

## VIVEK K. SINGH

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### PROFESSIONAL PREPARATION

#### MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Cambridge, MA

*Post-Doctoral Associate, Human Dynamics Group, MIT Media Lab*

Sep 2012-

- Research Focus: Understanding and influencing human behavior using social, behavioral, 'Big Data'.
- Research Interests: Big Data Analytics, Computational Social Science, Mediated Human Interaction.
- *Mentor: Professor Alex 'Sandy' Pentland*

#### UNIVERSITY OF CALIFORNIA, IRVINE

Irvine, CA

*Ph.D., Information and Computer Science*

2007-2012

- Thesis Topic: "Personalized Situation Recognition", Graduation: Aug 2012.
- Research Interests: Personalized Decision Systems, Multimedia Information Systems, Social Media.
- *Advisor: Professor Ramesh Jain*

#### NATIONAL UNIVERSITY OF SINGAPORE

Singapore

*Master of Computing, (Computer Science)*

2003-2005

*Bachelor of Engineering, (Computer Engineering)*

1998-2002

- Master's Thesis: "Cooperative multi-camera surveillance using model predictive control".
- Fully sponsored for undergraduate studies under the SIA-NOL scholarship. (One of 25 candidates selected from over 8,000 applicants nation-wide in India).

### RESEARCH EXPERIENCE

#### MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Cambridge, MA

**Post-doctoral Research**

Sep 2012-

- **Social Reality Mining:** Devised network data analysis methods to analyze one of the richest *real-world* social behavior datasets (<http://realitycommons.media.mit.edu/>) to study the effect of social behavior on various facets (e.g. happiness, spending, and health) of human life. One study has found correlations between the *social behavior* of users measured via different modalities like call, SMS, Bluetooth, and GPS logs and their *spending behavior*. Second study has found that the network topology, information flow, and cohesion in the community can be used to predict the average happiness level. Work in progress to utilize these data to provide explicit and implicit recommendations for users to undertake different actions in health and wellness settings.
- **Privacy of Personal Data:** Design and development of a framework that allows users to share their personal information with different service providers while maintaining certain guarantees on their privacy. Work in progress in defining an 'EigenBehaviors' based approach for translating user data into higher semantic descriptors that support privacy protection as well as the utility of data. Second work in progress on quantifying the effect of 'second-hand smoke' based methods on stopping information leakage in social settings.

**UNIVERSITY OF CALIFORNIA, IRVINE**

Irvine, CA

**Doctoral Research**

2007-2012

- **Situation Recognition:** Designed a framework for translating social media and other location-based streams into personalized situations. It allows users of varying expertise levels to model different situations of interest by selecting, combining, visualizing, and analyzing heterogeneous data streams (e.g. Twitter, mobile sensors, images, weather, traffic). The developed system (EventShop) can be graphically configured to detect situations and generate personalized alerts for millions of end users. Applications studied include Thailand Flood mitigation, Daily Asthma recommendations, and new business store location analysis. Sandbox version of EventShop is available at <http://auge.ics.uci.edu/eventshop/> and a demo is available at <http://youtu.be/gA3sVAgEL2I>. (Public release planned soon.)
- **Tele-presence:** Designed and implemented a system for connecting multiple environments over the Web. The system detects different situations in each environment and automatically switches to the most suitable devices (cameras, microphones, speakers, display), thus allowing the users to focus on interaction rather than the device constraints.
- **Social Dynamics:** Created a Game-theoretic model of user behavior on social media sites. The model can estimate the optimal contribution strategy for each rational user, resultant community behavior, and allows the system designer to exploit the selfishness of end users to design incentive mechanisms which will optimize system performance while still benefiting the users.

**KODAK RESEARCH LABS**

Rochester, NY

**Research Intern**

2010

- **Shared Media Reliving:** Designed and developed a system which allows each user to have a personalized reliving experience from media collections shared over social networks. The system creates audio-visual shows which are aesthetically pleasing, yet interactive and semantically drivable based on people, locations, time, and events discovered in the media collection; thus allowing each user to relive experiences from their own perspective.

