

AUTOMATIC TESTING OF SMART SPEAKER APPS

J.L.A.I.A.Sandaruwani

198772M

Faculty of Information Technology

University of Moratuwa

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Declaration

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

Name of Student

Signature of Student

UOM Verified Signature

J.L.A.I.A.Sandaruwani

.....

Date:

Supervised by

Name of Supervisor

Signature of Supervisor

Dr. Kulani Mahadewa

.....

Date:

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Abstract

With the emergence of the Internet of Things (IoT), Smart Speakers open up a new world where we can talk to a machine for getting help in our day-to-day lives. The Smart Speaker Apps (SSA)s provide a user-friendly vocal experience to the customers by allowing them to dictate commands to the speaker through voice commands. Amazon Alexa is one of the most prevalent smart speakers which allows third-party developers to write SSAs called Skills. Due to the prevalence of Alexa, it has become vulnerable to security and privacy threats by malicious skill developers. In particular, Alexa skills could be overprivileged such that they collect more data than necessary or specified by the privacy policy in the skills description. In this research, we systematically explore skills to test whether the behaviors of the skills adhere to the privacy policy provided in the skill description. We extracted the utterances related to privacy-sensitive behavior of the skills through Natural Language Processing (NLP) techniques. Second, we implemented a dynamic testing tool Test case Generator & Invocator based on the fuzzing technique to automatically manipulate the inputs to the skills and observe the output to identify the skills which accept the privacy-sensitive information. During the study, we discovered that 21% of the tested skills accept privacy-sensitive data. We have simply focused on the real or actual behavior of the skills during the research. The claimed behavior of the skills is covered by our study, which will be the focus of further work.

Index Terms - **Alexa skills, Amazon Alexa, vulnerabilities, Internet of Things, privacy, security, Automatic testing**

Table of Contents

	Page
Declaration	i
Acknowledgment	ii
Abstract	iii
Table of Contents	iv
List of Figures	vi
List of Tables	vi
Chapter 1	
1. Introduction	1
1.1. Background	1
1.2. Challenges	2
1.3. Problem Statement	3
1.4. Aim and Objectives	3
1.5. Scope	3
Chapter 2	
2. Literature Review	5
2.1. Introduction	5
2.2. Related Works	5
2.3. Alexa Skills	8
2.3.1. Publishing a third-party skill	8
2.3.2. Invocation Name	9
2.3.3. Invoking Alexa Skills	9
2.4. Alexa Developer Console	10
2.5. How does a user access skill content?	11
Chapter 3	
3. Approach	12
3.1. Introduction	12
3.2. Proposed Approach	12
3.2.1. Testing actual behavior of the skills	13
3.2.2. Testing Claimed behavior of the skills	15
Chapter 4	
4. Technology adapted	17
4.1. Introduction	17
4.2. Technology adapted	17
Chapter 5	
5. Implementation	19
5.1. Introduction	19
5.2. Implementation	19
5.2.1. Test case Generator & Invocator	20
5.2.2. Policy-sentence Utterances generator	20
5.2.3. Step 1: Collecting privacy policy data	20
5.2.4. Step 2: Preprocessing	21
5.2.5. Step 3: Processing	22
5.2.6. Response Processor	28

Chapter 6	
6. Evaluation	31
6.1. Introduction	31
6.2. Evaluation	31
Chapter 7	
7. Discussion	38
7.1. Introduction	38
7.2. Discussion	38
Conclusion	39
Future works	39
References	40
Appendixes	45

List of Figures

	Page
Figure 1.1: General Architecture and Data Flow To Invoke a Skill	1
Figure 3.1: High-level Architectural Diagram of the Approach	12
Figure 5.1: Smart Speaker Apps Description	19
Figure 5.2: Classification report for the prediction of the test data set using the trained model	31
Figure 6.1: Accepted skill count vs skill Category	32

List of Tables

	Page
Table 5.1 Labeled utterances	23
Table 5.2 Keywords related to Utterances category	27
Table 6.1 Utterance Category vs Accepted Skill Count	33
Table 6.2.1: Utterance Category - Personal Information	33
Table 6.2.2: Utterance Category - User security-related information	34
Table 6.2.3: Utterance Category - Financial related Data	35
Table 6.2.4: Utterance Category - Personal services	35
Table 6.2.5: Utterance Category - Employment Information	36
Table 6.3: Results comparison with SkillDetective[21] tool	37