

## Alon Efrat — Curriculum Vitae

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### Education

- 1998 Ph.D. Computer Science, Tel-Aviv University, Israel  
Thesis: *Optimal Geometric Location Problems*  
Advisor: Prof. Micha Sharir
- 1993 M.Sc. Computer Science, The Technion, Israel  
Thesis: *Maintaining the Smallest Enclosing Circle*  
Advisors: Prof. Alon Itai and Prof. Reuven Bar-Yehuda
- 1991 B.Sc. Applied Mathematics, Mathematics Department, The Technion, Israel

### EMPLOYMENT and APPOINTMENTS

- 2007 - present Associate Professor, Computer Science Department, University of Arizona
- 2000 - 2007 Assistant Professor, Computer Science Department, University of Arizona
- 2000 - 2002 Visiting Researcher and Consultant, IBM Almaden Research Center
- 1999 - 2000 Post Doctorate Research Fellow (Sponsor: Leonidas Guibas), Stanford University
- 1994 - 1998 Instructor, Computer Science Department, Tel-Aviv University, The Technion, Israel

## Services to the community

- On the editorial board of the *International Journal of Computational Geometry and Applications (IJCGA)*, the *Elsevier Journal of Discrete Algorithms (JDA)*.
- Conference local chair, the 22th *ACM Symposium of Computational Geometry (SoCG)*, Sedona, Arizona 2006.
- Program Committee member for the 21th. *ACM Symposium of Computational Geometry (SoCG)* 2005 .
- A guest editor of the special issue of the *International Journal of Computational Geometry and Applications (IJCGA)* dedicated to selected papers from the ACM Symposium of Computational Geometry (SoCG) 2005.
- Co-Chair an *NSF Workshop on Geometric Approaches to Ad Hoc and Sensor Networks*. 2006.
- Program Committee member of the *IEEE International Conference on Communications, Wireless Adhoc and Sensor Networks (WAS ICC)* 2007.
- Program Committee member of the *IEEE 3rd Int. conf. on Broadband Communication, Networks and systems (BROADNET)*, 2006–2009.
- Program committee member of the 50 *Annual IEEE Symposium on Foundations of Computer Science (FOCS 2009)*.
- Program Committee member of the *IEEE Conference on Computer Communications (INFOCOM)*, 2009–2011.
- Program Committee member of the *ACM Symp. Computational Geometry (SoCG)*, 2013.
- Co-Chair of *International Symposium on Algorithms and Experiments for Sensor Systems, Wireless Networks and Distributed Robotics (ALGOSENSORS)* 2014.
- Co-Chair of the *Workshop on Geometric Optimization in Wireless Communication and Sensing*. In conjunction with SoCG2014.
- Program Committee member for the *ACM International Symposium on Advances in Geographic Information Systems (ACM GIS)*, 2007–2015.
- Program Committee member for the *International Conference on Distributed Computing in Sensor Systems (DCOSS)*, 2012, 2013, 2015.
- Program Committee member of the *International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISIGRAPP)*. 2015
- Program Committee member of the *IEEE Design of Reliable Communication Network (DRCN)*. 2015, 2016.
- NSF panel review, multiple times.

## Students and Post-Doctorate Researchers

**Mauro Margalho Coutinho** Post-Doctorate research assistant. 2012-2013. Currently a Professor from University of Amazonia, Brazil.

**Cesim Erten**, Post-Doctorate research assistant. 2004–2005. Currently an assistant professor at the Computer Science and Engineering Department at Isik University in Turkey.

**Carola Wenk**, Post-Doctorate research assistant. 2000-2001. Currently an associate professor at the Department of Computer Science at Tulane University.

**Aparna Das** Post-Doctorate research assistant. 2011.

**Thienne Johnson** Post-Doctorate research assistant. 2011–Current.

**Swaminathan Sankararaman** PhD student. Currently at Akamai

**Javad Taheri** PhD student. 2010-1013. Currently at Microsoft.

**Parrish Myers** Master student. 2010-2013. Currently at Raytheon.

**Jesus Arango**, PhD. 2005–2007. Currently at Cisco Systems.

**Lingesh Palaniappan**, Master student. 2001–2003. Currently at Microsoft.

**Qiyam Tung** Master student. 2009-2015. Currently at Amazon.

## List of Publications

### A. Patents

1. System and method for detecting proximity between mobile device users. US 2004/0198398.
2. Gesture Identification and Replication, Alon Efrat and Kobus Barnard (pending) 2013

### B. Book Chapters

1. “Cross-modality Indexing, Browsing and Search of Distance Learning Media on the Web.” Alon Efrat, Arnon Amir, Kobus Barnard and Qunfu Fan . Book chapter. eBook *Internet Multimedia Search and Mining*. Edited by Xian-Sheng Hua, Marcel Worring and Tat-Seng Chua.

