl**. *The 25th Annual International Conference on Mobile Computing and Networking (MobiCom)* 2019

### **Poster and Demonstration of Expanding Rural Cellular Networks with Virtual Coverage**

**Kurtis Heimerl**, Kashif Ali, Joshua Blumenstock, Brian Gawalt, Eric Brewer. *Demo at 10th USENIX symposium on Networked Systems Design and Implementation (NSDI)* 2013

### **Communitysourcing: Engaging Local Crowds to Perform Expert Work Via Physical Kiosks**

**Kurtis Heimerl**, Brian Gawalt, Kuang Chen, Tapan Parikh, Björn Hartmann. *Interactivity at the annual conference on Human Factors in Computing Systems (CHI)* 2012

### **Metamouse: Multiple Mice for Legacy Applications**

**Kurtis Heimerl**, Divya Ramachandran, Joyojeet Pal, Eric Brewer, Tapan Parikh. *Demo at International Conference on Information and Communication Technologies and Development (ICTD)* 2009

## Technical Reports

### **How Users Understand Cellular Infrastructure**

**Kurtis Heimerl**, Tapan Parikh. *University of California, Berkeley Technical Report No. UCB/EECS-2012-42*

### **Transforming Community-based Healthcare with CommScape**

Kuang Chen, **Kurtis Heimerl**, Tapan Parikh, Christine Robson and Beth Trushkowsky. *University of California, Berkeley Technical Report No. UCB/EECS-2009-155*

### **Enabling Innovation Below the Communication API**

Ganesh Ananthanarayanan, **Kurtis Heimerl**, Matei Zaharia, Michael Demmer, Teemu Koponen, Arsalan Tavakoli, Scott Shenker, Ion Stoica. *University of California, Berkeley Technical Report UCB/EECS-2009-141*

## Teaching Experience

### **University of Washington**

**Seattle, WA 2017, 2018, 2019**

Lead instructor of CSE461 and CSEP 561 Computer Networks. Led classes of over eighty students and developed new course content.

<b>University of Washington</b>	<b>Seattle, WA 2016, 2017, 2020</b>
Lead instructor of CSE599 and CSEP 599 Information Communication Technologies and Development (ICTD) and CSE599 Computing for Social Good. Created the courses, including the syllabus and grading content.	
<b>University of California, Berkeley</b>	<b>Berkeley, CA, 2013</b>
Summer Undergraduate Program in Engineering Research at Berkeley (SUPERB) Mentor for Cristine Dierk working on communitysourcing and Mark Watt working on cellular security	
<b>University of California, Berkeley</b>	<b>Berkeley, CA 2012</b>
Lead Instructor of undergraduate class CS-194-22: Cellphones as a computing platform	
<b>University of California, Berkeley</b>	<b>Berkeley, CA, 2011</b>
Summer Undergraduate Program in Engineering Research at Berkeley (SUPERB) Mentor for Kehontas Rowe from Mills College working on communitysourcing.	
<b>University of California, Berkeley</b>	<b>Berkeley, CA 2010</b>
Graduate Student Instructor of graduate class CS-294-35: Cellphones as a computing platform under Professor Eric Brewer.	
<b>University of Washington</b>	<b>Seattle, WA 2006-2007</b>
Teacher's assistant for operating systems courses under Professor Ed Lazowska	
<b>University of Washington</b>	<b>Seattle, WA 2005</b>
Teacher's assistant for introductory computer programming courses under Professor Hal Perkins and Lecturer Stuart Reges.	

## Academic Service

<b>Demos Chair: ACM ICTD</b>	<b>2019</b>
<b>Notes Chair: ACM COMPASS</b>	<b>2018</b>
<b>Program Committee: ACM MobiSYS</b>	<b>2020</b>
<b>Program Committee: ACM CHI</b>	<b>2020</b>
<b>Program Committee: ACM COMPASS</b>	<b>2018,2019,2020</b>
<b>Program Committee: ICTD</b>	<b>2013, 2015, 2016, 2017,2019,2020</b>
<b>Program Committee: ACM/IEEE Symposium on Edge Computing</b>	<b>2019, 2020</b>
<b>Program Committee: ACM DEV</b>	<b>2014,5</b>
<b>Program Committee: HotMobile</b>	<b>2016</b>
<b>Program Committee: CHI Work-in-Progress</b>	<b>2013, 2014</b>

