



**FINAL YEAR PROJECT REPORT**  
**E FOOD DETECTOR: AN INTELLIGENT DEVICE**  
**THAT DETECTS THE QUALITY OF FOOD**  
**USING RASPBERRY PI 3**

In fulfillment of the requirement  
For degree of  
BS (Information Technology)

**By**

**MUHAMMAD TAHA KHAN**  
**ERAJ ABBAS**  
**ZERAFSHAN ASLAM**

**45940 BSIT**  
**45898 BSIT**  
**45934 BSIT**

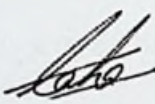
**SUPERVISED**

**BY**

**SHAISTA ASHRAF FAROOQI**  
**BAHRIA UNIVERSITY (KARACHI CAMPUS)**  
**2016-2020**

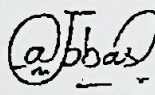
## DECLARATION

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

Signature :   
\_\_\_\_\_

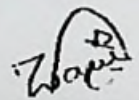
Name : M.Taha Khan

Reg No. : 45940

Signature :   
\_\_\_\_\_

Name : Syed Eraj Hadi

Reg No. : 45898

Signature :   
\_\_\_\_\_

Name : Zerafshan Aslam

Reg No. : 45934

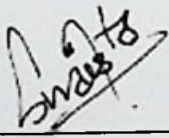
Date : 14-06-2020

## APPROVAL FOR SUBMISSION

We certify that this project report entitled “AN INTELLIGENT DEVICE THAT DETECTS THE QUALITY OF FOOD” was prepared by **Taha Khan, Zerafshan Aslam and Eraj Abbas** has met the required standard for submission in part fulfillment of the requirements for the award of Bachelor of Computer Science (Honors’) at Bahira University.

Approved by,

Signature :



\_\_\_\_\_

Supervisor: Shaista Ashraf Farooqi

Dated : 14/06/2020

The copyright of this report belongs to Bahria University according to the Intellectual Property Policy of Bahria University BUORIC-P15 amended on April 2019. Due acknowledgement shall always be made of the use of any material contained in, or derived from, this report.

© 2019 Bahria University. All right reserved.

## **ACKNOWLEDGEMENTS**

We would like to thank everyone who had contributed to the successful completion of this project. We would like to show gratitude to our research supervisor, Shaista Ashraf, for her invaluable advice, guidance, and her enormous patience throughout the development of the research.

Also, we would like to express my gratitude to our loving parents and friends who had helped and encouraged us.

## ABSTRACT

Many people in this world get infected with some serious disease and many die because of eating unhealthy food. Such kind of food cause diseases like food poisoning, heart issue, high blood pressure, gastroenteritis, diarrhea caused by Campylobacter, pneumonia, trachoma, skin infections, nausea, vomiting, stomach pains and so on. Nowadays, unhealthy food problems have become so common and all of us facing these issues and blaming the environment but forget about what we are eating or what kind of food we are using. Is it fresh? Is it Edible? It is very crucial to check the food quality before consuming the food.

There are several technologies like raspberry pi, sensors (PH, Moisture, and Gas) through which we became capable and developed a hardware which contain more than one sensor. It senses the quality of food at environment box which contains constant temperature and helps user to detect the food freshness, guide them that this food is in edible condition or not. We integrate our hardware with android application through which our device becomes more user-friendly. This is the new effective approach to detect the food than the approaches we have used before. By using one hardware we can check our food which contain moisture, gas or ph. The result obtained through these sensors are then evaluated.

## TABLE OF CONTENTS

DECLARATION.....	i
APPROVAL FOR SUBMISSION.....	ii
ACKNOWLEDGMENTS.....	v
ABSTRACT.....	vi
TABLE OF CONTENTS.....	vii
LIST OF FIGURES.....	viii
LIST TABLES .....	xiv
<b>CHAPTERS</b>	
<b>CHAPTER 1: INTRODUCTION</b>	
1.1 Background .....	15
1.2 Method Previously provided .....	16
1.3 Problem Statements .....	17
1.4 Objectives .....	17
1.5 Scope of Project .....	18
1.6 Project Methodology .....	18
<b>CHAPTER 2: LITERATURE REVIEW</b>	
2.1 Introduction .....	19
2.2 Literature Review .....	20
2.2.1 Top Devices Related to our project .....	20
2.2.2 Food Sniffer .....	20
2.2.3 Nima Device .....	21
2.2.4 Food Poisoning detector .....	22
2.2.5 Scio .....	22
2.2.5.1 the scio sensor .....	23
2.2.5.2 real time, precision grain analysis.....	23
2.2.5.3 real time raw material inspection.....	23
2.2.5.4 Food baverages quality control.....	23
2.2.5.5 real time manufacturing quality control....	24
2.2.5.6 smart phone.....	24
2.2.5.7 smart kitchen appliances.....	24
2.2.5.8 smart cups and bottle .....	25
2.2.6 LinkSquare.....	25
2.2.7 Metal Detector.....	26

2.2.8	Food Allergen Detector.....	27
2.2.9	FoodBorne.....	29
2.2.10	Tomra.....	33
2.2.11	Laser.....	35
2.2.12	Xray inspection system.....	35
2.2.13	FTIR system.....	37
2.2.14	New Hnadheld device.....	37
2.2.15	Data Sensor.....	38

