

FINAL YEAR PROJECT REPORT

Arduino base automatic and intelligent plant irrigation system



Project Advisor:

Dr. Shahid Awan

Submitted By:

Iqra Shoukat 13005065231

Naila Hafiz 13005065328

Maryam Khan 13005065207

Session:

Year 2013 - 17

University of Management & Technology,

Johar Town, Lahore, Pakistan.

Dedication

We devote our thesis work to our adoring guardians and extraordinary appreciation to our aware instructors, a warm appreciation to our relatives and companions, whose inspirational statements and push for determination ring in our ears. Without their collaboration it would have not been conceivable to finish the graduation and make them feel glad. We likewise commit this paper to our companions who have upheld us all through the procedure in any capacity. We will dependably welcome all they have done and how they bolstered

Final Approval

Panel of Examiners

- **Head of Department** _____

Department of Computer Science

UMT Lahore

- **Program Director (Final Year Projects)** _____

Department of Computer Science

UMT Lahore

- **Supervisor** _____

Department of Computer Science

UMT Lahore

- **Co-Supervisor** _____

Acknowledgment

To start with and the preeminent, we wish to offer our most profound thanks to our venture guide Dr. Shahid Awan for the persistent help in our BS contemplates and in the last year extend, for his understanding, inspiration, energy and tremendous learning. His direction helped all of us the time in the last year extend and the written work of this proposal. Without him this proposition would not have been finished. We additionally might want to thank all the regarded instructors of software engineering office for their direction inside and out they control us and make us qualified to finish this theory.

Abstract

This project is an automatic irrigation system for households, plants, parks and crops. Our system is designed to provide a schedule to the plants to ensure that plant have enough water for their growth. Our system takes the real time data for water content of the plant as input argument. The brain of our system is able to make decisions for the user when to distribute water into the plants and how much water should be delivered. Utilizing our system lowers the water expense.

REVISION CHART

Ver.	Primary Authors	Details & Description of version	Completion Date
0.1	TBD	Preliminary draft created for distribution and comments for reviews and suggestions	24/11/2016
0.1.1	TBD	To give SRS a consistent look	2/12/2016
0.1.2	TBD	Update SRS to reflect suggestion from advisor	6/12/2016
0.1.3	TBD	Update section to describe new product design	20/12/2016
0.1.4	TBD	Updating section to describe new product design	30/12/2016
0.1.5	TBD	Final inspection	20/7/2017

CONTENTS

- 1. INTRODUCTION 11**
 - 1.1 MOTIVATIONS 11
 - 1.2 PROJECT OVERVIEW 11
 - 1.3 PROBLEM STATEMENT 12
 - 1.4 OBJECTIVES 12

- 2. DOMAIN ANALYSIS 13**
 - 2.1 CUSTOMER 13
 - 2.2 STAKEHOLDERS 13
 - 2.3 AFFECTED GROUPS WITH SOCIAL OR ECONOMIC IMPACT 14
 - 2.4 DEPENDENCIES/ EXTERNAL SYSTEMS 14
 - 2.5 REFERENCE DOCUMENTS 14
 - 2.5.1 Related Projects 14
 - 2.5.2 Feature Comparison 14

- 3. REQUIREMENTS ANALYSIS 15**
 - 3.1 REQUIREMENTS 15
 - 3.2 LIST OF ACTORS 18
 - 3.3 LIST OF USE CASES 18
 - 3.4 SYSTEM USE CASE DIAGRAM 19
 - 3.5 EXTENDED USE CASES 20
 - 3.6 USER INTERFACES (MOCK SCREENS) 28

