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COMPUTING PROJECT - II REPORT

(Project Term January-April, 2019)

Project-Smart Box

Submitted by

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Course Code: CSE308

Under the Guidance of

Mrs. Navjot Kaur

**School of Computer Science and Engineering
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DECLARATION

We hereby declare that the project work entitled “Smart Box” is an authentic record of our own work carried out as requirements of **COMPUTING PROJECT - II** for the award of B.Tech degree in Computer Science from Lovely Professional University, Phagwara, under the guidance of **Mrs. Navjot Kaur**, during January to April 2019. All the information furnished in this computing project - II report is based on our own intensive work and is genuine.

Project Group

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CERTIFICATE

This is to certify that the declaration statement made by this group of students is correct to the best of my knowledge and belief. They have completed this Project under my guidance and supervision. The present work is the result of their original investigation, effort and study. No part of the work has ever been submitted for any other degree at any University. The Project is fit for the submission in Computing Project - II subject, Computer Science & Engineering from Lovely Professional University, Phagwara.

Signature and Name of the Mentor

Designation

School of Computer Science and Engineering,
Lovely Professional University,
Phagwara, Punjab.

Date :

ACKNOWLEDGEMENT

In preparation of our assignment, we had to take the help and guidance of some respected persons, who deserve our deepest gratitude. As the completion of this assignment gave us much pleasure, we would like to show our gratitude towards **Mrs. Navjot Kaur**, Course Instructor, on Lovely Professional University for giving us good guidelines for assignment throughout numerous consultations. We would also like to expand our gratitude to all those who have directly and indirectly guided us in writing this assignment.

In addition, a hearty thanks to Professor Abhinav Hans Sir, who introduced us to the Arduino programming, and his help was the underlining of our project. We also thank Lovely Professional University for including this course.

We took help from numerous websites and YouTube channels for the hardware connections and the Arduino programming. We have also used QT software for the application to display, which is learnt from QT documentation.

Many people, especially our classmates have made valuable comment suggestions on our project which gave us an inspiration to improve the quality of the project.

Finally we thank each and every person for helping in the project.

THANK YOU

Project Team.

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INTRODUCTION

About the project:

The project is based on IoT. In this project, we deal with current, temperature, humidity. We make use of sensors to detect the breakage in the circuit, detection of the total no of people in the room to make or break the circuit. Counting of people determines switching on/off lights to conserve electricity.

There are 3 different modules, Module 1 is about finding the voltage in the circuit, Module2 is about finding the Temperature and Humidity of the room, Module3 is about finding the total number of people in the room to switch lights on/off accordingly.

We make use of Current sensors, Counting sensors, Humidity and Temperature sensors, Arduino, etc.

We device a hardware (Smart Box) in which we integrate the sensors in a box.

Module 1:

- To detect the voltage of the current in the room, we introduce a current sensor. This sensor is integrated in a box so called SMART BOX.
- The current in the wires of room is given as an input to the sensor. This sensor is controlled by Arduino.
- With the help of Arduino we get the voltage readings
- This Smart Box is compatible with many other modules integrated in it.

Module 2:

- To detect the present room temperature and Humidity with the help of the sensor. This sensor is also integrated in the Smart Box.
- With the Help of Arduino, we control the Temp-Humidity sensor and get the data to the application via Wi-Fi.
- We send the data from the Arduino to the application designed in QT.

Module 3:

- To count the total no of people entered or left the room. This helps to ON or OFF the circuit automatically.
- This sensor controls the total smart box. We connect this module to the main circuit.
- We make use of IR sensors to detect the movement of people IN and OUT of the room.

Working with QT

What is Qt

Qt is much more than just a cross-platform SDK - it's a technology strategy that lets cost-effectively design, develop, deploy, and maintain software while delivering a seamless user experience across all devices.

Code less, create more, deploy everywhere

Write source code once, build and watch it run on any operating system and hardware. It's truly cross-platform.

Design for tomorrow, deliver today

Embrace the complete freedom to design tomorrow's UIs. Use drag-and-drop tools, declarative QML or imperative C++ - the choice is yours.