### C. Papers in Journals

1. P.K. Agarwal, A. Efrat, M. Sharir and S. Toledo, Computing a segment-center for a planar point set, *J. Algorithms* 15 (1993), 314–323.
2. A. Efrat, M. Sharir and G. Rote, On the union of fat wedges and separating a collection of segments by a line, *Computational Geometry: Theory and Applications (CGTA)* 3 (1994), 277–288.
3. A. Efrat and C. Gotsman, Subpixel image registration using circular fiducials, *International J. of Computational Geometry and Applications (ICJTA)* 4 (1994), 403–422.
4. A. Efrat, M. Sharir and A. Ziv, Computing the smallest  $k$ -enclosing circle and related problems. *Computational Geometry: Theory and Applications (CGTA)* 4 (1995), 119–136.
5. A. Efrat and M. Sharir, A near-linear algorithm for the planar segment center problem, *Discrete and Computational Geometry (DCG)* 16 (1996), 239–257.
6. A. Efrat and O. Schwarzkopf, Separating and shattering long line segments. *Information Processing Letters (IPL)* 64 (1998), 309–314.
7. L.P. Chew, D. Dor, A. Efrat and K. Kedem, Geometric pattern matching in  $d$ -dimensional space, *Discrete and Computational Geometry (DCG)* 21 (1999) 257–274.
8. A. Efrat and M.J. Katz, On the union of  $\kappa$ -curved objects, *Computational Geometry: Theory and Applications (CGTA)* 14 (1999), 241–254.
9. A. Efrat and M. Sharir, On the complexity of the union of fat objects in the plane, *Discrete and Computational Geometry (DCG)* 23 (2000), 171–189.
10. P.K. Agarwal, A. Efrat and M. Sharir, vertical decomposition of shallow levels in 3-dimensional arrangements and its applications, *SIAM J. Computing (SICOMP)* 29 (2000), 912–953.
11. A. Efrat, M.J. Katz, F. Nielsen and M. Sharir, dynamic data structures for fat objects and their applications, *Computational Geometry: Theory and Applications (CGTA)* 15 (2000), 215–227.
12. A. Efrat and M.J. Katz, Computing an Euclidean bottleneck matching in higher dimension. *Information Processing Letters (IPL)* , 4 (2000), 169–174.
13. A. Efrat, M.J. Katz and A. Itai, Geometry helps in bottleneck matching and related problems, *Algorithmica* 1 (2001), 1–28.
14. A. Amir, A. Efrat, P. Indyk and H. Samet, efficient algorithms and regular data structures for dilation, location and proximity problems, *Algorithmica* 30 (2001), 166–187.

15. B. Aronov, A. Efrat, D. Halperin and M. Sharir, a subquadratic bound on the number of regular vertices of the union of Jordan regions, *Discrete and Computational Geometry (DCG)* 25 (2001), 203–220.
16. T. Chan and A. Efrat fly cheaply: on the minimum fuel-consumption problem. *J. Algorithms* 41 (2001), 330–337.
17. N. Davis, K. Cheverst, K. Mitchell and A. Efrat, using and determining location in a context-sensitive tour guide: the guide experience, *IEEE J. Computers* 34 (2001), 35–41.
18. A. Efrat, F. Hoffmann, K. Kriegel, C. Schultz and C. Wenk, geometric algorithms for the analysis of 2D-Electrophoresis gels, *Journal of Computational Biology (JCB)*, (special issue dedicated to papers from RECOMB 2001), 9 (2002), 299–316.
19. A. Efrat, L. J. Guibas, S. Har-Peled, J. S. B. Mitchell and T.M. Murali. New Similarity Measures Between Polylines with Applications to Morphing and Polygon Sweeping, *Discrete and Computational Geometry (DCG)* 28 (2002), 535–569.
20. A. Efrat, F. Hoffmann, K. Kriegel, C. Knauer, G. Rote and C. Wenk, covering shapes by ellipses *Algorithmica (special issue on shape algorithms)* 38 (2003), 145–160.
21. A. Amir and S. Srinivasan, Search the audio, browse the video — a generic paradigm for video collections. *Journal on Applied Signal Processing, (EURASIP)* 2 (2003), 209–222.
22. H. Alt, A. Efrat, G. Rote and C. Wenk, matching planar maps, *J. Alg.* 49 (2003) 262–283.
23. A. Efrat, the Complexity of the union of  $(\alpha, \beta)$ -covered objects, *SIAM J. Computing (SICOMP)* 34 (2005), 755–787.
24. A. Efrat, P. Indyk and S. Venkatasubramanian, pattern matching for sets of segments, *Algorithmica* 40(2004), 147-160.
25. A. Efrat, S. Kobourov and A. Lubiw, computing homotopic shortest paths efficiently, *Computational Geometry: Theory and Applications (CGTA)* 35 (2006) 162–172.
26. B. Aronov, A. Efrat, V. Koltun and M. Sharir, On the union of  $\kappa$ -round objects in three and four dimensions, *Discrete and Computational Geometry (DCG)* (special issue dedicated to *Symp. Computational Geometry (SoCG)* 2004).
27. A. Efrat, L.J. Guibas and O.A. Hall-Holt and L. Zhang, On Incremental Rendering of Silhouette Maps of a Polyhedral Scene. *Computational Geometry: Theory and Applications (CGTA)* 38(2007) 129-138.
28. O. Cheong, A. Efrat and S. Har-Peled, on finding a guard that sees most and a shop that sells most, *Discrete and Computational Geometry (DCG)* 37 (2007) 545–563.
29. A. Efrat, C. Erten and S. Kobourov. Fixed-location circular arc drawings, *Journal of Graph Algorithms and Applications*, 11 (2007) 145-164.
30. A. Efrat and S. Har-Peled, locating guards in art galleries, *Information Processing Letters (IPL)* , 4 (2000), 169-174.
31. B. Aronov, A. Efrat, V. Koltun and M. Sharir, On the union of  $\kappa$ -round objects in three and four dimensions, *Discrete and Computational Geometry (DCG)* (special issue dedicated to *Symp. Computational Geometry (SoCG)*). 36 (2006) 511-526.

