International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

AUTOCON IOT

Mr. Mohan Babu C[1], Naveen B[2]

[1]Asst. Professor Dept. of ECE, SJCIT, Chickballapur, India, Mohanbabu015@gmail.com
[2]Dept. of ECE, SJCIT, Chickballapur, India, naveenbpraveen1999@gmail

ABSTRACT

The number of Internet of Things (IoT) applications is increasing exponentially as the IoT develops quickly across many industries, including smart cities and smart manufacturing. Software applications, especially those for the Internet of Things, are frequently tested using standardised conformance testing methodologies. Current conformity testing methods, however, necessitate ongoing human involvement and the installation of extra software on the target device under test, which is time-consuming, expensive, and memory-intensive. In order to make existing conformance testing suitable for automatically evaluating widely distributed constrained IoT systems, it is crucial to improve and optimise it. In this research, we introduce a test triggering mechanism based on a standardised test interface as a unique technique for automated and scalable conformance testing for IoT applications. A testing environment's new logical components that exchange messages between a testing system and a target IoT device serve as the foundation for this triggering mechanism. By certifying IoT applications, this method of autonomous conformance testing can reduce the cost and need for human intervention to reduce the number of errors and accelerate the IoT market.

A well-known conformity and interoperability testing methodology is necessary to ensure the compatibility of IoT implementations that adhere to the same standards. In this sense, IoT conformance testing is quickly rising to the top of the list of crucial IoT technologies. Confirming that an IoT device has correctly implemented its referring standard specifications, such as detailed values of protocol messages and their format based on standard specifications, is the main objective of conformance testing. A test system, a system being tested, and a set of test cases make up conformance testing in general. To determine how well the system being tested complies with standards, the testing system runs the test cases against it.

Such conformance testing methodologies don't function well with restricted IoT devices because they lack a user interface (UI) and sufficient memory to store the source code needed for the tests. In order to evaluate such limited IoT devices, Two requirements should be taken into account in a testing approach for IoT applications in order to automate the testing process for constrained IoT applications: (1) the system under test should be instrumented by a testing system via a standardised testing interface without human intervention, and (2) a set of testing application programming interfaces (APIs) on the testing system that stimulate With only the barest of testing functions, these requirements enable the test system to govern limited systems under test. To enable eAUTOCON-IoT, a set of logical components and procedures must be added to both the test system and the system being tested in order to share the data required for testing.

***Keywords**: Conformance Testing, Internet of things, one M2M standards, testing automation.*

1. INTRODUCTION

The Internet-of-Things (IoT) is acting as the next technological revolution influencing all application domains, including smart homes, smart cities, agriculture, automobiles, healthcare, industries,andtransport.Itisestimatedthattherewillbe50to100billionsmartthingsandobjects connected to the Internet by 2020.For the last two decades, interoperability has been the main hurdle of IoT development and adoption. To successfully adopt the IoT, it is necessary to overcome its fragmentation. An acceptable standard is required to ensure the interoperability between IoT services and eliminate fragmentation by introducing horizontal applications. Assuring the interoperability between IoT implementations referring to the same standards requires a well-known conformance and interoperability testing process. In this regard, IoT conformance testing is becoming one of the most important aspects of IoT technologies The primary goal of conformance testing is to ensure that an IoT device has properly implemented its referring standard specifications such as detailed values of protocol messages and their format based on standard specifications. In general, conformance testing consists of a test system, a system under test and a set of test cases, where the testing system executes the test cases against a system under test to assess its degree of standard compliance. Such conformance testing approaches do not work well with constrained IoT devices, which do not have any user interface (UI) or enough memory space to store testing related source code. To many manufacturers use their own software agent having UIs for stimulating the system under test to initiate a specific behavior. However, such testing tools require human developers to be involved in conformance testing procedures. For example, to test a registration function, which requires a system under test to send a registration request to a testing system; a developer should instruct the system under test via a software testing agent that sends the corresponding stimulus to the system under test. Testing hundreds of IoT constrained devices using such conformance testing tools is a time-consuming job, which is not efficient for testing IoT devices testing process for constrained IoT applications, two requirements should be considered in a test

These requirements allow the test system to control constrained systems under test with minimum testing functions

II. In this article, we describe AUTOCON-IoT, a newly developed testing approach to automatically test a large number of constrained IoT applications. AUTOCON-IoT introduces a logical component called Upper Tester that sits between the testing system and the system under test and automatically performs testing procedures. Upper Tester uses a triggering mechanism that sends a standardized test message to a target system under test so that the system under test can initiate a specified function to be tested. In addition, AUTOCONIoT uses a set of common testing APIs that defines different triggering messages (e.g., discovery, registration, and measurement) to confirm the compliance of the system under test. With the adoption of the AUTOCON-IoT into the existing testing system, it is predicted that testing experts can reduce the testing error resulting from human intervention, and these standard-based automated testing approaches can also be applied in other IoT specifications and industry fields.