**NATIONAL UNIVERSITY OF SINGAPORE**

Singapore

**Research Assistant**

2002, 2007

- **Video Surveillance:** Developed a multi-camera surveillance system that countered delay problems in multi-sensor environments by combining Model Predictive Control with a cooperative-competition strategy.
- **Interactive Story-telling:** Developed an environment to allow users to collaboratively write stories in natural language which were dynamically converted into animated stories by matching user text with a corpus of video clips and descriptions.

**TEACHING EXPERIENCE (*FULL-TIME*)****INSTITUTE OF TECHNICAL EDUCATION**

Singapore

**Lecturer (Full-time): Web and Multimedia**

2002-2006

**Computing**

- Four years of teaching experience in the field of Multimedia Computing and Computer Programming.
- Courses taught: *Databases, Programming, Computer Architecture, Multimedia Production, Digital Logic and Networking.*
- Mentored student teams in multiple industrial collaboration driven projects.

## AWARDS AND ACHIEVEMENTS

- **1<sup>st</sup> prize** for predicting crime patterns in London in ***Datathon on “Big Data for Social Good”*** organized by O<sub>2</sub>, MIT, Telefonica and Open Data Institute, at Campus Party, London, Sep 2013.
- Selected as an ***“Emerging leader in Multimedia Research”***, by IBM Research Labs, NY. One of 10 selected world-wide in 2009.
- ***Best Paper Award*** at ACM Workshop on Social Media (WSM 2009) co-located with ACM Multimedia Conference.
- ***Best Student Paper*** at IEEE Workshop on Situation Management (SIMA 2009).

## PROFESSIONAL SERVICE

- **Conference/Workshop Organization**
  - **Co-general Chair:** First ACM Workshop on ‘Personal Data Meets Distributed Multimedia’, co-located with ACM Multimedia Conference, Oct 2013, Barcelona, Spain.
  - **TPC Area Chair:** ACM International Conference on Multimedia, Area: Big and Broad Multimedia Streams (tentative), 2014, Orlando, Florida, USA.
  - **Workshops Co-Chair:** International Conference on Sensor Systems and Software, 2014, Warwick, Great Britain.
- **Co-edited Book:** *Geo-Intelligence and Visualization through Big Data Trends*, with Burcin Bozkaya, IGI Global publishing, (forthcoming, 2014).
- **Program Committee Member:**
  - ICWSM workshop: Real-Time Analysis and Mining of Social Streams 2012,
  - PerCom workshop: Semantic Ambient Multimedia Experiences 2012,
  - ACM Multimedia Workshop: Socially Aware Multimedia 2012,
  - Multimedia and Ubiquitous Engineering Conference (MUE 2012),
  - ACM International Conference on Multimedia Retrieval (ICMR2012),
  - ACM International Conference on Multimedia (MM2013).

## FUNDING

- **Funded Research Programs:**
  - **Lead/Coordinator:** *Cyber-Security Initiative* in collaboration with the King Abdulaziz City of Science and Technology, Saudi Arabia and Center for Complex Engineering Systems, MIT.
  - **Funding Proposal Review:** NSF CAREER Proposals, 2013.

## TEACHING

- **Selected teaching at Institute of Technical Education:**
  - **Full time lecturer for 4 years:** *Databases, Programming, Computer Architecture, Multimedia Production, Digital Logic and Networking.*
- **Selected teaching at UC, Irvine:**
  - **Guest Lectures:** CS225: Next Generation Search Systems.
  - **TA/Grader:** CS222: Data Management, CS122A: Data Management Fundamentals, CS113: Computer Game Development
- **Student Mentorship:**
  - Tasuki Hirata (Independent Study, Sloan Fellow program @ MIT)
  - Kumar Abhinav (M.S., MIT)
  - Patrick Marx (UROP, EECS @ MIT)
  - Rex Lam (UROP, EECS @ MIT)
  - Shy Huang (MS, University of Winnipeg), co-advised with Pradeep Atrey.