32. P. Brass, E. Cenek, C. A. Duncan, A. Efrat, C. Erten, D. Ismailescu, S. G. Kobourov, A. Lubiw and J. S. B. Mitchell, On Simultaneous, Planar Graph Embeddings, *Computational Geometry: Theory and Applications (CGTA)* , 36 (2007) 117-130.
33. A. Efrat and S. Har-Peled. Locating Guards in Art Galleries. *Information Processing Letters (IPL)* 100 (2010) 238–245.
34. R. Kraft, M. Escobar, M. Narro, J. Kurtis, K. Barnard, A. Efrat and L. Restifo, "Phenotypes of Drosophila Brain Neurons in Primary Culture Reveal a Role for Fascin in Neurite Shape and Trajectory", *The Journal of Neuroscience*, 26 (2006) 8734.
35. A. Efrat, L.J. Guibas and O.A. Hall-Holt and L. Zhang, On Incremental Rendering of Silhouette Maps of a Polyhedral Scene. *Computational Geometry: Theory and Applications (CGTA)* 38(2007) 129-138.
36. O. Cheong, A. Efrat and S. Har-Peled, on finding a guard that sees most and a shop that sells most, *Discrete and Computational Geometry (DCG)* 37 (2007) 545–563.
37. A. Efrat, C. Erten and S. Kobourov. Fixed-location circular arc drawings, *Journal of Graph Algorithms and Applications*, Journal of Graph Algorithms and Applications 11 (2007) 145-164.
38. C. A. Duncan, A. Efrat, S. G. Kobourov and C. Wenk, drawing with fat edges, *International Journal of Foundations of Computer Science (IJFCS) Special Issue of on Graph Drawing*. 17 (2006), 1143-1165.
39. A. Amir, A. Efrat, J. Myllymaki, L. Palaniappan and K. Wampler, Buddy tracking — efficient proximity detection among mobile friends, *Pervasive and Mobile Computing*, 3 (2007), 489–511.
40. A. Efrat, Q. Fan and S. Venkatasubramanian, curve matching, time warping, and light fields, new algorithms for computing similarity between curves, *J. Mathematic Imaging and Vision*, 27(2007) 203-216.
41. Esther Ezra and Micha Sharir and Alon Efrat, On the performance of the ICP algorithm, *Computational Geometry, Theory and Applications (CGTA)* 41(2008) 77-93.
42. J. Arango, A. Efrat, S. Ramasubramanian, M. Krunz, S. Pink, Retransmission and Backoff Strategies for Wireless Broadcasting, *Elsevier J. Ad Hoc Networks* 8(2010), 77-95.
43. Alon Efrat, Yi Shi and Y. Thomas Hou. Algorithm design for a class of base station location problems in sensor network, *ACM/Springer J. Wireless Networks*, 15(2009) 21–38.
44. Esther M. Arkina, Sang Won Baeb, Alon Efrat, Kazuya Okamoto, Joseph S.B. Mitchell and Valentin Polishchuk, Geometric stable roommates, in *Information Processing Letters (IPL)*, 109(2009) 219-224.
45. A. Efrat , C. Erten, D. Forrester, A. Iyer, O. Kilic, S. G. Kobourov. Force-Directed Approaches to Sensor Localization, *IEEE Tran. Sensor Networks, (ToSN)* 7 (2010).
46. Q. Fan, K. Barnard A. Amir and A. Efrat, Robust Spatio-temporal Matching of Electronic Slides to Presentation Videos, *IEEE Tran. Image Processing (TIP)*, 8 (2011) 2315–2328.
47. S. Sankararaman, A. Efrat, S. Ramasubramanian and P.K. Agarwal, On Channel-Discontinuity-Constraint Routing in Wireless Networks, In *Elsevier Ad Hoc Newtorks*, 13 (2014), 153–169.
48. E. M. Arkin, A. Efrat, J. S. B. Mitchell, V. Polishchuk, S. Ramasubramanian, S. Sankararaman and J. Taheri. Data Transmission and Base-Station Placement for Optimizing Network Lifetime. In *Elsevier Ad Hoc Newtorks*. 12 (2014), 201-218.

49. D. Hay, P. K. Agarwal, A. Efrat, S. Ganjugunte, S. Sankararaman, and G. Zussman, The Resilience of WDM Networks to Probabilistic Geographical Failures, *IEEE/ACM Transaction on Networking (ToN)*, 21 (2013), 1525-1538.
50. H. Alt, E. Arkin, A. Efrat, G. Hart, F. Hurtado, I. Kostitsyna, A. Kröller, J. Mitchell, and V. Polishchuk. Scandinavian Thins on Top of Cake: New and Improved Algorithms for Stacking and Packing. *ACM J. Theory of Computing Systems (ToCS)*. 54(2014), 689-714.
51. S. Sankararaman, K. Abu-Affash, A. Efrat, S. Eriksson-Bique, V. Polishchuk, S. Ramasubramanian, and M. Segal, “Optimization schemes for protective jamming” *ACM/Springer Mobile Networks and Applications Journal (MONET.) Special Issue on Smart Object Applications and Management (MONAMI)*.
52. Liron Levin, Alon Efrat, Michael Segal, Collecting Data in Ad-Hoc Networks with Reduced Uncertainty *Elsevier J. Ad-Hoc Networks*, 17 (2014), 71-81.
53. Y. Suh, B. Moon, A. Efrat, J. Kim, S. Lee, K. S. Perumalla, D. Jefferson, A. J. Park. VET: Extent Mapping Scheme for Flash Memory Devices. *Elsevier J. of Systems Architecture JSA* 60(2014): 357-371.
54. M. Coutinho, A. Efrat, T. Johnson, A. Richa and M. Liu, Healthcare Supported by Data Mule Networks in Remote Communities of the Amazon Region, *Journal of Computer Networks and Communications*, 2014.
55. Sebastian Neumayer, Alon Efrat and Eytan Modiano, “Geographic Max-Flow and Min-Cut Under a Circular Disk Failure Model” *Computer Networks*, 77 (2015), 117-127.
56. A. Efrat, Y. Hu, S. G. Kobourov, S. Pupyrev, MapSets: Visualizing Embedded and Clustered Graphs,” *Journal of Graph Algorithms and Applications. (JGAA)*, 19 (2015), 571-593.
57. Alon Efrat, Sandor P. Fekete, Poornananda R. Gaddehosur, Joseph S. B. Mitchell Valentin Polishchuk and Jukka Suomela, “Improved approximation algorithms for relay placement” *ACM Transaction on Algorithms. (TALG)*. To appear.
58. E. Arkin, A. Efrat, C. Knauer, J. Mitchell, V. Polishchuk, G. Rote, L. Schlipf, T. Talvitie Shortest path to a segment and quickest visibility queries, *J. Computational Geometry (JoCG)* special issue dedicated to selected papers from SoCG 2015.