We empirically evaluate a prototype implementation of AUTOCON-IoTwith an IoT global standards called oneM2M. We can define a set of testing APIs using the triggering mechanism, which can test constraint oneM2M IoT applications without human intervention. Our experiments also reveal that the use of a triggering IoT testing improves the time required for testing and shows advantages over existing conformance testing using stimuli. The main contributions of our work are as follows: 1) A testing approach that uses a standard-based triggering message that instruments a constrained IoT application under test to perform specified tasks and checks functional compliance of the IoT application. Our approach fully automates testing procedures for constrained IoT applications; therefore, many IoT applications can be easily tested without human intervention.

Our experience developing the approach, together with an experimental evaluation of a triggering-based IoT testing method with several conventional conformance testing mechanism shows the advantage of the approach in terms of performance and testing time. 3) Standard inputs to an industry driven de-factor standards group, the oneM2M IoT standards body, where the proposed triggering mechanism is reflected in one of the normative specifications as a standard-based testing mechanism. The triggering IoT testing feature based on the proposed approach in oneM2M has already been included in designated oneM2M testing tools.

The remainder of this paper is organized as follows: Section II provides an overview and state- of-the-art for conformance testing to motivate automated IoT testing. Section III describes architecture for an automated and scalable conformance testing mechanism for IoT applications.

2. METHODOLOGY

As mentioned in the previous section, we propose a standard based automatic conformance testing for IoT applications using stimulus. The basic idea is to trigger an IoT application under testing to perform a requested behavior so that a testing system can check its compliance. To make our approach applicable to IoT applications from different manufacturers, we design the testing framework based on oneM2M global IoT standards conventional conformance testing can be applied to constrained IoT applications that do not have a UI to control the behavior of applications. Both the test system (TS) and system under test (SUT) As a target SUT does not have any user interface, the manufacturer of the SUT typically brings its own software or tool that can control the SUT to perform a specific behavior, e.g., sending a registration request. However, these tools cannot support interoperability, reusability, and integration with learning activities

3. BLOCK DIAGRAM

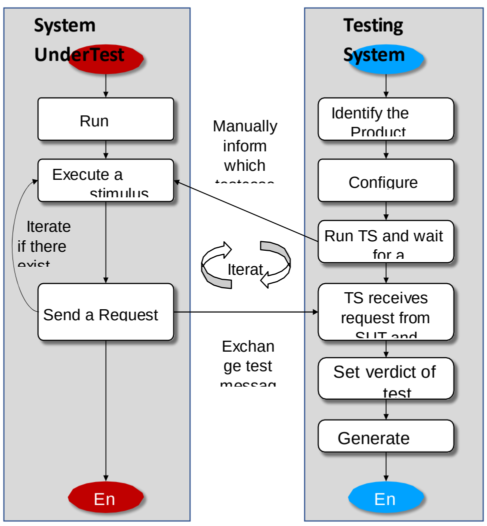

Fig.1 .Block diagram

Figure.1Shows the Block diagram proposed system

A) TRIGGERING MESSAGE

The key to executing automatic conformance testing is to define a standard-based triggering mechanism between the TS and the SUT. The trigger mechanism in AUTOCON IoT depends on two coherent components over the UTs in the TS and the SUT. Ut-SUT acts as a lightweight HTTP server that runs in SUT, and it is comprised of one exposed endpoint to a defined request-response message system expressed in a specific message format such as JSON or XML (https://www.w3.org/TR/REC-xml/). In this section, we consider JSON as a message format. This lightweight HTTP server is exposed to a local network where it cannot obtain incoming requests from external sources