## PUBLICATIONS

### Journals/ Book chapters: (9),

1. **V. K. Singh\***, *L. Freeman\**, *B. Lepri*, and *A. Pentland*, *Classifying Spending Behavior using Socio-Mobile Data*, ASE Human Journal, 2013. (\* denotes equal contribution)
2. **V.K. Singh\***, *E. Shmueli\**, *B. Lepri*, and *A.S. Pentland*, *Sensing, Understanding, and Shaping Human Behavior*, IEEE Transactions on Computational Social Systems, (Invited paper, \* denotes equal contribution), 2013
3. **V. K. Singh**, *M. Gao*, and *R. Jain*, *Towards Cyber-Physical Response Systems*, IEEE Pervasive Computing (Under Review), 2013.
4. **V. K. Singh**, *P. Krafft*, and *A. Pentland*, *Happiness Prediction and Strength of Ties*, (Working Paper). 2013.
5. *A. Abdulkareem*, **V.K. Singh**, *E. Shmueli*, *A. Pentland*, and *A. Alfaris*, *An Eigenbehavior Approach for Behavioral Privacy*, (Working Paper). 2013.
6. **V. K. Singh**, *R. Jain* and *M. Kankanhalli*, *Mechanism Design for Incentivizing Social Media Contributions*, in Social Media and Modeling (Eds. Hoi, Luo, Boll, Xu, Jin, King), Springer-Verlag London Limited, 2011.
7. **V. K. Singh**, *H. Pirsiavash*, *I. Rishabh*, and *R. Jain*, *Towards Environment to Environment (E2E) Multimedia Communication Systems*, in Multimedia Tools and Applications, 2009.
8. **V. K. Singh** and *M. Kankanhalli*, *Adversary Aware Surveillance Systems*, IEEE Trans. Info. Forensics and Security, (TIFS), 2009.
9. **V. K. Singh**, *P. Atrey* and *M. Kankanhalli*, *Coopetitive Multi-camera Surveillance using Model Predictive Control*. Journal of Machine Vision and Applications, (MVA), 2008.

### Conferences and Workshops: (19),

10. *M. Nouh*, *A. Almatouq*, *A. Abdulkareem*, **V.K. Singh**, *E. Shmueli*, *A. Pentland*, 2014. *Social Information Leakage: Effects of Awareness and Peer Pressure on User Behavior*, Human Computer Interaction International Conference, (Accepted. To Appear.) (**HCI'14**)
11. **V. K. Singh\***, *L. Freeman\**, *B. Lepri*, and *A. Pentland*, *Social Behavior Predicts Spending Behavior*, ASE/IEEE Social Computing conference, (**SocialCom'13**).
12. *S. Pongpaichet*, **V. K. Singh**, *R. Jain* and *A. Pentland*, *Situation Fencing*, ACM MM: Workshop on Personal Data Meets Distributed Multimedia, 2013 (**ACM MM – PDM'13**).
13. **V. K. Singh**, *M. Gao*, and *R. Jain*, *Situation Recognition: An Emerging Problem for Dynamic Heterogeneous Big Multimedia*. ACM Multimedia (**MM'12**).
14. *M. Gao*, **V. K. Singh**, and *R. Jain*, *EventShop: From Heterogeneous Web Streams to Personalized Situation Detection and Control*. (Technical Note), ACM Web Science (**WebSci'12**).
15. **V. K. Singh**, *J.Luo*, *D. Joshi*, *M. Das*, *P.Lei*, *P.Stubler*, *Reliving On Demand: A Total Viewer Experience*, ACM Multimedia (**MM '11**).
16. **V. K. Singh**, *From Multimedia Data to Situation Detection*. (Doctoral Symposium) ACM Multimedia (**MM '11**).
17. *R. Jain*, **V.K. Singh**, and *M. Gao*, *Social Life Networks for the Middle of the Pyramid*. WWW Workshop on Social Media Engagement, (**WWW-SoME'11**)
18. **V. K. Singh**, *M. Gao*, and *R. Jain*, *Social pixels: Genesis and Evaluation*. ACM Multimedia (**MM '10**).
19. **V. K. Singh** and *R. Jain*: *Structural Analysis of the Emerging Event-Web*. (Poster) World Wide Web Conference (**WWW'10**).
20. **V. K. Singh**, *R. Jain* and *M. Kankanhalli*, *Motivating Contributors in Social Media Networks*. **Best Paper**: ACM Multimedia- Workshop on Social Media, (**ACM MM-WSM'09**)
21. **V. K. Singh** and *R. Jain*, *Situation-based Control for Cyber Physical Environments*, **Best student paper**: IEEE workshop on situation management (**IEEE SIMA'09**)
22. *M. Paleari*, **V.K. Singh**, *B. Huet*, and *R. Jain*, *Toward Environment-to-Environment (E2E) Affective Sensitive Communication Systems*, ACM Multimedia- Workshop on Multimedia technology for distance learning, (**ACM MM-MTDL'09**).
23. *M. Saini*, **V.K. Singh**, *R. Jain*, and *M. Kankanhalli*, *Multimodal Observation Systems*, (Short Paper) ACM Multimedia, (**MM'08**)
24. **V.K. Singh**, *H. Pirsiavash*, *I. Rishabh*, and *R. Jain*, *Towards Environment to Environment (E2E) Multimedia Communication Systems*, ACM MM- Workshop on Semantic Ambient Media Experiences, (**ACM MM-SAME'08**).
25. **V. K. Singh**, *P. Atrey* and *M. Kankanhalli*, *Coopetitive Multimedia Surveillance*, International Conference on Multimedia Modeling (**MMM'07**).
26. **V. K. Singh** and *M. Kankanhalli*, *Towards adversary aware surveillance systems*, Int. Conf. on Multimedia and Expo, (**ICME'07**).
27. *G. SivaRam*, *K.R. Ramkrishnan*, *P. Atrey*, **V.K. Singh**, and *M. Kankanhalli*, *A Design Methodology for Selection and Placement of Sensors in Multimedia Surveillance Systems*, ACM Multimedia-Workshop on Video Surveillance and Sensor Networks, (**ACM MM-VSSN'06**)
28. **V. K. Singh** and *P.K. Atrey*, *Coopetitive Visual Surveillance using Model Predictive Control*, ACM Multimedia-Workshop on Video Surveillance and Sensor Networks, (**ACM MM-VSSN'05**)

