

15-821/18-843: Mobile and Pervasive Computing

Fall 2025 Readings

Mahadev Satyanarayanan, Asim Smailagic, and Padmanabhan Pillai

1. Introduction and Background

- [Weiser1991] Weiser, M.
The Computer for the 21st Century.
Scientific American, September, 1991.
- [Satya1996] Satyanarayanan, M.
Fundamental Challenges in Mobile Computing.
In *Proceedings of the Fifteenth ACM Symposium on Principles of Distributed Computing*. Philadelphia, PA, May, 1996.
- [Satya2001] Satyanarayanan, M.
Pervasive Computing: Vision and Challenges.
IEEE Personal Communications 8(4), August, 2001.
- [Ebling2017] Ebling, M. and Want, R.
Satya Revisits ‘Pervasive Computing: Vision and Challenges’.
IEEE Pervasive Computing 16(3), July-September, 2017.

2. Ubiquitous Data Access

- [Kistler1992] Kistler, J.J., Satyanarayanan, M.
Disconnected Operation in the Coda File System.
ACM Transactions on Computer Systems 10(1), February, 1992.
- [Muthitacharoen2001] Muthitacharoen, A., Chen, B., Mazieres, D.
A Low-bandwidth Network File System.
In *Proceedings of the 18th ACM Symposium on Operating Systems Principles*. Chateau Lake Louise, Alberta, October, 2001.
- [Lee2002b] Lee, Y.W., Leung, K.S., Satyanarayanan, M.
Operation Shipping for Mobile File Systems.
IEEE Transactions on Computers 51(12), December, 2002.
- [Flinn2003] Flinn, J., Sinnamohideen, S., Tolia, N., Satyanarayanan, M.
Data Staging on Untrusted Surrogates.
In *Proceedings of FAST’03: 2nd USENIX Conference on File and Storage Technologies*. San Francisco, CA, March, 2003.
- [Tolia2007] Tolia, N., Satyanarayanan, M., Wolbach, A.
Improving Mobile Database Access over Wide-area Networks without Degrading Consistency.
In *MobiSys ’07: Proceedings of the 5th International Conference on Mobile Systems, Applications and Services*. San Juan, Puerto Rico, 2007.
- [Bai2016] Bai, Y., Zhang, X., Zhang, Y.
Improving Cloud Storage Usage Experience for Mobile Applications.
In *Proceedings of the 7th ACM SIGOPS Asia-Pacific Workshop on Systems*. Hong Kong, China, August, 2016.

3. Exploiting Virtual Machines

- [Caceres2005] Caceres, R., Carter, C., Narayanaswami, C., Raghunath, M.
Reincarnating PCs with Portable SoulPads.
In *Proceedings of the 3rd International Conference on Mobile Systems, Applications, and Services*.
Seattle, WA, June, 2005.
- [Satya2007] Satyanarayanan, M., Gilbert, B., Touns, M., Tolia, N., Surie, A., O'Hallaron, D., Wolbach, A., Harkes, J., Perrig, A., Farber, D., Kozuch, M., Helfrich, C., Nath, P., Lagar-Cavilla, A.
Pervasive Personal Computing in an Internet Suspend/Resume System.
IEEE Internet Computing 11(2), March-April, 2007.
- [Surie2008] Surie, A., Lagar-Cavilla, A., de Lara, E., Satyanarayanan, M.
Low-Bandwidth VM Migration via Opportunistic Replay.
In *Proceedings of HotMobile 2008: Ninth Workshop on Mobile Computing Systems and Applications*.
Napa Valley, CA, February, 2008.
- [Satya2009] Satyanarayanan, M., Bahl, P., Caceres, R., Davies, N.
The Case for VM-Based Cloudlets in Mobile Computing.
IEEE Pervasive Computing 8(4), September--December, 2009.
- [Ha2013b] Ha, K., Pillai, P., Richter, W., Abe, Y., Satyanarayanan, M.
Just-in-Time Provisioning for Cyber Foraging.
In *Proceedings of the 11th International Conference on Mobile Systems, Applications, and Services (MobiSys 2013)*. Taipei, Taiwan, June, 2013.
- [Ha2017] Ha, K., Abe, Y., Eiszler, T., Chen, Z., Hu, W., Amos, B., Upadhyaya, R., Pillai, P., Satyanarayanan, M.
You Can Teach Elephants to Dance: Agile VM Handoff for Edge Computing.
In *Proceedings of the Second IEEE/ACM Symposium on Edge Computing*. San Jose, CA, October, 2017.