B) AUTOMATIC TESTING PROCEDURE

The actual procedure of the automatic conformance testing is similar to the procedure shownintheflowchartinFig.4withafewchanges,such as the test erneeds to configure the points of address and communication ports for both Ut-TS and Ut-SUT. Typically, when a product is presented for conformance testing, the test administrator needs to determine and list the test cases in the control file, as demonstrated by the chosen product profile features. In most cases, such control files are prepared statically, which is indicated by the features of a testing product profile

4. APPLICATIONS

- Used in Health care
- smart homes
- Smart cities
- Wearable devices for testing

5. ADVANTAGES

- Minimizing transmission risk in hospital,.
- Smart home Smart cities emerge strongly from the pandemic,
- Social distancing is also resolved by iot,
- Generates automatic test cases

6. CONCLUSION

The automated and scalable conformance testing mechanism by introducing a triggering mechanism in the current state of the art of conformance testing in the IoT. We noted some of the challenges of conformance testing in the IoT. The current IoT market is fragmented due to the inefficiency in conformance testing, which creates interoperability issues between multiple IoT applications. Due to the large scale of the IoT applications, which each have dozens of features, it is difficult to perform manual conformance testing. Our approach for automatic conformance testing helps to speed up the process of testing and certification for the IoT standardization bodies. By performing the automatic conformance testing process, we can assure the interoperability of the multiple implementations of the same standard without actually setting up interoperability testing between each implementation individually. As oneM2MTester was successfully introduced in the oneM2M INTEROP events and produced positive results by speeding up the process with no errors by reducing the human intervention, we plan to use this approach in further interoperability events and improve it according to the demands and further requirements. Moreover, this approach is compatible with remote testing that has the test system in a cloud service. For remote testing, automated testing is a required mechanism.

ACKNOWLEDGEMENT:

The authors expressing their Gratitude towards Mr. MOHAN BABU C the guide for providing a great guidance and valuable support in the completion of this great work. Without him we would not led to success of this work.

REFERENCES

[1] L. Atzori, A. Iera, and G. Morabito, ''The Internet of Things: A survey,'' Comput. Netw., vol. 54, no. 15, pp. 2787–2805, Oct.2010.

[2] Al-Fuqaha, M. Guizani, M. Mohammadi, M. Aledhari, and M. Ayyash, ''Internet of Things: A survey on enabling technologies, protocols, and applications,'' IEEE Commun. Surveys Tuts., vol. 17, no. 4, pp. 2347–2376, 4th Quart.,2015.

[3] D. Evans, ''The Internet of Things: How the next evolution of the Internet is changing everything,'' CISCO, San Jose, CA, USA, White Paper, 2011, vol. 1, pp.1–11.

[4] M. Blockstrand, T. Holm, L.-Ö. Kling, R. Skog, and B. Wallin, ''More than 50 billion connected devices,'' Ericsson, Stockholm, Sweden, White Paper, 2011, vol. 14, p.124.

[5] S.Ziegler,C.Crettaz,L.Ladid,S.Krco,B.Pokric,A.F.Skarmeta,A.Jara,W.Kastner,and

[6] M. Jung, ‘‘IoT6—Moving to an IPv6-based future IoT,’’ in The Future Internet. Berlin, Germany: Springer, 2013, pp. 161–172.

[7] B.KangandH.Choo,‘‘AnexperimentalstudyofareliableIoTgateway,’’ICTExp.,vol.4, no. 3, pp. 130–133, Sep.2018.

[8] R.Roman,J.Zhou,andJ.Lopez,‘‘Onthefeaturesandchallengesofsecurityandprivacyin distributed Internet of Things,’’ Comput. Netw., vol. 57, no. 10, pp. 2266–2279, Jul.2013.

[9] 8] R. Khan, S. U. Khan, R. Zaheer, and S. Khan, ‘‘Future Internet: The Internet of Things architecture, possible applications and key challenges,’’ in Proc. 10th Int. Conf. Frontiers Inf. Technol., Dec. 2012, pp. 257–260.

[10] D. Miorandi, S. Sicari, F. De Pellegrini, and I. Chlamtac, ‘‘Internet of Things: Vision, applicationsandresearchchallenges,’’AdHocNetw.,vol.10,no.7,pp.1497–1516,Sep.2012.

[11] R. S. Sinha, Y. Wei, and S.-H. Hwang, ‘‘A survey on LPWA technology: LoRa and NB- IoT,’’ ICT Exp., vol. 3, no. 1, pp. 14–21, Mar.2017