### CHAPTER 3: DESIGN AND METHODOLOGY

3.1	Work breakdown structure.....	39
3.2	Assembling of hardware .....	40
3.2.1	Agile software development.....	40
3.2.2	Scrum Methodology.....	41
3.2.3	Testing phase.....	41
3.2.3.1	Unit Testing.....	42
3.2.3.2	Intergration Testing.....	42
3.2.3.3	System Testing.....	42
3.2.3.4	Acceptance Testing.....	42
3.2.4	Requirement gathering and analysis.....	43
3.3	GUI of the application.....	43
3.3.1	Implementation .....	44
3.3.2	Integration and testing .....	45
3.3.2.1	Regression testing.....	45
3.3.3	Deployment of system .....	45

### CHAPTER 4: IMPLEMENTATION

4.1	Flow of the Project .....	46
4.2	Step#1: Assembling.....	47
4.2.1	Circuit Diagram .....	47
4.3	Environmental Box .....	47
4.3.1	Environmental box Qualities .....	48
4.3.2	Environmental Box Purpose .....	48
4.4	Components use for Assembling the hardware .....	48
4.4.1	System Design.....	48
4.4.2	What is Raspberry Pi 3 .....	49
4.4.3	What is Raspberry Pi 3 cabale.....	49



4.4.4	How do I started with Raspberry Pi 3 .....	49
4.4.5	How Raspberry Pi 3 different from its precedence.....	50
4.4.6	Power Supply.....	51
4.4.7	SD card .....	51
4.4.8	Mouse and Keyboard.....	51
4.4.9	Computer Screen .....	52
4.4.10	VGA .....	52
4.4.11	HDMI to VGA adapter.....	53
4.4.12	IO Port Expander.....	53
4.5	Sensors Which used or The Device.....	54
4.5.1	Electrical Sensor.....	54
4.5.2	Moisture Sensor .....	54
4.5.2.1	How moisture sensor work.....	54
4.5.3	Gas Sensor.....	55
4.5.3.1	Gas sensor Construction.....	55
4.5.3.2	Gas sensor working.....	56
4.5.4	PH sensor.....	56
4.5.4.1	what is PH.....	56
4.5.4.2	Specification.....	57
4.6	Downloading Operating System.....	58
4.6.1	Format SD card.....	59
4.6.2	Extract Noobs .....	59
4.6.3	Copy the files.....	60
4.6.4	Connecting Raspberry Pi.....	60
4.6.5	Startup Raspberry pi .....	62
4.7	Installation.....	63
4.8	Python Updation.....	65
4.9	Commands and Libraries.....	65
4.9.1	Commands detail.....	65
4.9.2	Libraries detail .....	66
4.10	DataBase Step.....	67
4.10.1	Firebase On Google search.....	67
4.10.2	Login Firebase.....	67
4.10.3	WelcomeScreen Firebase.....	68

4.10.4	Creating a Database.....	68
4.10.5	Naming Database .....	68
4.10.6	Active user in Firebase.....	69
4.10.7	Database Types.....	69
4.10.8	Database Table.....	69

## CHAPTER 5: RESULTS AND DISCUSSION

5.1	Challenges faced.....	70
5.2	Why we use RaspberryPi instead of Arduino.....	71
5.3	Why we use cloud database.....	71
5.4	Why we use MCP3008.....	71
5.5	What is meant by MQ .....	72
5.6	Why we use MQ3.....	72
5.7	Why we use firebase as a cloud database .....	72
5.8	Why we develop an Mobile Application.....	72
5.9	Why we use Android Studio.....	73

## CHAPTER 6: CONCLUSION AND RECOMMENDATION.....75

6.1	Introdcution.....	75
6.2	Risk areas Identified.....	75
6.3	Development Process.....	76
6.3.1	Informal development process.....	76
6.3.2	Not enough Paper.....	76
6.3.3	No written Requirement .....	76
6.3.4	Requirement with poor measurability.....	76
6.3.5	Requirement Omit extra-unctional aspects.....	76
6.3.6	High requirement.....	76
6.3.7	No SQA function.....	77
6.3.8	No mechanism to capture .....	77
6.4	Architecture.....	77
6.4.1	No defined software Architecture.....	77
6.4.2	No message Dictionary.....	77
6.4.3	Poor modularity of code .....	77

6.5	Design .....	78
	6.5.1 Design after coding.....	78
	6.5.2 Statechart would be more appropriate.....	78
	6.5.3 Analysing real time scheduling.....	78
	6.5.4 No systematic Approach for GUI.....	78
6.6	Implementation.....	78
	6.6.1 Coding Style is Inconsistence.....	78
	6.6.2 Too fill Resources.....	79
	6.6.3 Global variable is too many .....	79
	6.6.4 Ignoring compiler warning.....	79
	6.6.5 Inadequate Concurrency management.....	79
	6.6.6 Use o home made Realtime OS.....	79
6.7	Verification and Validation .....	79
	6.7.1 No peer reviews.....	80
	6.7.2 No test plans.....	80
	6.7.3 No deect tracking .....	80
	6.7.4 No Stress testing.....	80
6.8	Dependability.....	80
	6.8.1 Insuficient reliability consideration.....	80
	6.8.2 Insuficient Security Consideration.....	80
	6.8.3 Insuficient Safety Consideration.....	80
	6.8.4 Insuficient System reset approach Consideration.....	81
	6.8.5 Risk problem with external tools.....	81
	6.8.6 Disaster recovery not tested.....	81
6.9	People.....	81
	6.9.1 Many Developer and high turnover.....	81
	6.9.2 No training to managing outsource relationships.....	81
6.10	Risk Of Securities on Embeded System.....	81
6.11	Conclusion.....	82
6.12	Cost Estimation.....	82
	<b>References .....</b>	<b>75</b>
	<b>APPENDICES.....</b>	<b>75</b>