4. Resource-driven Dynamic Adaptation

- [Noble1997] Noble, B.D., Satyanarayanan, M., Narayanan, D., Tilton, J.E., Flinn, J., Walker, K.R.
Agile Application-Aware Adaptation for Mobility.
In *Proceedings of the 16th ACM Symposium on Operating Systems and Principles*, pages 276--287.
Saint-Malo, France, October, 1997.
- [Flinn1999] Flinn, J., Satyanarayanan, M.
Energy-aware Adaptation for Mobile Applications.
In *Proceedings of the 17th ACM Symposium on Operating Systems and Principles*. Kiawah Island, SC,
December, 1999.
- [Martin1999] Martin, T.L., Siewiorek, D.P.
Non-ideal Battery Properties and Low Power Operation.
In *Proceedings of the Third International Symposium on Wearable Computers*. San Francisco, CA,
October, 1999.
- [Pillai2001] Pillai, P., Shin, K.G.
Real-Time Dynamic Voltage Scaling for Low-Power Embedded Operating Systems.
In *Proceedings of the 18th ACM Symposium on Operating Systems Principles*. Chateau Lake Louise,
Alberta, October, 2001.
- [Sorber2005] Sorber, J., Banerjee, N., Corner, M.
Turducken: Hierarchical Power Management for Mobile Devices.
In *Proceedings of the 3rd International Conference on Mobile Systems, Applications, and Services*.
Seattle, WA, June, 2005.
- [Cuervo2010] Cuervo, E., Balasubramanian, A., Chok, D., Wolman, A., Saroiu, S., Chandra, R., Bahl, P.
MAUI: Making Smartphones Last Longer with Code Offload.
In *Proceedings of the 8th International Conference on Mobile Systems, Applications, and Services (MobiSys)*. San Francisco, CA, June, 2010.

5. Mobile Hardware Technologies

- [Narayanaswami2002a] Narayanaswami, C., Kamijoh, K., Raghunath, M., Inoue, T., Cipolla, T., Sanford, J., Schlig, E., Venkiteswaran, S., Guniguntala, D., Kulkarni, V., Yamazaki, K.
IBM's Linux Watch: The Challenges of Miniaturization.
IEEE Computer 35(1), January, 2002.
- [Shen2007] Shen, G., Li, Y., Zhang, Y.
MobiUS: Enable Together-viewing Video Experience Across Two Mobile Devices.
In *MobiSys '07: Proceedings of the 5th International Conference on Mobile Systems, Applications and Services*. San Juan, Puerto Rico, 2007.
- [Lee2008] Lee, J.C.
Hacking the Nintendo Wii Remote.
IEEE Pervasive Computing 7(3), July-September, 2008.
- [McCaffrey2008] McCaffrey, C., Chevalerias, O., O'Mathuna, C., Twomey, K.
Swallowable-Capsule Technology.
IEEE Pervasive Computing 7(1), January-March, 2008.
- [McDonnell2010] McDonnell, J., Waters, J., Loh, W., Castle, R., Dickin, F., Balinsky, H., Shepherd, K.
Memory Spot: A Labeling Technology.
IEEE Pervasive Computing 9(2), April-June, 2010.
- [Siewiorek2017] Siewiorek, D.
Wearable Computing: Retrospectives on the First Decade.
GetMobile 21(1), March, 2017.