For developers, by developers

Qt takes the hassle out of programming and 'it just feels right'. It's intuitive, has all the tools you need, comprehensive documentation and full support from Qt community.

Bluetooth Communication

The Qt Bluetooth module provides both C++ and QML APIs for the short-range (less than 100 meters) wireless protocol developed by the Bluetooth Special Interest Group. It provides classic Bluetooth and Bluetooth Low Energy features.

QBluetoothSocket Class

The QBluetoothSocket class enables connection to a Bluetooth device running a bluetooth server.

Header: `#include <QBluetoothSocket>`

qmake: `QT += bluetooth`

Since: Qt 5.2

Inherits: QIODevice

Working with Arduino

What is Arduino?

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing is used.

digitalRead()

Description

Reads the value from a specified digital pin, either HIGH or LOW.

Syntax

`digitalRead(pin)`

Parameters

Pin: the number of the digital pin you want to read

Returns

HIGH or LOW

digitalWrite()

Description

Write a HIGH or a LOW value to a digital pin.

Syntax

`digitalWrite(pin, value)`

Parameters

Pin: the pin number

value: HIGH or LOW

delay(),Serial etc.

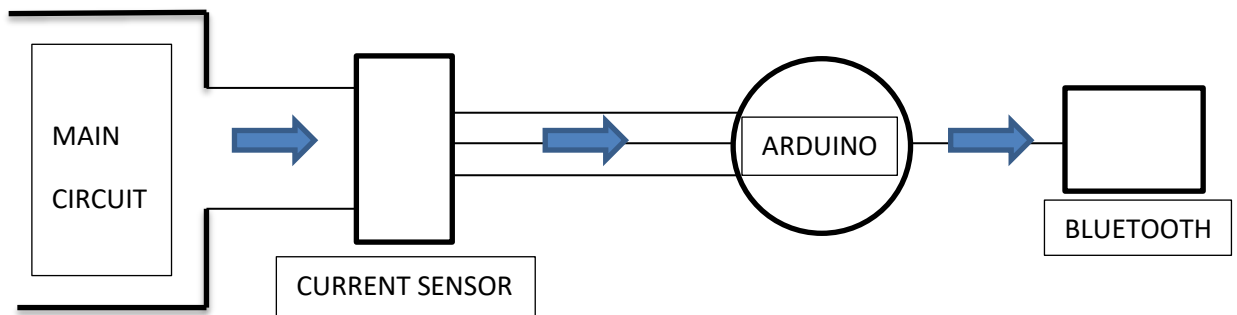
Profile of the Problem and Analysis

This project is designed to give the solution of these problems

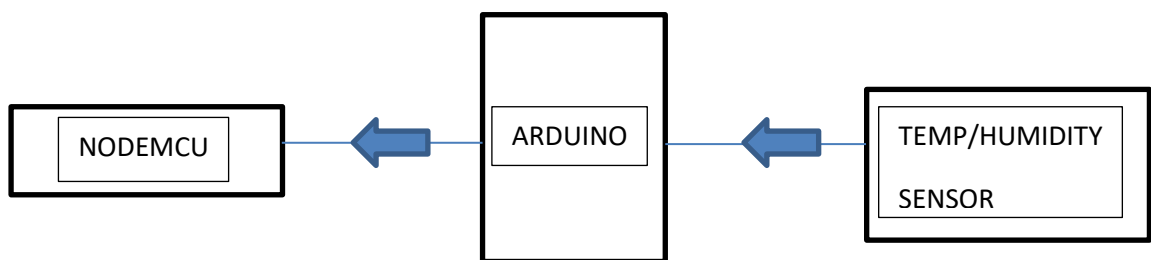
1. Module 1 is designed to find the current in the circuit.
2. Module 2 is designed to find the temperature and humidity of the room
3. Module 3 is designed to find the number of people in the room and turn the power ON and OFF.