### C. Papers in Proceedings of Peer-Reviewed Conferences

1. A. Efrat, M. Sharir and A. Ziv, computing the smallest  $k$ -enclosing circle and related problems. (*WADS*) 1993, vol. 709, 325-336.
2. A. Efrat and C. Gotsman, subpixel image registration using circular fiducials, *Proc. of the second Israeli Symposium on Theory of Computing and Systems* 1994, 127-136.
3. A. Efrat and M. Sharir, near-linear algorithm for the planar segment center problem, *Proc. ACM-SIAM Symp. Discrete Algorithms (SODA)* 1994, 87-97.
4. P.K. Agarwal, A. Efrat and M. Sharir, vertical decomposition of shallow levels in 3-dimensional arrangements and its applications, *Symp. Computational Geometry (SoCG)*, 1995, 39-50.

5. L.P. Chew, D. Dor, A. Efrat and K. Kedem, geometric pattern matching in  $d$ -dimensional space, *3rd European Symposium on Algorithms (ESA)*, LNCS vol. 979, 1995, 264–279.
6. A. Efrat and A. Itai, improvements on bottleneck matching and related problems, using geometry. *Symp. Computational Geometry (SoCG)*, 1996, 301–310.
7. A. Efrat and M.J. Katz, computing most-uniform and minimum deviation matchings in geometric settings. *Proc. 7th Annual International Symposium on Algorithms and Computational (ISAAC)*, 1996, 115–125.
8. A. Efrat and O. Schwarzkopf, separating and shattering long line segments, *Proc. 7th Annual International Symposium on Algorithms and Computational (ISAAC)*, 1996, 36–44.
9. A. Efrat and M. Sharir, on the complexity of the union of fat objects in the plane, *Symp. Computational Geometry (SoCG)*, 1997, 104–112.
10. A. Efrat, M.J. Katz, F. Nielsen and M. Sharir, dynamic data structures for fat objects and their applications. *Proc. 5th Workshop on Algorithms and Data Structures (WADS)*, 1997, 297–396.
11. A. Efrat and M.J. Katz, on the Union of  $\alpha$ -curved Objects, *Symp. Computational Geometry (SoCG)*, 1998, 206–213.
12. A. Efrat and S. Har-Peled, fly Cheaply: on the Minimum fuel-consumption problem, *Symp. Computational Geometry (SoCG)*, 1998, 143–145.
13. B. Aronov, A. Efrat, D. Halperin and M. Sharir, a subquadratic bound on the number of regular vertices of the union of Jordan regions. *Proc. 6th Scand. Workshop on Algorithms Theory (SWAT)*, 1998, 322–334.
14. A. Efrat, The complexity of the union of  $(\alpha, \beta)$ -covered objects, *Symp. Computational Geometry (SoCG)*, 1999, 134–142.
15. A. Amir, A. Efrat, P. Indyk and H. Samet, efficient algorithms and regular data structures for dilation, location and proximity problems, *Proc. 40 Annual IEEE Symposium on Foundations of Computer Science (FOCS)*, 1999, 160–170.
16. H. H. Gonzalez-Banos, E. Mao, J.C. Latombe, T. M. Murali and A. Efrat, planning robot motion strategies for efficient model construction, *Proc. 9th International Symposium of Robotics Research*, 2000, 345–352.
17. A. Efrat, L.J. Guibas, O.A. Hall-Holt and L. Zhang, on incremental rendering of silhouette maps of a polyhedral scene. *Proc. ACM-SIAM Symp. Discrete Algorithms (SODA)*, 2000, 910–917.
18. A. Efrat, L.J. Guibas, S. Har-Peled, D.C. Lin, J.S.B. Mitchell, T.M. Murali. sweeping simple polygons with a chain of guards, *Proc. ACM-SIAM Symp. Discrete Algorithms (SODA)*, 2000, 297–936.
19. A. Efrat, P. Indyk and S. Venkatasubramanian. pattern matching for sets of segments. *Proc. ACM-SIAM Symp. Discrete Algorithms (SODA)*, 2001, 295–304.
20. A. Efrat, S. Har-Peled, L. Guibas and T.M. Murali, morphing between curves, *Proc. ACM-SIAM Symp. Discrete Algorithms (SODA)*, 2001, 680–689.