6. Sensing & Actuation

- [Efstratiou2007] Efstratiou, C., Davies, N., Kortuem, G., Finney, J., Hooper, R., Lowton, M.
Experiences of Designing and Deploying Intelligent Sensor Nodes to Monitor Hand-Arm Vibrations in the Field.
In *MobiSys '07: Proceedings of the 5th International Conference on Mobile Systems, Applications and Services*. San Juan, Puerto Rico, 2007.
- [Chebrolu2008] Chebrolu, K., Raman, B., Mishra, N., Valiveti, P., Kumar, R.
BriMon: A Sensor Network System for Railway Bridge Monitoring.
In *Proceedings of the 6th International Conference on Mobile Systems, Applications, and Services*. Breckenridge, CO, June, 2008.
- [Simoens2013] Simoens, P., Xiao, Y., Pillai, P., Chen, Z., Ha, K., Satyanarayanan, M.
Scalable Crowd-Sourcing of Video from Mobile Devices.
In *Proceedings of the 11th International Conference on Mobile Systems, Applications, and Services (MobiSys 2013)*. Taipei, Taiwan, June, 2013.
- [Ha2014] Ha, K., Chen, Z., Hu, W., Richter, W., Pillai, P., Satyanarayanan, M.
Towards Wearable Cognitive Assistance.
In *Proceedings of the Twelfth International Conference on Mobile Systems, Applications, and Services*. Bretton Woods, NH, June, 2014.
- [Wang2017] Wang, J., Amos, B., Das, A., Pillai, P., Sadeh, N., Satyanarayanan, M.
A Scalable and Privacy-Aware IoT Service for Live Video Analytics.
In *Proceedings of ACM Multimedia Systems*. Taipei, Taiwan, June, 2017.
- [George2023] George, S., Turki, H., Feng, Z., Ramanan, D., Pillai, P., Satyanarayanan, M.
Low-Bandwidth Self-Improving Transmission of Rare Training Data.
In *Proceedings of the 29th Annual International Conference on Mobile Computing and Networking (ACM MobiCom '23)*. Madrid, Spain, October, 2023.

7. Novel Wireless Technologies

- [Halperin2010] Halperin, D., Hu, W., Sheth, A. Wetherall, D.
802.11 with Multiple Antennas for Dummies.
SIGCOMM Comput. Commun. Rev. 40(1), Jan, 2010.
- [Bharadia2013] Bharadia, D., McMilin, E., Katti, S.
Full duplex radios.
ACM SIGCOMM computer communication review 43(4), August, 2013.
- [Liu2013] Liu, V., Parks, A., Talla, V., Gollakota, S., Wetherall, D., Smith, J. R.
Ambient backscatter: wireless communication out of thin air.
ACM SIGCOMM Computer Communication Review 43(4), August, 2013.
- [Rappaport2013] Rappaport, T. S., Sun, S., Mayzus, R., Zhao, H., Azar, Y., Wang, K., Gutierrez, F.
Millimeter wave mobile communications for 5G cellular: It will work!
IEEE Access 1, 2013.
- [Boccardi2014] Boccardi, F., Heath, R. W., Lozano, A., Marzetta, T. L., Popovski, P.
Five disruptive technology directions for 5G.
IEEE Communications 52(2), 2014.
- [Dongare2018] Dongare, A., Narayanan. R., Gadre, A., Luong, A., Balanuta, A., Kumar, S., Iannucci, B, Rowe, A.
Charm: Exploiting Geographical Diversity through Coherent Combining in Low-Power Wide-Area Networks.
In *2018 17th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN)*. 2018.

