

ABSTRACT

Pesticide recommendation for crop disease is a new innovative way of identifying the crop disease using the sensors and alerting the farmer about the diseases and suggest him the best pesticide to be used for that particular disease. The motivation behind developing this project is to reduce the farmer efforts of continuously monitoring the crop health by using the required sensors. The data obtained using the sensors are uploaded to the cloud. Machine learning algorithm is used to analyze this uploaded data to identify the disease. Machine learning provides system the ability to automatically adjust to conditions pertaining to environmental factors and improve from historic data without being explicitly programmed. Traditional model of disease detection uses the complex process like image processing to identify the disease. Which is more time consuming and also requires installation of the expensive sensors which takes good quality images. This model will solve the above mentioned problem by decreasing the complexity in processing and the workload.

Agriculture development is providing the assistance to the crop producer by the help of various new technology and the agriculture resources. In this project a working model is developed to detect the disease of the crop using IOT and based on the data collected using sensors the best pesticides will be suggested to the crop producer for better yield.

In this project, an architecture is proposed which focuses on IOT and agriculture automation using the sensors and traditional crop disease detection methods. The architectural framework is general for variety of crops and their disease. To demonstrate working of this architecture the mango crop and its diseases is been chosen.

TABLE OF CONTENTS

ABSTRACT	i
TABLE OF CONTENTS	ii
LIST OF ACRONYMS	vi
LIST OF FIGURES	vii
LIST OF TABLES	viii
CHAPTER 1	1
INTRODUCTION TO IOT BASED CROP DISEASE DETCTION AND PESTICIDES RECOMMENDATION	1
1.1 Purpose	1
1.2 Motivation	2
1.3 Problem Statement	2
1.4 Objective	2
1.5 Scope and Relevance	3
1.6 Literature Survey	3
1.7 Methodology and Architectural Roadmap	4
1.8 Organization of Thesis	5
1.9 Summary	6

CHAPTER 2	7
REQUIREMENT SPECIFICATION FOR IOT BASED CROP DISEASE DETCTION AND PESTICIDES RECOMMENDATION	7
2.1 Functional Requirements	7
2.2 Non-Functional Requirements	7
2.3 Hardware Requirements	7
2.4 Software Requirements	7
 CHAPTER 3	 8
DESIGN OF IOT BASED CROP DISEASE DETCTION AND PESTICIDES RECOMMENDATION	8
3.1 High Level Design	8
3.1.1 System Architecture	8
3.1.2 Sequence Diagram	10
3.1.3 Activity Diagram	10
3.1.4 Class Diagram	11
3.2 Low Level Design	12
3.2.1 Server module	12
3.2.2 Hardware module	13
3.2.3 Data Flow Diagram	14

CHAPTER 4	16
IMPLEMENTATION DETAILS OF IOT BASED CROP DISEASE DETCTION AND PESTICIDES RECOMMENDATION	16
4.1 Implementation Requirements	16
4.1.1 Hardware Requirements	16
4.1.2 Software Requirements	18
4.2 Implementation Tool features	19
4.3 Coding Conventions	21
4.3.1 Naming Conventions	21
4.3.2 Comments	22
4.3 Summary	22
 CHAPTER 5	 23
SOFTWARE TESTING OF IOT BASED CROP DISEASE DETCTION AND PESTICIDES RECOMMENDATION	23
5.1 Testing Process	23
5.2 Functional Testing	23
5.2.1 Unit testing of modules	23
5.2.2 Integration Testing	24
5.2.3 System Testing	25
5.5 Summary	25

CHAPTER 6	26
RESULTS AND ANALYSIS OF IOT BASED CROP DISEASE DETCTION AND PESTICIDES RECOMMENDATION	26
6.1 Results	26
6.2 Comparative Analysis	28
6.3 Summary	29
 CHAPTER 7	 30
CONCLUSION OF IOT BASED CROP DISEASE DETCTION AND PESTICIDES RECOMMENDATION	30
7.1 Limitations	30
7.2 Future Enhancements	30
REFERENCES	31
APPENDIX-A CODE SNIPPETS	32
APPENDIX-B SCREENSHOTS	34

LIST OF ACRONYMS

AC	Alternating Current
DC	Direct Current
DMA	Direct Memory Access
IC	Integrated circuit
IDE	Integrated Development Environment
IoT	Internet of Things
ML	Machine Learning
NTC	Negative Temperature Co-efficient
RAM	Random Access Memory
UML	Unified Modeling language
USB	Universal Serial Bus

LIST OF FIGURES

Figure No.	Figure Name	Page No.
Figure 1.1	Project Roadmap	5
Figure 3.1	Architecture Diagram	8
Figure 3.2	Decision Tree	9
Figure 3.3	Sequence Diagram for crop-disease detection	10
Figure 3.4	Activity Diagram for crop-disease detection	10
Figure 3.5	Class diagram	12
Figure 3.6	Server Module	13
Figure 3.7	Hardware Module	13
Figure 3.8	Level 0 DFD	14
Figure 3.9	Level 1 DFD	14
Figure 3.10	Level 2 DFD	15
Figure 4.1	Arduino UNO board	16
Figure 4.2	DHT11 sensor	17
Figure 4.3	ESP8266 WiFi module pin configuration	18
Figure 6.1	Pesticides stored in database	26
Figure 6.2	Server Detection the disease	27
Figure 6.3	Alerting the Farmer	27

LIST OF TABLES

Table No.	Table Name	Page No.
Table 4.1	Arduino UNO specifications	19
Table 4.2	DHT11 sensor specifications	20
Table 4.3	Naming convention followed in source code	21
Table 6.1	Disease results	28