21. A. Efrat, F. Hoffmann, K. Kriegel, C. Schultz and C. Wenk. geometric algorithms for the analysis of 2D-Electrophoresis gels, *Int. Conf. Computational Molecular Biology (RECOMB)*, 2001, 114–123.
22. A. Amir, A. Efrat and S. Srinivasan, developments in phonetic word retrieval, *ACM Int. Conf. Information and Knowledge Management (CIKM) 2001* , 580–582.
23. A. Efrat, F. Hoffmann, K. Kriegel, C. Knauer, G. Rote and C. Wenk, covering shapes by ellipses *Proc. ACM-SIAM Symp. Discrete Algorithms (SODA)*, 2002, 453–454.
24. A. Efrat, S. Kobourov and A. Lubiw, Computing Homotopic Shortest Paths Efficiently, *European Symposium on Algorithms (ESA) 2002*, 411–423.
25. H. Alt , A. Efrat, G. Rote and C. Wenk, matching planar maps, *Proc. ACM-SIAM Symp. Discrete Algorithms (SODA) 2003*, 589–592.
26. A. Efrat, H. H. González-Banos, S. Kobourov and L. Palaniappan, optimal motion strategies to track and capture a predictable target, *IEEE Int. Conf. Robotics and Automation (ICRA)*, 2003.
27. M. Dror, A. Efrat, A. Lubiw and J. S. B. Mitchell, touring a sequence of polygons, *ACM Symposium on Theory of Computing (STOC) 2003*, 473–482.
28. P. Brass, E. Cenek, C. A. Duncan, A. Efrat, C. Erten, D. Ismailescu, S. G. Kobourov, A. Lubiw and J. S. B. Mitchell, on simultaneous, planar graph embedding, (*WADS*) 2003, 243–255.
29. O. Cheong, A. Efrat and S. Har-Peled, on finding a guard that sees most and a shop that sells most, *Proc. ACM-SIAM Symp. Discrete Algorithms (SODA)*, 2004, 1098–1107.
30. A. Amir, A. Efrat, J. Myllymaki, L. Palaniappan and K. Wampler, buddy tracking — efficient proximity detection among mobile friends *IEEE (INFOCOM) 2004*.
31. J. Arango, M. Degermark, A. Efrat and S. Pink, an efficient flooding algorithm for mobile Ad-hoc networks, *Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks (WiOpt)*, 2004.
32. B. Aronov, A. Efrat, V. Koltun and M. Sharir, on the union of  $\kappa$ -round objects in three and four dimensions, *Symp. Computational Geometry (SoCG) 2004*, 383–390.
33. Q. Fan, A. Efrat, V. Koltun, S. Krishnan and S. Venkatasubramanian, hardware-assisted natural neighbor interpolation, *Workshop on Algorithm Engineering and Experiments (ALENEX) 2005*.
34. A. Efrat, S. Har-Peled and J. Mitchell, approximation algorithms for two optimal location problems in sensor networks, *IEEE conf. Broadband Communication, Networks and Systems. (BROADNET) 2005*.
35. A. Iyer, A. Efrat, C. Erten, D. Forrester and S. Kobourov, force-directed approaches to sensor localization, *Workshop on Algorithm Engineering and Experiments (ALENEX) 2006*.
36. E. Ezra, M. Sharir and A. Efrat, On the ICP Algorithm, *Symp. Computational Geometry (SoCG)*, 2006.
37. J. Arango, A. Efrat, S. Ramasubramanian and M. Krunz, retransmission and back-off strategies for broadcasting in multi-hop wireless networks, *IEEE conf. Broadband Communication, Networks and Systems (BROADNET) 2006*.

38. Y. Shi, Y. T. Hou, and A. Efrat, algorithm Design for Base Station Placement Problems in Sensor Networks, *3rd Int. Conf. on Quality of Service in Heterogeneous Wired/Wireless Networks* 2006.
39. Jesus Arango, A. Efrat, M. Krunz and S. Ramasubramanian, onroad vehicular broadcast, *15th International Conference on Computer Communications and Networks (ICCCN)* 2006.
40. A. Efrat, R. Balasubramanian and S. Ramasubramanian, coverage time optimization in sensor networks, *IEEE Int. Conf. on Mobile Ad-hoc and Sensor Systems (MASS)* 2006.
41. Q. Fan, A. Amir, K. Barnard, A. Efrat, and L. Ming, Matching Slides To Presentation Videos, *ACM International Workshop on Multimedia Information Retrieval (SIGMM)*. 2006.
42. Q Fan, A. Amir, K. Barnard, R. Swaminathan, A. Efrat, temporal modeling of slide change in presentation videos *IEEE Int. Conf. Acoustics, Speech, and Signal Processing (ICASSP)* 2007.
43. A. L. Buchsbaum, A. Efrat S. Jain and S. Venkatasubramanian, Restricted strip covering and the sensor cover problem, *ACM-SIAM Symp. Discrete Algorithms (SODA)* 2007.
44. Alon Efrat, Sandor P. Fekete, Poornananda R. Gaddehosur, Joseph S. B. Mitchell Valentin Polishchuk and Jukka Suomela, Improved approximation algorithms for relay placement *European Symposium on Algorithms (ESA)* 2008.
45. P. K. Agarwal, A. Efrat, R Sharathkumar, and Hai Yu, On Approximate Geodesic Distance Queries amidst Dynamic Point Clouds, *Workshop Algorithmic Foundations of Robotics (WAFR)* 2008.
46. Quanfu Fan, Kobus Barnard and Arnon Amir, Accurate Alignment of Presentation Slides with Educational Video, *IEEE International Conference on Multimedia & Expo (ICME)* 2009.
47. A. Winslow, Q. Tung, Q. Fan, J. Torkkola, R. Swaminathan, K. Barnard, A. Amir and C. Gniady, Studying On The Move - Enriched Presentation Video For Mobile Devices, *Workshop on Mobile Video Delivery (MoViD)* 2009, in conjunction with IEEE *INFOCOM* 2009.
48. S. Sankararaman, Alon Efrat S. Ramasubramanian and P. K. Agarwal. On Channel-Discontinuity-Constraint Routing in Wireless Networks. *INFOCOM* mini-conference 2010.
49. R. Swaminathan, M. Thompson, S. Fong, A. Efrat, A. Amir, K. Barnard, Improving and Aligning Speech with Presentation Slides. *Int. Conf. Patter Recognition (ICPR)* 2010.
50. Pankaj K. Agarwal, Alon Efrat, Shashidhara K. Ganjugunte, David Hay, Swaminathan Sankararaman, Gil Zussman, Network Vulnerability to Single, Multiple, and Probabilistic Physical Attacks' *Military Communications Conference (MILCOM)* 2010.
51. E. M. Arkin, A. Efrat, J. S. B. Mitchell, V. Polishchuk, S. Ramasubramanian, S. Sankararaman and J. Taheri. Data Transmission and Base-Station Placement for Optimizing Network Lifetime. *ACM SIGACT/SIGMOBILE Workshop Foundations Mobile Computing (DIALM-POMC)* 2010.
52. M. Coutinho, T. Moreira, E. Silva, A. Efrat and T. Johnson "A new proposal of data mule network focused on Amazon riverine population" *ACM/SIGCOM Extreme Conference on Communication (EXTREMCOM)*, 2011.
53. P. K. Agarwal, A. Efrat, S. K. Ganjugunte, David Hay S. Sankararaman and G. Zussman, The Resilience of WDM Networks to Probabilistic Geographical Failures, *INFOCOM* 2011.