8. Security & Privacy

- [Beresford2003] Beresford, A.R., Stajano, F.
Location Privacy in Pervasive Computing.
IEEE Pervasive Computing 2(1), January-March, 2003.
- [Corner2003] Corner, M.D., Noble, B.D.
Protecting Applications with Transient Authentication.
In *Proceedings of MobiSys 2003: The First International Conference on Mobile Systems, Applications, and Services*. San Francisco, CA, May, 2003.
- [Surie2007] Surie, A., Perrig, A., Satyanarayanan, M., Farber, D.
Rapid Trust Establishment for Pervasive Personal Computing.
IEEE Pervasive Computing 6(4), October-December, 2007.
- [Enck2010] Enck, W., Gilbert, P., Chun, B., Cox, L., Jung, J., McDaniel, P., Sheth, A.
TaintDroid: an Information-flow Tracking System for Realtime Privacy Monitoring on Smartphones.
In *Proceedings of OSDI'10: the 9th USENIX Conference on Operating Systems Design and Implementation*. Vancouver, BC, 2010.
- [Geambasu2011] Geambasu, R., John, J., Gribble, S., Kohno, T., Levy, H.
KeyPad: An Auditing File System for Theft-Prone Devices.
In *Proceedings of EuroSys 2011*. Salzburg, Austria, April, 2011.
- [Hong2017] Hong, J.
The Privacy Landscape of Pervasive Computing.
IEEE Pervasive Computing 16(3), July-September, 2017.

9. Location & Context Awareness

- [Ward1997] Ward, A., Jones, A., Hopper, A.
A New Location Technique for the Active Office.
IEEE Personal Communications 4(5), October, 1997.
- [Anhalt2001] Anhalt, J., Smailagic, A., Siewiorek, D., Gemperle, F., Salber, D., Weber, S., Beck, J., Jennings, J.
Toward Context-Aware Computing: Experiences and Lessons.
IEEE Intelligent Systems 16(3), May/June, 2001.
- [Davies2001] Davies, N., Cheverst, K., Mitchell, K., Efrat, A.
Using and Determining Location in a Context-Sensitive Tour Guide.
IEEE Computer 33(8), August, 2001.
- [Hightower2001] Hightower, J., Boriello, G.
Location Systems for Ubiquitous Computing.
IEEE Computer 33(8), August, 2001.
- [Harle2005] Harle, R., Hopper, A.
Deploying and Evaluating a Location-Aware System.
In *Proceedings of the 3rd International Conference on Mobile Systems, Applications, and Services*.
Seattle, WA, June, 2005.
- [Cranshaw2012] Cranshaw, J., Schwartz, R., Hong, J.I., Sadeh, N.
The Livelihoods Project: Utilizing Social Media to Understand the Dynamics of a City.
In *Proceedings of the Sixth International AAAI Conference on Weblogs and Social Media*. 2012.

10. Design Methodologies & Infrastructure

- [Gemperle1998] Gemperle, F., Kasabach, C., Stivoric, J., Bauer, M., Martin, R.
Design for Wearability.
In *Proceedings of the Second International Symposium on Wearable Computers*. Pittsburgh, PA,
October, 1998.
- [Narayanaswami2002b] Narayanaswami, C., Raghunath, M.T.
Designing a New Form Factor for Wearable Computing.
IEEE Pervasive Computing 1(4), October-December, 2002.
- [Garlan2002] Garlan, D., Siewiorek, D.P., Smailagic, A., Steenkiste, P.
Project Aura: Toward Distraction-Free Pervasive Computing.
IEEE Pervasive Computing 1(2), April-June, 2002.
- [Balan2007] Balan, R., Gergle, D., Satyanarayanan, M., Herbsleb, J.
Simplifying Cyber Foraging for Mobile Devices.
In *MobiSys '07: Proceedings of the 5th International Conference on Mobile Systems, Applications and Services*. San Juan, Puerto Rico, 2007.
- [Luo2007] Luo, L., Siewiorek, D.P.
KLEM: A Method for Predicting User Interaction Time and System Energy Consumption during
Application Design.
In *Proceedings of the 11th IEEE International Symposium on Wearable Computers*. Boston, MA,
October, 2007.
- [Davies2017] Davies, N., Clinch, S.
Pervasive Data Science.
IEEE Pervasive Computing 16(3), July-September, 2017.