

[56] Wenke Lee, Salvatore J Stolfo, and Kui W Mok. A

[67] Bernhard Schölkopf, John C Platt, John Shawe-Taylor,  
data mining framework for building intrusion detec-

Alex J Smola, and Robert C Williamson. Estimating  
tion models. In Proceedings of the IEEE Symposium on  
the support of a high-dimensional distribution. Neural  
Security and Privacy (S&P), pages 120-132, 1999.

computation, 13(7):1443-1471, 2001.

[57] Xiaopeng Li, Qiang Zeng, Lannan Luo, and Tongbo Luo.

[68] Amit Kumar Sikder, Hidayet Aksu, and A Selcuk Ulu-

T2Pair: Secure and Usable Pairing for Heterogeneous

agac. 6thsense: A context-aware sensor-based attack

IoT Devices. In Proceedings of the ACM Conference on

detector for smart devices. In 26th USENIX Security

Computer & Communications Security (CCS), 2020.

Symposium (USENIX Security), pages 397-414, 2017.

[58] Haoyu Liu, Tom Spink, and Paul Patras. Uncovering

[69] Amit Kumar Sikder, Leonardo Babun, Hidayet Aksu,

security vulnerabilities in the belkin wemo home au-

and A Selcuk Uluagac. Aegis: a context-aware security

tomation ecosystem. In 2019 IEEE International Con-

framework for smart home systems. In Proceedings of

ference on Pervasive Computing and Communications

the 35th Annual Computer Security Applications Confer-

Workshops (PerCom Workshops), pages 894-899, 2019.

ence (ACSAC), pages 28-41, 2019.

[70] Vijay Sivaraman, Dominic Chan, Dylan Earl, and

[59] Tomas Mikolov, Ilya Sutskever, Kai Chen, Greg S Cor-

Roksana Boreli. Smart-phones attacking smart-homes.

rado, and Jeff Dean. Distributed representations of

In Proceedings of the 9th ACM Conference on Security &

words and phrases and their compositionality. In

Privacy in Wireless and Mobile Networks (WiSec), pages

Advances in neural information processing systems

195-200, 2016.

(NeurIPS), pages 3111-3119, 2013.

[71] Yuan Tian, Nan Zhang, Yueh-Hsun Lin, XiaoFeng Wang,

[60] Sirajum Munir and John A Stankovic. Failuresense:

Blase Ur, Xianzheng Guo, and Patrick Tague. Smartauth:

Detecting sensor failure using electrical appliances in

User-centered authorization for the internet of things.

the home. In 11th International Conference on Mobile Ad

In 26th USENIX Security Symposium (USENIX Security),

Hoc and Sensor Systems (MobiHoc), pages 73-81, 2014.

pages 361-378, 2017.

[61] Dang Tu Nguyen, Chengyu Song, Zhiyun Qian,

[72] Rob van der Meulen and Janessa Rivera. Gartner says

Srikanth V Krishnamurthy, Edward JM Colbert, and

a typical family home could contain more than 500

Patrick McDaniel. lotsan: fortifying the safety of iot sys-

smart devices by 2022. Technical report, 2014. [http:](http://)

items. In Proceedings of the 14th International Conference

[//www.gartner.com/newsroom/id/2839717](http://www.gartner.com/newsroom/id/2839717).

on emerging Networking Experiments and Technologies (CoNEXT), pages 191-203, 2018.

[73] Qi Wang, Wajih UI Hassan, Adam Bates, and Carl Gunter. Fear and logging in the internet of things. In

[62] Sukhvir Notra, Muhammad Siddiqi, Hassan Habibi Network and Distributed System Security Symposium Gharakheili, Vijay Sivaraman, and Roksana Boreli. An (NDSS), 2018.

experimental study of security and privacy risks with

[74] Rixin Xu, Qiang Zeng, Liehuang Zhu, Haotian Chi, Xie emerging household appliances. In IEEE conference on aojiang Du, and Mohsen Guizani. Privacy leakage in communications and network security (CNS), 2014.

smart homes and its mitigation: Ifttt as a case study.

[63] F. Pedregosa, G. Varoquaux, A. Gramfort, V. Michel, IEEE Access, 7:63457-63471, 2019.

B. Thirion, O. Grisel, M. Blondel, P. Prettenhofer,

[75] Moosa Yahyazadeh, Proyash Podder, Endadul Hoque, R. Weiss, V. Dubourg, J. Vanderplas, A. Passos, D. Cour- and Omar Chowdhury. Expat: Expectation-based pol- napeau, M. Brucher, M. Perrot, and E. Duchesnay. Scikit- icy analysis and enforcement for appified smart-home learn: Machine learning in Python. Journal of Machine platforms. In Proceedings of the 24th ACM Symposium Learning Research, 12:2825-2830, 2011.

on Access Control Models and Technologies (SACMAT),  
pages 61-72,2019.

[64] Friedrich Pukelsheim. The three sigma rule. The American Statistician, 48(2):88-91, 1994.

[76] Juan Ye, Graeme Stevenson, and Simon Dobson. Fault detection for binary sensors in smart home environ-

[65] Eyal Ronen, Adi Shamir, Achi-Or Weingarten, and Colin O'Flynn. lot goes nuclear: Creating a zigbee chain reaction. In Pervasive Computing and Communications (PerCom), pages 20-28, 2015.

tion. In 2017 IEEE Symposium on Security and Privacy (S&P), pages 195-212, 2017.

[77] Juan Ye, Graeme Stevenson, and Simon Dobson. Detecting abnormal events on binary sensors in smart

[66] Lee Russell. Wireless security monitoring versus a home environments. In Pervasive and Mobile Computing, pages 32-49, 2016.

cellular jammer. 2014.

ing, pages 32-49, 2016.

USENIX Association  
30th USENIX Security Symposium 4239