Bahria University
Discovering Knowledge

FINAL YEAR PROJECT REPORT

MINIMIZING ELECTRICITY THEFT USING INTERNET OF THINGS

By

SYED IBRAHIM KHALIL (43711)

MEHROZ AHMAD (43767)

SUPERVISED BY

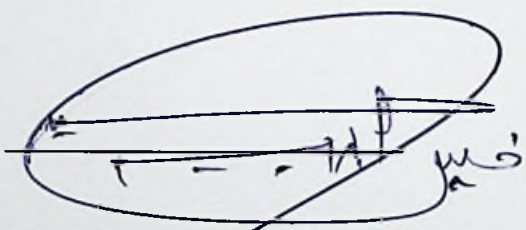
(DR. SYED SAFDAR ALI RIZVI)

BAHRIA UNIVERSITY (KARACHI CAMPUS)

2019

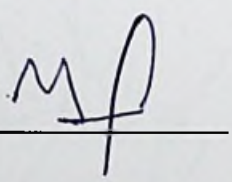
DECLARATION

We hereby declare that this project report is based on our original work except for citations and quotations which have been duly acknowledged. We also declare that it has not been previously and concurrently submitted for any other degree or award at Bahria University or other institutions.

Signature : 

Name : Syed Ibrahim Khalil

Reg No. : 43711

Signature : 

Name : Mehroz Ahmad

Reg No. : 43767

Date : 16th Dec, 2019

APPROVAL FOR SUBMISSION

I certify that this project report entitled **"MINIMIZING ELECTRICITY THEFT USING INTERNET OF THINGS"** was prepared by **SYED IBRAHIM & MEHROZ AHMAD** have met the required standard for submission in partial fulfilment of the requirements for the award of Bachelor of Computer Science (Honours) at Bahria University.

Approved by,

Signature : _____

Supervisor : Dr. Syed Safdar Ali Rizvi

Date : 16th Dec, 2019

ACKNOWLEDGEMENTS

We would like to thank everyone who had contributed to the successful completion of this project. We would like to express my gratitude to my research supervisor, Dr. Syed Safdar Ali Rizvi for his invaluable advice, guidance and his enormous patience throughout the development of the research.

In addition, we would also like to express my gratitude to our loving parent and friends who had helped and given me encouragement.

MINIMIZING ELECTRICITY THEFT USING INTERNET OF THINGS

ABSTRACT

Electricity theft is one of the major issues for a country as well as a critical problem for electricity companies which faces huge amount of loss daily because of it. To provide a solution to this problem, the concept of SMART GRID is introduced, using latest cloud connectivity. Smart Grid provides two-way communication between supply and consumption of electricity, which would be viable to identify theft easily. We have made cost-effective cost effective monitoring devices that are connected to NAN network, a small network consisted of automesh devices that sends up its monitored readings to Amazon Web Services (AWS) cloud, which is then passed through "MQTT-Topics", rules and Lambda function to Losant IoT Enterprise, for visualization, potential theft identification and analysis.

TABLE OF CONTENTS

DECLARATION		**ii**
APPROVAL FOR SUBMISSION		**iii**
ACKNOWLEDGEMENTS		**vi**
ABSTRACT		**vii**
TABLE OF CONTENTS		**viii**
LIST OF TABLES		**xi**
LIST OF FIGURES		**xii**
LIST OF SYMBOLS / ABBREVIATIONS		**xvii**
CHAPTER		
INTRODUCTION		**18**
1.1	Background	18
1.2	Problem Statement	19
1.3	Aims and Objectives	20
1.4	Scope of Project	20
LITERATURE REVIEW		**21**
2.1	Electricity Generation	21
2.2	Electricity Consumption	22
2.3	Smart Grid	22
2.3.1	Concept of Smart Grid	23
2.3.2	Smart Infrastructure	24
2.3.1	Data Concentrator	24

	4.2.2	Creating Lambda Function	66
4.3	Losant		71
	4.3.1	Device Connectivity	71
	4.3.2	Data Collection And Visualization	72
	4.3.3	Device Creation	72
	4.3.4	Workflows	75
	4.3.5	Webhook	85
	4.3.6	Data Table	86
4.4	POWER BI		87
	4.4.1	Getting Started	88
4.5	Result		91
	4.5.1	DATA GRAPH	91
	4.5.2	Dashboards	94

CONCLUSION AND RECOMMENDATION **99**

5.1	Smart Grid Benefits		99
5.2	Future Scope		100
	5.2.1	Industrial CT	100
	5.2.2	Extended Range of Repeaters	101
	5.2.3	Zigbee	102
	5.2.4	Integration of multiple CT's	104

REFERENCES **106**

APPENDICES **109**

APPENDIX A: Graphs **109**

APPENDIX B: Computer Program Listing **118**

APPENDIX C: Calibration **126**