54. P. K. Agarwal, Alon Efrat, Chris Gniady, Joseph S. B. Mitchell, Valentin Polishchuk and Girishkumar R. Sabhnani, Distributed Localization and Clustering Using Data Correlation and the Occam's Razor Principle *IEEE Int. Conf. Distributed Computing in Sensor Systems (DCOSS)* 2011.
55. P. K. Agarwal, A. Efrat, S. Sankararaman and W. Zhang, "Nearest-Neighbor Searching Under Uncertainty," In *ACM Symposium on Principles of Database Systems (PODS)* 2012.
56. Qiyam Tung, Alon Efrat, Kobus Barnard and Ranjini Swaminathan, Expanding the point- Automatic Enlargement of Presentation Videls. *ACM MULTIMEDIA (MM)* 2011.
57. S. Neumayer,, A. Efrat and E. Modiano, "Geographic Max-Flow and Min-Cut Under a Circular Disk Failure Model" in *IEEE INFOCOM Mini-Conference* 2012.
58. S. Sankararaman, K. Abu-Affash, A. Efrat, S. Eriksson-Bique, V. Polishchuk, S. Ramasubramanian, and M. Segal. Optimization schemes for protective jamming. *ACM Symp. Mobile Ad Hoc Networking and Computing (MobiHoc)* 2012.
59. E. Arkin, A. Efrat, G. Hart, I. Kostitsyna, A. Krolller, J. Mitchell and V. Polishchuk. Scandinavian Thins over a Fat Top: on the Smallest One-Size-Fits-All Box. *Int. Conf. Fun with Algorithms (FUN)*. 2012.
60. Y. Suh, B. Moon, A. Efrat, J. Kim, S. Lee, Kalyan S. Perumalla, D. Jefferson, A. Park, "VET: Extent Mapping Scheme for Flash Memory Devices. *IEEE Modelling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS)* 2012.
61. Y. Kharitonova, Q. Tung, A. Danehy, A. Efrat K. Barnard, "Client-side backprojection of presentation slides into educational video" *ACM MultiMedia (MM)*. 2012
62. Alon Efrat, Joseph Mitchell, Parrish Myers and Swaminathan Sankararaman. Efficient Algorithms for Pursuing Moving Evaders in Terrains. *ACM International Conference on Advances in Geographic Information Systems (SIGSPATIAL)* 2012.
63. Liron Levin, Alon Efrat, Michael Segal, *International Workshop on Resource Allocation Cooperative and Competition in Wireless Network (RAWNET/WNC)* 2013.
64. Mikko Nikkil, Alon Efrat and Valentin Polishchuk, "Sweeping a Terrain by Collaborative Aerial Vehicles", *ACM International Conference on Advances in Geographic Information Systems (SIGSPATIAL)* 2013.
65. T. Johnson, J. Vergara , C. Doll , M. K. , G. Sundararaman, H. Rajendran, , A. Efrat, and M. Hingle. Mobile Food Recommendation System Based on The Traffic Light Diet" *Int. Conference on Mobile Computing, Applications and Services (MobiCASE)* 2013.
66. Qiyam Tung, Alon Efrat, Chris Gniady and Kobus Barnard. *MobiSLIC: Content-aware Energy Saving for Educational Videos on Mobile Devices. International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services, (MobiQuitous)* 2013.
67. A. Efrat, Y. Hu, S. Kobourov and S. Pupyrev. MapSets: Visualizing Embedded and Clustered Graphs. *Graph Drawing (GD)* 2014.
68. E. Arkin, A. Efrat, J. S. B. Mitchell and E. Packer. Hybrid Algorithms for Scheduling Sensors for Guarding Polygonal Domains. *European Workshop on Computational Geometry (EuroCG)* 2014.

