TRANSFORMING MOBILE DEVICES INTO SMART IOT GATEWAYS

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(158228P)

Degree of Master of Science in Computer Science

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DECLARATION

I declare that this is my own work and this dissertation does not incorporate without acknowledgment any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Masters Dissertation under my supervision.

Signature of the supervisor: ……. Date: …….

Name: Dr. Indika Perera

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ABSTRACT

Internet of Things (IOT) which is considered as the 'Next Industrial Revolution' is a heavily discussed topic across the globe which is all about inter-connection of *things* for the betterment of the human beings. Apart from the end nodes which are either sensors or actuators, a reliable and robust connection is the most significant component of any IOT deployment. Therefore, different concepts of IOT gateways have been introduced by many IOT vendors to the industry to cater various types of connectivity options. However, still there are major challenges and weaknesses prevailing in the industry, often in the connectivity component unanswered which have limited the full potential of IOT deployments.

This research is focused on prototyping a smarter IOT gateway using an Android based mobile device which can overcome some of these limitations identified. nRF51822 Bluetooth based sensor tag which gives five different sensor readings and a cloud instance of Splunk IOT Data Analytics platform were used along with the Prototype gateway to demonstrate an actual IOT deployment in this research.

The prototype successfully managed to push processed and filtered sensor data into the Splunk cloud which significantly reduced the data load which saved cloud storage. A python-based application was used to process the raw sensor data to meaningful information. In addition to that this prototype added value to the IOT gateways, by having features such as real-time alerting leveraging on Google Cloud Messaging services.

However, using Android based mobile devices as IOT gateways created new set of limitations where few recommendations such as developing hardware-addons to accept other wireless IOT connectivity technologies and customizing the Android OS etc. were proposed towards the end of this research.

Keywords: IOT Gateways, Data Analytics and Visualizations, Data Translation, Real-time alerting, Bluetooth Sensor Tags

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LIST OF ABBREVIATIONS

ALS	Ambient Light Sensor
AMQP	Advanced Message Queuing Protocol
API	Application Programming Interface
BLE	Bluetooth Low Energy
CCM	Central control, Context detection & Management
COAP	Constrained Application Protocol
DA	Device Abstraction
GATT	Generic Attribute Profile
GCM	Google Cloud Messaging
HTTP	Hyper Text Transfer Protocol
IaaS	Infrastructure as a Service
IIOT	Industrial Internet of Things
IOT	Internet of Things
IR	Infra-Red
IT	Information Technology
JMS	Java Message Service
LAN	Local Area Network
LoRa	Long Range
MQTT	MQ Telemetry Transport
NFC	Near Field Communication
PaaS	Platform as a Service
PS	Proximity Sensor
REST	Representational State Transfer
RFID	Radio-Frequency IDentification
SaaS	Software as a Service
TCP	Transmission Control Protocol
UUID	Universally Unique Identifier
Wi-Fi	Wireless Fidelity

XMPP	Extensible Messaging and Presence Protocol

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