

# A TOR-Based Anonymous Communication Approach to Secure Smart Home Appliances

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**Abstract**— Digital information has become a social infrastructure and with the expansion of the Internet, network infrastructure has become an indispensable part of social life and industrial activity for mankind. The idea of using existing electronics in smart home appliances and connecting them to the Internet is a new dimension along which technologies continue to grow, and in recent years mankind has witnessed an upsurge of usage of devices such as smart phone, smart television, home health-care device, smart LED light bulbs system, etc. Their build-in internet-controlled function has made them quite attractive to many segments of consumers and smart phone has become a common gadget for social networking. There are, however, serious challenges which need to be addressed as these tiny devices are designed for specific functions and lack processing capacity required for most security software. This research explores how these internet-enabled smart devices can be turned into very dangerous spots for distributed attacks purposes by cybercriminals for various ill intentions in a pinpointed manner. It then introduces a new approach to deal with such problems by taking advantage of the anonymous communication of the Onion Router (hereafter: TOR). It compares pros and cons of using anonymous communication scheme and justifies it be an efficient countermeasure to most attack scenarios.

**Keyword**— Smart Appliances, the Internet of Things, Security, Anonymous Communication, the Onion Router (TOR)



**Nguyen Phong HOANG** was born in Tien Giang Province, Vietnam in 1992. He received his undergraduate degree in Business Administration majoring in Information & Communications technology (ICT) from Ritsumeikan Asia Pacific University (APU), Japan. He is presently pursuing his graduate studies at the Graduate School of Informatics at Kyoto University in Japan. He has received numerous scholarship and awards; APU Tuition Reduction Scholarship from 2010-2014, JASSO (Japan Student Services Organization) Scholarship from 2011-2012, and TOYOTA Tsusho Scholarship from 2013-2014. His research interests include information security, privacy and anonymous communication. He hopes to advance his research on TOR (The Onion Router), one of the most robust anonymous tools, during his graduate studies. He participated in the 16<sup>th</sup> International Conference on Advanced Communication Technology and received Outstanding Paper Award from the Conference. He has been an IEEE member since 2013.



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