

## **ACKNOWLEDGMENTS**

All praise and thanks to Allah, who provided us with the ability to complete this work.

The success of any project depends mostly on the encouragement and guidelines of many others. So that we would like to present our sincere thanks to many people who guided us through the four years of the faculty.

At first we would like to thank Prof. Dr. Sami ,All Doctors and Assistants of the higher institute of computer science & information system –culture and science city at Oct 6 for their continued support ..

Moreover we would like to express our gratitude to our advisor Prof. Dr. Sami for His support, patience, and encouragement throughout this project. It is not often that one finds an advisor and colleague that always finds the time for listening to the little problems besides his experience, technical and editorial advice was essential to the completion of this project and has taught us innumerable lessons along our entire course.

Many thanks also go to Eng. Dalia Tourky for supporting us by providing many valuable comments that improved our project with her patience, knowledge, experience and professionalism, and for providing help and support throughout the whole years of study.

*Team Work*

*July, 2018*

## **Summary**

This project aid in monitoring infant in an incubator and records the relevant data into the mobile application. The monitoring system consists of an incubator equipped with a humidity sensor to measure the humidity level, a pulse sensor that can be attached to an infant placed inside the incubator to monitor infant's heart pulse and Temperature sensor to measure the body temperature of The baby.

The measurement results which are the pulse rate, humidity level and temperature are sent to a mobile application.

Temperature sensor and Humidity sensor connects by Arduino Uno, and Pulse sensor connect with ESP only to avoid the problems that case when it connects with a temperature sensor and humidity.

At first, the measurements of three sensors display by the using Blynk app to show the measurements of them; then these measurements upload to Firebase database. Finally making a mobile app with IOS and android system.

The primary Objective of this project will enable doctors to monitor the infant condition through mobile application closely.

# **LIST OF CONTENTS**

## **Chapter 1:**

<b>Introduction.....</b>	
1.1 The Meaning of neonatal incubator.....	
1.2 The Usage Of neonatal incubator.....	
1.3 History of incubator.....	
1.4 Types of incubator.....	
1.5 Parts of incubator.....	
1.6 Common conditions treated in the neonatal intensive care unit (NICA) .....	
1.7 Temperature Body of Baby.....	
1.7.1 Body Temperature divided into two Categories.....	
1.7.2 Temperature Range.....	

## **Chapter 2:**

<b>Hardware and component.....</b>	
2.1 Hardware.....	
2.2 The component and their types.....	
2.2.1 Arduino .....	
2.2.1.1 Board Types.....	

2.2.1.2 Arduino – Board Description.....	
2.3 Node MCU.....	
2.4 Humidity sensor.....	
2.4.1 Technical Specifications.....	
2.4.2 The types of DHT sensors.....	
2.4.3 NTC thermistor meaning.....	
2.5 Body temperature sensor.....	
2.5.1 The types of body temperature sensors.....	

## **Chapter 3:**

<b>Design and Implementation.....</b>	
3.1 Design of sensors .....	
3.1.1 Design of LM 35 (Body Temperature Sensor).....	
3.1.2 DHT 11 (Humidity & Temperature Incubator Sensor).....	
3.1.3 Pulse sensor (Heart Sensor).....	
3.1.4 The Three Sensors together using the ESP and the Arduino .....	
3.2 Hardware Implementation.....	
3.2.1 LM35 Implementation.....	
3.2.2 DHT11 Implementation.....	
3.2.3 Pulse Sensor (Heart Sensor) Implementation.....	
3.2.4 LM35 and DHT11 with ESP Implementation.....	
3.3 Software Implementation.....	

3.3.1 Blynk Implementation.....	
3.3.2 Uploading measurements on firebase database.....	
3-3-3 Implementation phases on android and IOS app.....	
1. Use Case Diagram for app.....	
2. Use case narratives.....	
3. 3.Activity Admin Diagram.....	
4. 4.Activity User Diagram.....	
5. 5.Sequence Diagram.....	
6. User requirement.....	
7. Android and IOS implementation for app.....	

## **Chapter 4:**

Conclusion.....	
<b>References</b> .....	
<b>Appendix</b> .....	
Appendix A –Hardware coding.....	
Appendix B–IOS coding.....	
Appendix c–Android coding.....	
ملخص المشروع باللغة العربية.....	

## **TABLE OF FIGURES**

### **Chapter1:**

Figure1-1 Neonatal care or Specialized nurseries.....	
Figure1-3-1 First Incubator.....	
Figure 1-4-1 Portable Incubator.....	
Figure1-4-2 Open box type.....	
Figure 1 4-3 Close type.....	
Figure 1-4-4 Double walled.....	
Figure 1-5-1 Baby inside the Incubator with all connection.....	

### **Chapter2:**

Figure 2-1-1 Arduino Uno and IDE software.....	
Figure 2-1-2 Arduino Uno component.....	
Figure 2-2-1 ESP 8266.....	
Figure 2-2-2 Node MCU 8266.....	
Figure 2-3-1 DHT11 pins.....	
Figure 2-3-2 DHT11 & DHT22.....	
Figure 2-3-3 NTC Thermistor .....	
Figure2-5-1 Pulse Sensor.....	
Figure 2-5-2 Pulse Sensor Kit Contents.....	

Figure 2-5-9 Wires of Pulse Sensor .....

### **Chapter 3:**

Figure 3.1.1 Connection between LM35 and Arduino .....

Figure 3.1.2 Connection between DHT11 and Arduino .....

Figure 3.1.3 Connection between pulse sensor and Arduino .....

Figure 3.1.4 DHT11 and LM35 with ESP .....

Figure 3-2-5 Blynk Working .....

Figure 3-2-6 Blynk app measurement .....

Figure 3-3-1 UML Use case for app .....

Figure 3-3-2 Use case narratives for app .....

Figure 3-3-3 Activity Admin Diagram for app .....

Figure 3-3-4 Activity User Diagram for app .....

Figure 3-3-3 sequence diagram .....

Figure 3-3-4 Login activity .....

Figure 3-3-5 Incubators .....

Figure 3-3-6 DataOfIncubators .....

Figure 3-3-7 Add-Baby .....

Figure 3-3-8 Add-User .....

Figure 3-3-9 Tools .....

Figure 3-3-10 Add\_Incubator .....

Figure 3-3-11 Remove\_Incubator .....

Figure 3-3-12 Logout .....

Figure 3-3-13 UserView .....

## **TABLE OF Tables**

### **Chapter1:**

Table 1-7-1 Temperature Range.....

Table 1-7-2 Temperature Range.....

### **Chapter2:**

Table 2-1-1 Arduino boards microcontroller.....

Table 2-2-1 Node MCU pins numbers, names, and functions.....

Table 2-2-1 Node MCU pins numbers, names, and functions.....

Table 2-3-1 compare between DHT11 & DHT22.....

Table 2-4-1 the different types of body temperature sensors.....

## **TABLE OF Equations**

### **Chapter3:**

Equation3-2-1 Body temperature .....