- 4. DATA FLOW DIAGRAM (OPTIONAL) 33**
 - 4.1 DATA FLOW DIAGRAM LEVEL 0 33
 - 4.2 DATA FLOW DIAGRAM LEVEL 1 34

- 5. SYSTEM DESIGN 35**
 - 5.1 SYSTEM ARCHITECTURE DIAGRAM 35
 - 5.2 CLASS DIAGRAM 36

5.3	COLLABORATION DIAGRAMS	42
5.5	ERD.....	43
5.6	DATA DICTIONARY	44
6.	IMPLEMENTATION DETAILS	46
6.1	DEVELOPMENT SETUP	46
6.2	DEPLOYMENT SETUP	47
6.3	ALGORITHMS	48
6.4	CONSTRAINTS	51
6.4.1	Assumptions	51
6.4.2	System constraints	51
6.4.3	Restrictions.....	51
6.4.4	Limitations	51
7.	TESTING	52
7.1	EXTENDED TEST CASES	52
7.2	DECISION TABLE	63
7.2.1	Code snippet	64
7.2.2	Decision coverage table	65
7.3	TRACEABILITY MATRIX	66
7.3.1	RID vs UCID (requirements vs use cases)	66
7.3.2	Prototypes (RID vs PID)	67
7.3.3	Test Cases (RID vs TID)	68
7.3.4	Coverage (UCID vs TID)	69
8.	RESULTS/OUTPUT/STATISTICS	70
8.1	%COMPLETION	70
8.2	%ACCURACY	70
8.3	%CORRECTNESS	70
9.	CONCLUSION	71
10.	FUTURE WORK	72
11.	BIBLIOGRAPHY	73
11.1	BOOKS.....	73
11.2	JOURNALS	73

11.3	ARTICLES	73
11.4	RESEARCH PAPERS.....	73
11.5	OTHER REFERENCES.....	73
12.	APPENDIX.....	74
12.1	GLOSSARY OF TERMS	76
12.2	PRE-REQUISITES	76

List of Figures

Figure 1 Use Case Diagram	21
Figure 2 Mock up(splash).....	30
Figure 3 Sign in	31
Figure 4 Status.....	32
Figure 5 Button on/off	33
Figure 6 Alert generate	34
Figure 7 Data flow diagram 0.....	35
Figure 8 Data flow diagram 1.....	36
Figure 9 System Architecture diagram	37
Figure 10 class diagram.....	38
Figure 11 Sequence sign in	39
Figure 12 Error in sign up.....	40
Figure 13 select zone.....	41
Figure 14 Sensor report	42
Figure 15 Error in showing reading	43
Figure 16 collaboration diagram	44
Figure 17 Entity relation diagram.....	45
Figure 18 Algorithm receiving data.....	50
Figure 19 Taking reading of sensors.....	51
Figure 20 Sensor reading	52
Figure 21 web page showing alert	63
Figure 22 weather forecast	63
Figure 23 monthly reports.....	64
Figure 24 code snippet android	66
Figure 25 arduino.....	66

List of Tables

Table 1: Stakeholder.....	15
Table 2: Feature Comparison.....	16
Table 3: Functional requirements.....	18
Table 5: Requirements	19
Table 6: Use Case (sign in)	22
Table 7: Use Case (Mode selection)	23
Table 8: Use Case (select zone)	24
Table 9: Use Case (check on/off toggle button)	25
Table 10: Use Case (check/ test status button)	26
Table 11: Use Case (check/test weather forecast button)	27
Table 12: Use Case (check/test Reaports button)	28
Table 13: Use Case (chect test Alert)	29
Table 14: Data Dictionary (motor)	46
Table 15: Data Dictionary (solenoid)	46
Table 16: Data Dictionary (sensors)	71
Table 17: Data Dictionary (zone)	47
Table 18: Test case(submit registration successfully)	54
Table 19: Test case (Mode selection button)	55
Table 20: Test case (check zone selection on application)	56
Table 21: Test case(Motor on/off button)	57
Table 22: test case(status button checking)	58
Table 23: Test case (Reports button checking)	59
Table 24: Test case (check alerts)	60
Table 24: Field testing	62
Table 25 :(Decision Table)	65
Table 26: Decision coverage table.....	67
Table 27: Traceability Matrix (RID vs UCID)	68
Table 28: Prototypes (RID vs PID).....	69
Table 29: Test Cases (RID vs TID)	70
Table 30: Coverage (UCID vs TID)	77

1. INTRODUCTION

1.1 Motivations

The inspiration for this venture originated from our nation where economy depends on agribusiness and the atmosphere conditions. The farmers in farm lands are dependent on the rains and bore wells and if farmer has a manual water pump then it needs to turn the pump on off whenever needed. In this situation conservation of water is of high importance. By continuously monitoring the status of the soil moisture level, we can control the consumption of water and thereby reduce the water wastage. Through this framework protection of water and work can be accomplished since the frameworks are programmed, they don't require constant checking of work. It will likewise help stay away from dryness of soil and eventually enhance to development of plant. It will also help avoid dryness of soil and ultimately improve to growth of plant.