## Selected Presentations

### **Technologies for Decentralized Urban Community Cellular Networks**

*IETF Global Alliance For Internet For All (GALA) Working Group, July 2019, Montreal, Quebec, Canada*

### **Community Networking @ UW**

*ISAT SNAP DARPA Workshop, April 2019, Berkeley, California, USA*

### **Expanding Cellular Coverage with Community Networks**

*Catholic Relief Services Webinar, September 2017, Online*

### **Community Cellular Networks**

*Asia Institute of Technology Networking Seminar, July 2017, Bangkok, Thailand*

### **Community Cellular Networks**

*GSM Association Lunch, June 2017, London, UK*

### **Community Cellular Manager**

*OpenCellular Workshop, June 2017, Nairobi, Kenya*

### **Expanding Cellular Coverage with Community Networks**

*NYC Cellular Class, February 2017, New York, New York, USA*

### **Community Cellular Manager**

*TIP Summit, November 2016, Menlo Park, California, USA*

### **Community Cellular Networks: Infrastructure for Financial Inclusion**

*Evidence to Action, May 2016, San Francisco, California, USA*

### **Community Cellular Networks**

*Liberation Technology Seminar, October 2015, Palo Alto, California, USA*

**Community Cellular Networks***Royal Holloway University Seminar*, April 2015, Egham, UK**Community Cellular Networks***University of Indonesia Networks Seminar*, March 2015, Jakarta, Indonesia**Community Cellular Networks***Rightscon Manila*, March 2015, Manila, Philippines**Community Cellular***Indonesian Broadcasting Expo (IBX)* October 2014, Bandung, Indonesia**Community Cellular***Jagongan Media Rakyat (JMR)* October 2014, Jogjakarta, Indonesia**GSM White Spaces: An Opportunity for Rural Coverage**

New York University, September 2014, NYC, NY

**Community Cellular Networks**

MIT D-Lab, September 2014, Boston, MA

**Building Community Cellular Networks With Endaga***EmTech* September 2014, Boston, MA**Building Community Cellular Networks With Endaga***USAID Frontiers in Development* September 2014, Washington, DC**Technology and Infrastructure for Developing Regions**

Facebook/Internet.org, July 2014, Palo Alto, CA

**Community Cellular Networks in Rural Papua, Indonesia**

Center for Southeast Asia Studies, February 2014, Berkeley, California

**Building and Running Community Cellular Networks with OpenBTS***IEEE Engineering For Change Webinar*, November 2013, Broadcast Online**Technology in Delivering Social Impact***Social Impact Speaker Series*, University of California, Berkeley, November 2013, Berkeley, California, USA**Community Cellular Networks**

Google, October 2013, Mountain View, CA, USA

**Community Cellular Networks**

Facebook, October 2013, Menlo Park, CA, USA

**The Village Base Station: Community Cellular Radio***Pakistan-ICTD Workshop*, Lahore University of Management Sciences, January 2013, Lahore, Pakistan**Mobile Security Survival Guide: What Every Activist and Rights Defender Needs to Know***Google Internet at Liberty*, June 2012, Washington DC, USA**Communitysourcing: Engaging Local Crowds to Perform Expert Work Via Physical Kiosks***BiD Seminar*, University of California, Berkeley, April 2012, Berkeley, California, USA**Introduction to OpenBTS/hands-on hacking**

Lookout Mobile Security, March 2012, San Francisco, California, USA

**The Evil Telco***OpenBTS HackDay - the Open Mobile Network*, June 2011, New York, New York, USA**MetaMouse: Improving the Sharing of Existing Applications***CITRIS Talk*, University of California, Berkeley, March 2010, Berkeley, California, USA

## References

**Eric Brewer**

Professor, Computer Science, University of California, Berkeley

[brewer@eecs.berkeley.edu](mailto:brewer@eecs.berkeley.edu)**Tapan Parikh**

Associate Professor, Cornell Tech

[tapan@represent.org](mailto:tapan@represent.org)**Richard Anderson**

Professor, Computer Science, University of Washington

[anderson@cs.washington.edu](mailto:anderson@cs.washington.edu)

**Bill Thies**  
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