



**BAHRIA UNIVERSITY**  
Discovering Knowledge

## **FINAL YAER PROJECT REPORT**

### **REMOTE HEALTH MONITORING SYSTEM (RHMS)**

**By**

Hanniya Aijaz	35541	BCE
Samiya Mehmood	35535	BCE

**Project Advisor Dr. Osama Rehman**

Deliverable  
Report 2 Volume

**Bahria University (Karachi Campus)**

**2017**

## ACKNOWLEDGEMENT

There is no boundary to thank *Allah (SWT)* for His endless blessing upon us that we got opportunity to complete our FYP project report on time for university undergraduate program. However, there are lots of people who encourage and helped us in completing our report under given report format.

Firstly, we would like to thank our parents who encourage us throughout our degree program as their appreciation, love and cooperation was our biggest achievement that we have completed our report. Next we would like to thanks deeply to our supervisor *Osama Rehman* under whose constant supervision, guidance, understanding, time and information related to project was our great support in a completion of our report. We would also like to express our special thanks to *Ma'am Nabiha Faisal* as she was our great supporter, listener and encourager as she was always there to guide us on right path throughout our degree program. Last but not the least, we our highly indebted to our institute *Bahria University Karachi Campus* who provide us with such cooperative teachers, labs, equipment and support that we achieved our goals.

## ABSTRACT

Precision and timeliness of the information collected relating to patients still remain as open challenges in current health systems, especially for cases relating to monitoring of patients with chronic diseases and severe health conditions. As a consequence, there is a need for improving quality of the gathered information which in-turn can largely improve the decisions made by medical professionals. Continuous observation of patients can allude towards predicting their future conditions (physiological and physical), help to reduce the health care cost while simultaneously improving patient care outcomes. This can be customarily performed through the usage of one or more sensors attached to the patient's body. Indeed, critical decisions made by the medical staff can largely depend on the gathered information originating from such sensors. For that, this work proposes the design of an automated Remote Health Monitoring System (RHMS) aimed towards indoor patients, such as for those present inside the hospitals. The proposed system has the potential to provide medical personals with the ability to continuously monitor the patients through a centralized observation system without being physically present at their bedsides. In this project we have investigate the issues of information quality, in-terms of precision and timeliness, hence providing essential research pieces and motivation particles about this subject.

**Keywords:** *Remote Health Monitoring, Lilypad Arduino, Hospital System, Patient Monitoring, Health.*

## Table of Contents

<b>Chapter 1 - INTRODUCTION</b> .....	1
<b>1.1 Purpose of the Project</b> .....	1
<b>1.1 Purpose, Aim and Objectives of Project</b> .....	2
<b>1.2 Overview of this Document</b> .....	3
<b>1.3 Existing System</b> .....	3
<b>1.3.1 Existing System Description</b> .....	4
<b>1.3.2 Problems in the Existing System</b> .....	5
<b>Chapter 2 - SYSTEM ANALYSIS</b> .....	6
<b>2.1 DATA ANALYSIS</b> .....	6
<b>2.1.1 Work Breakdown Structure</b> .....	6
<b>2.1.1 Data Flow Diagram</b> .....	7
<b>2.1.2 System Requirements</b> .....	7
<b>2.1.2.1 User Requirement</b> .....	7
<b>2.1.2.2 Functional and Data Requirements</b> .....	9
<b>2.1.2.2.1 Selection of Arduino Board</b> .....	10
<b>2.1.2.2.2 Sensor Connectivity Pins with Arduino</b> .....	10
<b>2.1.2.3 Non-Functional Requirements</b> .....	11
<b>2.1.2.3.1 Look and Feel Requirements</b> .....	11
<b>2.1.2.3.2 Usability Requirements</b> .....	12
<b>2.1.2.3.3 Security Requirements</b> .....	12
<b>2.1.2.4 Proposed Solutions</b> .....	12
<b>2.1.2.5 Alternative Solution</b> .....	13
<b>Chapter 3 – DESIGN CONSIDERATIONS</b> .....	14
<b>3.1 Design Constraints</b> .....	14
<b>3.1.1 Hardware and Software Environment</b> .....	14
<b>3.1.2 End User Characteristics</b> .....	15
<b>3.2 Architectural Strategies</b> .....	16
<b>3.2.1 Algorithm to be used</b> .....	16
<b>3.2.1.1 Flow Chart</b> .....	18
<b>3.2.2 Reuse of Existing Software Components</b> .....	19
<b>3.2.3 Project Management Strategies</b> .....	19
<b>3.2.3.1 Gantt chart</b> .....	21
<b>3.2.4 Development Method</b> .....	22
<b>3.3 Project Test Documentation (PTD)</b> .....	22
<b>3.3.1 Case Study</b> .....	22

Case 1 .....	22
Case 2: .....	23
3.3.2 Case Studies Purpose .....	23
Purpose One .....	23
Purpose Two .....	24
<b>Chapter 4 – SYSTEM DESIGN .....</b>	<b>25</b>
4.1 System Architecture and Program Flow .....	25
4.1.1 Architecture for Current RHMS system .....	25
4.1.2 Architecture for Future work.....	26
4.1.1 Major Modules .....	26
4.1.2 Sub Modules .....	28
4.2 Detailed System Design .....	30
4.2.1 Detailed component description.....	30
a. Lilypad Arduino .....	30
FTDI Connector .....	31
Pulse Sensor Amped.....	31
LM35.....	32
<b>Chapter 5 – IMPLEMENTATION AND VALIDATION .....</b>	<b>33</b>
5.1 Initial Setup Requirement .....	33
5.2 Database Creation .....	33
5.3 Admin Login Form .....	35
5.3.1 Option for Selection of Information .....	35
5.4 Doctor Login.....	37
5.5 Results.....	39
5.6 Testing .....	43
<b>Chapter 6 – CONCLUSION .....</b>	<b>46</b>
<b>Chapter 7 FUTURE WORK .....</b>	<b>47</b>
<b>Appendix A: Programming Source Code .....</b>	<b>48</b>
<b>ARDUINO IDE CODE 1 .....</b>	<b>48</b>
a. Interrupt Call Code.....	48
<b>FRONT END AND BACK END APPLICATION CODE .....</b>	<b>53</b>
a. Connection with database Code.....	53
b. Admin Login Form .....	53
c. Patient Entry Form Code .....	56
d. Doctor Home Page .....	60
e. Save Selected ID data for Graphic View.....	63
f. Display Patient List.....	64
g. Graph .....	66

<b>Code 1: Backend JavaScript Code .....</b>	<b>66</b>
<b>CODE 2: Front End HTML Code .....</b>	<b>67</b>
<b>REFERENCES.....</b>	<b>69</b>
<b>Conference Paper .....</b>	<b>69</b>
<b>Web Based .....</b>	<b>69</b>