## SELECTED INVITED TALKS

- 1) *Penn State University*, Information Science and Technology Department, Feb 2014 (tentative).
- 2) *Rutgers University*, LIS Department, Feb 2014 (tentative).
- 3) *Wright State University*, CS Department, Feb 2014 (tentative).
- 4) *Center for Complex Engineering Systems Workshop*, MIT, Nov 2013.
- 5) *Dagstuhl Seminar on Physical-Cyber-Social Computing*, Schloss Dagstuhl, Oct 2013.
- 6) *C4IT Talk Series*, George Mason University, Sep 2013.
- 7) *Macro Connections Talk Series*, MIT Media Lab, Sep 2013.
- 8) *Quantified Community Workshop, Center for Urban Sensing and Progress*, New York University, Sep 2013.
- 9) *Barabasi Lab*, Northeastern University, Aug 2013.
- 10) *Symposium on Success (Ignite Talk), ISQSS*, Harvard University, May 2013.
- 11) *CS Department Talk*, Indian Institute of Technology, Delhi, Apr 2013.
- 12) *HumNet Lab, Department of Civil Engineering*, MIT, Mar 2013.
- 13) *Event Information Management Workshop*, University of California, Irvine, Mar 2013.
- 14) *Mobile Sensing Workshop, Center for Urban Sensing and Progress*, New York University, Mar 2013.
- 15) *Camera Culture Talk Series*, MIT Media Lab, Cambridge, MA, Dec 2012.
- 16) *Raytheon BBN Technologies*, Cambridge, MA, Jun 2012
- 17) *Cisco Research*, San Jose, CA, May 2012

## ACADEMIC REFEREES

- 1) **Professor Alex (Sandy) Pentland**,  
Toshiba Professor of Media, Arts, and Sciences,  
Massachusetts Institute of Technology.  
[pentland@mit.edu](mailto:pentland@mit.edu)  
Phone: (617) 253-0648
- 2) **Professor Ramesh Jain**,  
Bren Professor in Bren School of Information and Computer Sciences,  
University of California, Irvine.  
[jain@ics.uci.edu](mailto:jain@ics.uci.edu)  
Phone: (949) 824-0133
- 3) **Professor Mohan Kankanhalli**,  
Professor, School of Computing, and Associate Provost (Graduate Education),  
National University of Singapore.  
[mohan@comp.nus.edu.sg](mailto:mohan@comp.nus.edu.sg)  
Phone: (+65) 6516-6738
- 4) **Professor Cesar Hidalgo**,  
ABC Career Development Assistant Professor,  
MIT Media Lab,  
[hidalgo@mit.edu](mailto:hidalgo@mit.edu)  
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