69. A. Efrat, E. Ezra, G. Grebla, R. Pinchasi and S. Sankararaman. Hitting Set Algorithms for Fast Data Recovery in the Face of Geographic Correlated Attacks.” *IEEE Conf. Design of Reliable Communication Network (DRCN)* 2015. Also invited to a special issue on Survivable and Resilient Communication Networks and Services of the *Journal of Network and Systems Management*.
70. E. Arkin, Y. Cassuto, A. Efrat, G. Grebla, J. S. B. Mitchell, M. Segal, S. Sankararaman. Friendly Jammers and their Environment. The Geometry of Friendly Jammers. *ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN)* 2015.
71. E. Arkin, A. Efrat, C. Knauer, J. Mitchell, V. Polishchuk, G. Rote, L. Schlipf, T. Talvitie Shortest path to a segment and quickest visibility queries. *Int. Sym. Computational Geometry (SoCG)* 2015.
72. Y. Allouche, E. Arkin, Y. Cassuto, A. Efrat, Grebla, J. S. B. Mitchell, S. Sankararaman, M. Segal. Secure Communication through Jammers Jointly Optimized in Geography and Time. *ACM Symp. Mobile Ad Hoc Networking and Computing (MobiHoc)*. 2015.
73. M. Liu, R. Agarwal, A. Richa, A. Efrat, T. Johnson, M. M. Coutinho, Robust Data Mule Networks with Remote Healthcare Applications in the Amazon Region: A Fountain Code Approach. *IEEE 17th Int. Conf. n e-Health Networking, Applications and Services (HealthCom)* 2015.

#### D. Papers in Less-Competitive Venues.

1. R. Bar-Yehuda, A. Efrat and A. Itai, A simple algorithm for maintaining the center of a planar point-set, *Proc. 5th Canad. Conf. Comput. Geom. (CCCG)*, 1993, 252–257.
2. A. Efrat, M. Lindenbaum and M. Sharir, finding maximally consistent sets of halfspaces, *Proc. 5th Canad. Conf. Comput. Geom. (CCCG)*, 1993, 432–436.
3. A. Efrat, M. Sharir and G. Rote, on the union of fat wedges and separating a collection of segments by a line, *Proc. 5th Canad. Conf. Comput. Geom. (CCCG)*, 1993, 115–120.
4. A. Efrat, S. G. Kobourov, M. Stepp, and C. Wenk, Growing Fat Graphs, video contribution, *Symp. Computational Geometry (SoCG)*, 277–278, 2002.
5. C. Wenk, H. Alt, A. Efrat, L. Palaniappan and Gunter Rote, Finding a curve in a map, video contribution, *Symp. Computational Geometry (SoCG)* 384–385, 2003.
6. K. Barnard, A. Connolly, L. Denneau, A. Efrat, J. N. Heasley, R. Jedicke, J. M. Kubica, B. Moon, A. Moore, S. Morris, P. Rao, The LSST moving object pipeline, *Observatory operations: strategies, processes, and systems, proceedings of SPIE* Vol. #6270, 2006.
7. J. Kubica, T. Axelrod, K. Barnard, A. Connolly, L. Denneau, A. Efrat, J. Heasley, R. Jedicke, B. Moon, A. Moore, S. Morris, P. Rao. Efficiently Tracking Moving Sources in the LSST. *The 207th meeting of the American Astronomical Association*. 2006.
8. E. Packer, S. Pupyrev, A. Efrat, S. Kobourov, Efficient Methods for Registration of Multiple Moving Points in Noisy Environments *Technical Report, The Department of Computer Science, University of Arizona TR13-01*: 2013

9. Swaminathan Sankararaman, Alon Efrat, Srinivasan Ramasubramanian, Javad Taheri: Scheduling Sensors for Guaranteed Sparse Coverage *CoRR abs/0911.4332*: (2009) <http://arxiv.org/pdf/0911.4332>
10. Jonathan Myers, Alon Efrat and Tim Spar. “Previously Unidentify Objects Found in MPC ‘One Night Stands’ File” 2013.

## Invited Presentations

- Computer Science Department, FU Berlin (1999). Subject of talk: Bottleneck Pattern Matching
- American Mathematical Society Meeting at South Carolina (2000). Subject of talk: Morphing between curves.
- Dagstuhl workshop on Computational Geometry (2001).
- Invited talk at Honda Research labs (2002). Subject of the talk: Art Gallery Problems.
- Dagstuhl workshop on Computational Geometry (2003). Subject of talk: Touring a Sequence of Polygons.
- Invited talk at Tel-Aviv University (2004). Subject of talk: Touring a Sequence of Polygons.
- Invited talk at Ben-Gurion University (2004). Subject of talk: Touring a Sequence of Polygons.
- Invited talk at Texas A&M university (2004). Subject of talk: Touring a Sequence of Polygons.
- Invited talk in ECE department at the University of Arizona (2004). Subject of talk: Touring a Sequence of Polygons.
- Invited visit and talk in Caltech (2005). Subject of talk: Sensors locations problems.
- Invited visit and talk in ASU (2005). Subject of talk: Sensors locations problems.
- Dagstuhl workshop on Computational Geometry (2005) Subject of talk: “On Sensor Locations Problems”.
- Invited visit and talk in Universitat Politecnica de Catalunya, Barcelona. (2006) Subject of talk: “On Sensor Locations Problems”.
- Invited visit and talk in Stony Brook. (2006) Subject of talk: “On Sensor Locations Problems”.
- Santa Barbara NSF Workshop on Geometric Approaches to Ad Hoc and Sensor Networks (2006) Subject of talk: “On sensor scheduling problems”.
- Dagstuhl workshop on Robot Motion Planning (2006). “Subject of talk: Optimal Strategies for Mobile Guards Problems”.
- Dagstuhl workshop on Computational Geometry (2007). “Subject of talk: Touring a Sequence of Polygons”.
- Dagstuhl workshop on Computational Geometry (2009). Subject of talk: “On Spanners for the CDC-path in Wireless networks”.
- Dagstuhl workshop on Algorithmic Methods for Distributed Cooperative (2009). Subject of talk: “Occam Razor Principle and Sensors Localization”.
- Lancaster University (2011). “Video browsing, Multi-Modalities, and the SLIC project”.
- The Technion Haifa. (2011) “Video browsing, Multi-modalities, and the SLIC project”.
- IBM Haifa research center (2011). “Video browsing, multi-modalities, and the SLIC project”.