Project Plan:

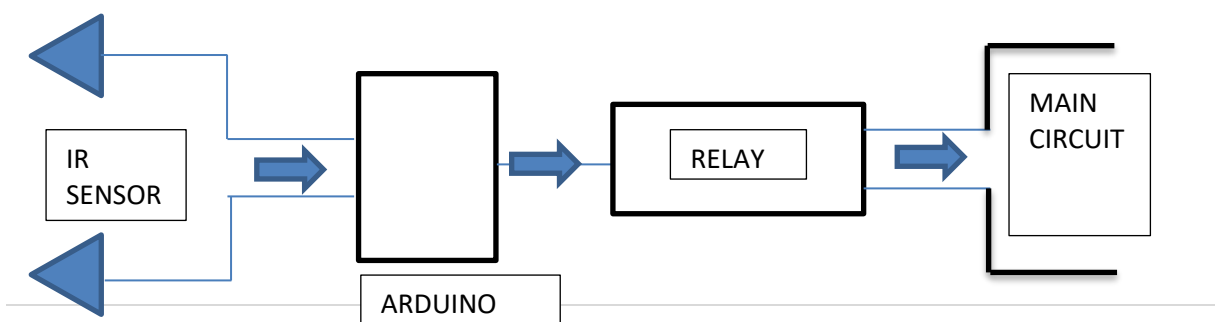
Module 1



Module 2:



Module 3:



Requirement Analysis

We are adding these hardware into a portable box which includes a basic circuit.

1. Arduino boards



2. Bread boards



3. Wires



4. 9v Battery



Specific requirements:

Module 1:

1. Current sensor

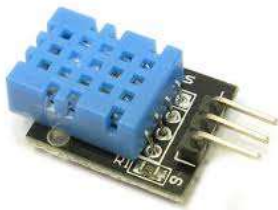


2. Bluetooth module



Module 2:

1. Temperature and humidity sensor



2. Node MCU



dc

Module 3:

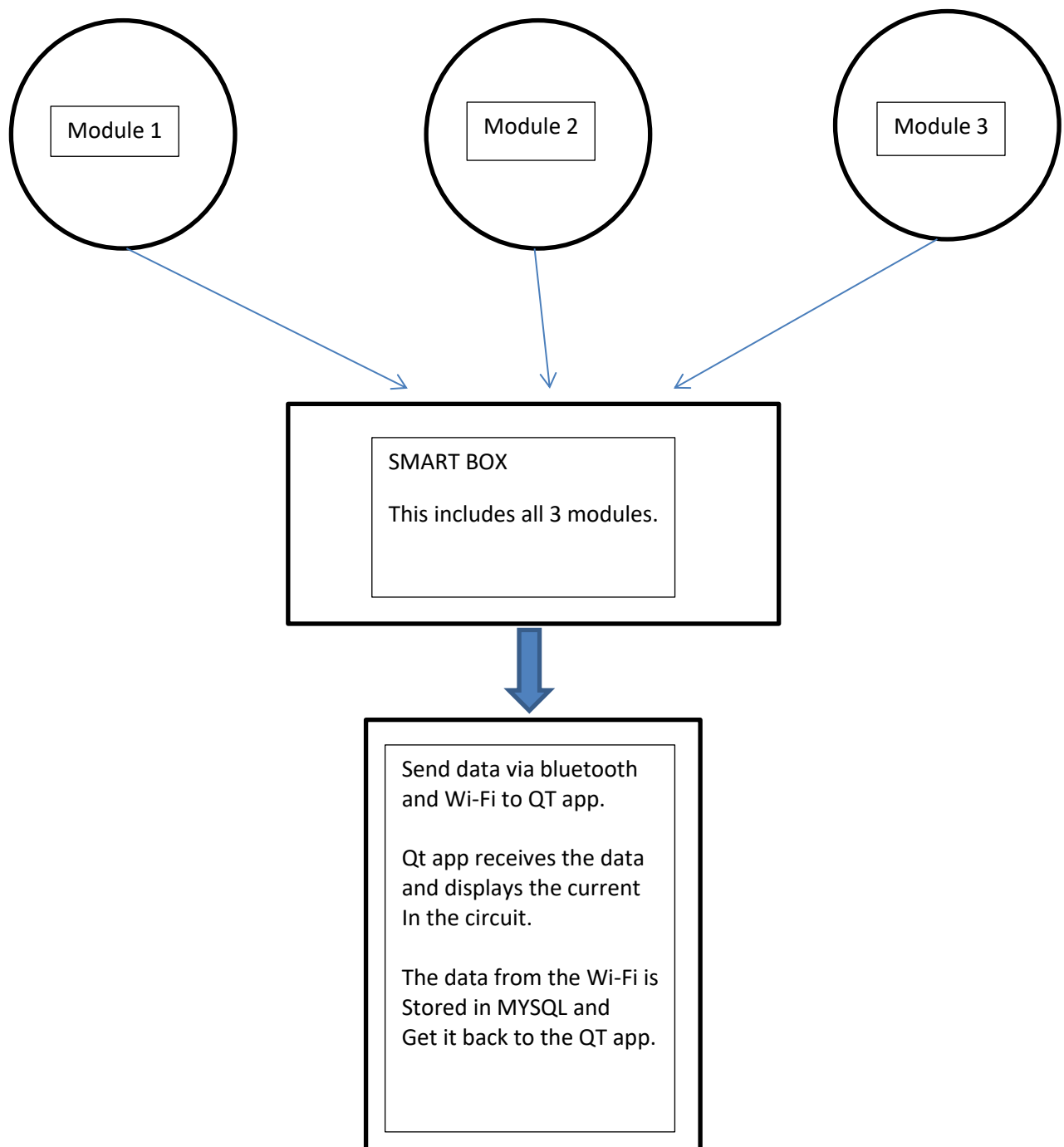
1. IR sensor



2. Relay Switch



Design – Flow chart



Wiring of modules

The right-hand-side is always connected to Arduino

Module 1:

Current sensor

Ground ----- ground

VCC ----- 5V

OUT ----- A0

Bluetooth

RX ----- TX

TX ----- RX

Ground ----- Ground

5V ----- 5V

EN ----- 5V

Module 2:

Temperature-humidity sensor

Ground ----- Ground

VCC ----- 3.3V

OUT ----- D4 PIN2

Module 3:

IR 1 AND 2

Ground ---- Ground

VCC ----- 5V

FOR 1

OUT ----- A0

FOR 2

OUT ----- A5

RELAY

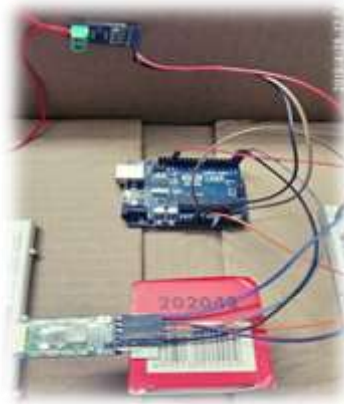
Ground ---- Ground

VCC ----- 5V

OUT ----- 2

Testing

Testing of module 1:

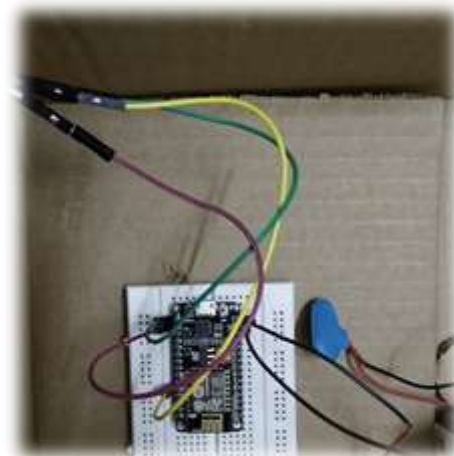
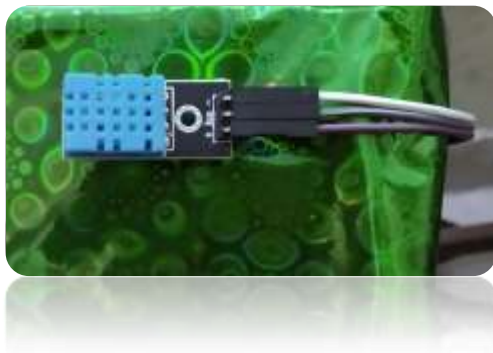


The current sensor is connected to the main circuit

The current sensor detects the current with the help of Arduino and sends the data to the app via bluetooth

The app developed in qt will detect the bluetooth and receive the data from it

Testing of Module 2:



The Temperature and Humidity sensor which is seen in fig:1 is attached to the box.

