



**Bahria University**  
Discovering Knowledge

**FINAL YAER PROJECT REPORT**  
**SMART IRRIGATION SYSTEM**

**By**

<b>ZAFRAN ZAFAR</b>	<b>(27215)</b>
<b>TAHSEEN ASLAM</b>	<b>(27233)</b>
<b>HALEEMA NADIA</b>	<b>(27115)</b>
<b>NUZAIFF ATHER</b>	<b>(32758)</b>
<b>S.M.DAIMUDDIN NUSRATI</b>	<b>(32758)</b>

**SUPERVISED BY**

**(MS. AYESHA DANISH)**

**BAHRIA UNIVERSITY (KARACHI CAMPUS)**

**2018**

## ACKNOWLEDGEMENTS

### ABSTRACT

We would like to thank everyone who had contributed to the successful completion of this project. We would like to express our gratitude to our research supervisor, **Ms. AYESHA DANISH** for her invaluable advice, guidance and her enormous patience throughout the development of the project.

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

## SMART IRRIGATION SYSTEM

### ABSTRACT

An automatic irrigation system is designed to provide water to the farms based on soil moisture, humidity and temperature conditions moreover water level is also measured. An algorithm is developed such that soil moisture sensor and humidity sensor values are continuously fed to Arduino Mega micro controller. The sensor information is compared with the threshold values. The system sends message to the user whenever sensors reach their threshold value. The user can provide commands to the system. The system may also be controlled by the user manually. The system is equipped with the photovoltaic panels and dual communication is established based on cellular-internet interface for continuous monitoring of data by the user. A website is designed to provide interface to the user. This system is preferable at water scarcity locations like agricultural areas because of its energy sovereignty, low cost and relatively more amounts of underground water saving.



## Table of Contents

CHAPTER 01 .....	9
INTRODUCTION .....	9
1.1 Background: .....	9
1.2 Problem Statements: .....	10
1.3 Aims and Objectives .....	11
1.4 Scope of Project .....	12
CHAPTER 02 .....	13
LITERATURE REVIEW .....	13
2.1 IOT Centered Irrigation Control System: .....	13
2.2 Automated Irrigation System using ZigBee – GSM: .....	15
2.3 Automated Irrigation System Using WSN& GSM Module: .....	16
2.4 Design And Implementation Of An Automatic Irrigation System Based On Monitoring Soil Moisture: .....	17
2.5 Automated Smart Irrigation System using Raspberry Pi: .....	19
CHAPTER 03 .....	22
DESIGN AND METHODOLOGY .....	22
3.1 Methodology: .....	22
3.1.1 Existing system: .....	22
3.1.2 Proposed system: .....	22
3.2 Hardware Implementation .....	29
3.2.1 Solar Panel: .....	29
3.2.2 Arduino Mega: .....	30
3.2.3 Soil Moisture Sensor: .....	31
3.2.4 Rain/Humidity Sensor: .....	32
3.2.5 Water Level Sensor: .....	32
3.2.6 Temperature Level Sensor: .....	33
3.2.7 Sim900 GSM Module: .....	34
3.3 Project Schedule: .....	35
3.3.1 Key Milestones throughout the Project: .....	35
3.3.2 Key Milestones 7 <sup>th</sup> Semester: .....	36
3.3.3 GANTT CHART FOR 7 <sup>TH</sup> SEMESTER: .....	37
3.3.4 Key Milestones 8 <sup>th</sup> Semester .....	38

3.3.5 Gantt chart of 8th Semester .....	38
3.4 RESOURCE ESTIMATION .....	39
CHAPTER 04 .....	40
IMPLEMENTATION .....	40
4.1 Splash Screen of Smart Irrigation System .....	40
4.2 Main Menu Smart Irrigation System .....	41
4.3 Splash Screen of Receiving SMS .....	42
CHAPTER 05 .....	45
RESULTS AND DISCUSSIONS .....	45
5.1 HARDWARE TESTS .....	46
5.2 Unit Tests .....	48
5.2.1 – Soil Moisture Sensor Subsystem .....	48
5.2.2 – Rain Sensor System .....	49
5.2.3 – Temperature Sensor Subsystem .....	49
5.2.4 – water level Subsystem .....	50
5.2.5 – Sensor Control Subsystem .....	51
5.2.6 – Web Application Subsystem .....	52
5.3 Component Tests .....	54
CHAPTER 06 .....	56
CONCLUSION AND RECOMMENDATIONS .....	56
6.1 Reasons to Develop Smart Irrigation System .....	56
6.2 Conclusion .....	57
6.3 Recommendation and Future Work .....	57
REFERENCES .....	59
APPENDICES .....	61
APPENDIX I: QUESTIONNAIRE .....	61
QUESTIONNAIRE .....	61
APPENDIX III: SMART IRRIGATION SYSTEM –CODING .....	65