- Ohio-State University. (2011) Subject of talk: “Occam Razor Principle and Sensors Localization.”
- **TEDx Tucson**, 2013. “The wonderful world of low-tech lectures recording: Making Low-Tech lectures into High Tech Distance learning”.
- Ben-Gurion University of the Negev (2015). “Near Optimal Resources Allocation for Enhancing Networks Survivability Under Geographically Correlated Attacks” and “Sweeping a Terrain by Collaborative Aerial Vehicles.”
- University of Arizona mathematics colloquium (2015). Subject: “Sweeping a Terrain by Collaborative Aerial Vehicles.”

## Teaching Experience Teaching Experience at The University of Arizona

- Taught a seminar on Optimization Problems in Sensors and Ad-hoc Networks. First offered in 2005, and offered every second year.
- Taught a course on Unix and Systems Programming (CSc352), Multiple times.
- Geometric Algorithms. (CSc437/537). Multiple Times.
- Geometric Matching and Applications to Biology (CSc534).
- Computer Graphics (CSc433/533). Multiple Times. 2003-2013.
- Advance Computer Graphics (CSc534). 2003.
- Design and Analysis of Algorithms (CSc545). Multiple times.

## Teaching Experience before joining The University of Arizona

- Collaborate in instructing research seminars on Computational Geometry, Stanford University.
- Instructor in courses on Data Structures and Algorithms, and on Graph Algorithms, in Tel-Aviv University. I also taught these courses at the Technion, at the College for Management in Herzelia, at th College of Tel-Aviv, and at IBM Israel. Due to the internet boom at this period, (1996–1998) all these places offered a certificate program degree in software engineering.
- Taught a course on Graph Algorithms, in the Academic College of Tel-Aviv, and at the Technion.
- Teaching assistant in an advanced course in Data Structures, The Technion.
- Taught courses of different levels in C and Unix Programming, Tel-Aviv University.
- Instructor at a course in Discrete Mathematics, Tel-Aviv University.
- Instructor at a seminar in Randomized Algorithms in Computational Geometry, Tel-Aviv University).
- Taught a seminar on Geographic Information Systems and Computational Geometry, Tel-Aviv University.
- Was a member of a team at the Open University (Israel) that prepared courses for distance learning. These courses include Advanced Algorithms, File Systems and Computational Geometry.



## Awards and Grants

- 2014 Dozor Scholarship for Distinguish Visiting Schoolers. Ben-Gurion University. \$3,000.
- 2013 REU TC: Small: NSF Collaborative Research: Protecting Networks from Large-Scale Physical Attacks and Disasters, \$15,000.
- 2012 Support of Modernization of Minor Planet Discovery (with Jonathan Myers) \$151,000
- 2011 Microsoft Matching: Indexing and Matching Mechanical Parts (With Kobus Barnard) \$31,000
- 2010 TC: Small: NSF Collaborative Research: Protecting Networks from Large-Scale Physical Attacks and Disasters, with Gil Zussman (PI) and Eytan Modiano. \$454,000.
- 2005 ACIST: Video Browsing with application for KUAT programs. With Kobus Barnard. \$95,000
- 2005 NSF: Databases for moving objects for the *Large Synoptic Survey Telescope (LSST)*. With Kobus Barnard and Bongki Moon. \$205,000.
- 2004 NSF REU Supplement: ITR/Collaborative Research: Intelligent Topology Control and Energy Provisioning for Wireless Video Sensor Networks. \$6,000
- 2004 NSF CAREER Grant 0348000. Pattern Matching, Realistic Input Models and Sensor Placement. Useful Algorithms in Computational Geometry. Duration 2004–2007. \$403,000
- 2003 ITCDI Grant (U. of Arizona) — “To forward or not to forward: Battery constrains in designing Routing Models”. \$15,000.
- 2003 NSF Grant 0312443 — ITR/Collaborative Research: Intelligent Topology Control and Energy Provisioning for Wireless Video Sensor Networks. With Steve Pink (Co-PI) Duration is 2002-2005. \$122,126.
- 2002 NSF Grant 0222920 — Visualization of Giga-Graphs and Graph Processes. With Stephen Kobourov (PI) and James Abelo. Duration is 2002-2005. \$240,000.
- 2002 NSF Grant 0222920 — “Visualization of Giga-Graphs and Graph Processes”, with Stephen Kobourov (PI) and James Abelo. Duration is 2002-2005. \$240,000.
- 2002 Honda Research Laboratory (a gift with Joe Mitchell (co-PI)) \$55,000
- 1998 The Rothschild Fellowship (Israel) (\$24,000)
- 1998 The Minerva Fellowship
- 1998 The Chateaubriand Fellowship
- 1998 The Pacific Institute for the Mathematical Sciences (Canada)
- 1996 The Maus prize and grant for distinguished graduate students, Tel-Aviv University
- 2002 Honda Research Laboratory (a gift with Joe Mitchell (co-PI)), \$55,000
- 1998 The Rothschild Fellowship, Israel (Post Doctorate Fellowship), \$24,000.
- 1998 The Minerva Fellowship Israel—Germany (Post Doctorate Fellowship)
- 1998 The Chateaubriand Fellowship, French (Post Doctorate Fellowship)
- 1996 The Maus prize and grant for distinguished graduate students, Tel-Aviv University, \$3000