The NodeMCU in fig:2 is with inbuilt WI-FI module which gets the data from the sensor and sends to the database and from the database we get in QT app.

Testing of Module 3:



The two IR sensors act like counting sensors. One sensor detects when the person enters the room and the other detects if person exits the room.

The relay is connected to the main circuit.

If the number of persons in the room is null then the relay is turned OFF which means the main circuit is broken.

If a person enters the room (number of persons in the room is more than 0) then the relay is turned ON

QT App Testing:

Bluetooth



Fig1



Fig2

QT App Testing: WI-FI



Fig1



Fig2

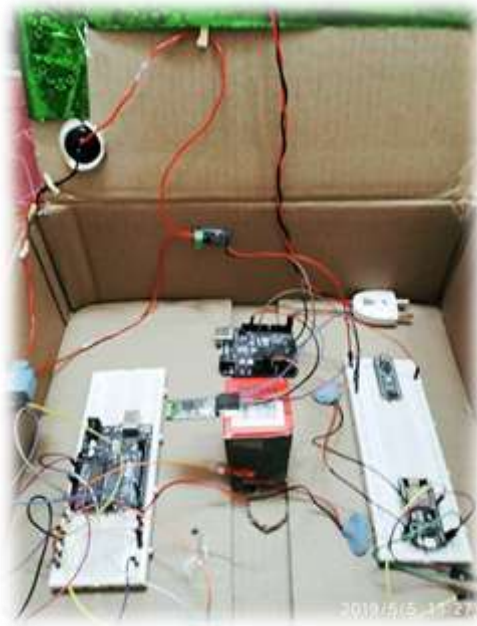
In both app testing, the fig1 says about the connection. In bluetooth fig1 is when we connect the bluetooth with the app and in Wi-Fi fig1 when the database (MySQL) is connected.

In bluetooth fig2 prints the reading which is sent via bluetooth from module1. In Wi-Fi fig2 also prints the temperature and humidity etc.via Wi-Fi from module2

The Wi-Fi and bluetooth app is for windows application and for android

Implementation

Making of Smart Box



All the modules are combined and placed inside the box

A small circuit is designed for testing the modules

Module1 and Module3 are interconnected

Module2 is separate which shows the present temperature and humidity of the room.

Source Code

Counting Sensor

```
if(digitalRead(in))
  IN();
if(digitalRead(out))
  OUT();
if(count<=0)
{
  digitalWrite(relay, HIGH);
  delay(200);
}
else
  digitalWrite(relay, LOW);
```

Current Sensor

```
RawValue = analogRead(analogIn);
Voltage = (RawValue / 1023.0) * 5000; // Gets you mV
Amps = ((Voltage - ACSoffset) / mVperAmp);
```

Temp-Humidity Sensor with NodeMCU

```
const char QUERY_POP[] = "update 6OUdLhUoid.QT set Humidity = %f, Temperature = %f, HeatIndex = %f, TM = now() where id = 1;";
```

```
char user[] = "6OUdLhUoid";
char password[] = "QbxWOqkU8Y";
char ssid[] = "OnePlus2"; // your SSID
char pass[] = "12345678y";
```

```
conn.connect(server_addr, 3306, user, password)
WiFiClient client;
MySQL_Connection conn((Client *)&client);
```

```
float h = dht.readHumidity();
float t = dht.readTemperature();
float hic = dht.computeHeatIndex(t, h, false);
MySQL_Cursor *cur_mem = new MySQL_Cursor(&conn);
sprintf(query, QUERY_POP, h, t, hic);
cur_mem->execute(query);
delete cur_mem;
delay(1000);
```