# Final Project Report for  Communication Systems + OOPS + ET 201

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* Required

Name *

Tanmay Patil

Enrollment Number *

BT21GCS056

Team Number *

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Mention the hardware components integrated in the prototype. *

NodeMCU and MRC522(RFID)

Explain why these specific components were used in the creation of the prototype. *

We have used RFID (MRC522) and NodeMCU hardware. The MRC522 device in question has been utilised to collect attendance, and NodeMCU, which is on the microcontroller side, is transmitting all of the user's data to the cloud. The NodeMCU has an ESP8266 Wi-Fi module integrated into it, so we don't need to utilise additional hardware with the ArduinoUNO in order to access the Wi-Fi capability. These modules include RFID (MRC522), which is one of the readily available market modules we can get our hands on.

Explain the working and application of the prototype. *

Our project has been fragmented into 2 parts, first being the indoor, In indoor we have created a prototype which consists of NodeMCU and RFID(MRC522), now this rfid reads the card and sends the data over to the nodemcu which then proceeds to upload the following data onto the google sheet and thingspeak. Now the second part which is the outdoor one, we have created 3 websites which has different roles to perform, starting with the client website which has a button when pressed it sends the coordinates of the device over to the google sheet. Now this google sheet will be read by the admin website which then plots the coordinates after it is plotted. The code then will make a decision weather the client is in the set bounds or not and a message will be displayed accordingly. Along with this we have alos created a virtual tour to provide a real life experience without even visiting it and at last we have also created a geolocator feature which tells you your current location. At last to sum this up we can created a JavaFX application which is basically a one stop access to all our features. This application consists of all the features which we are providing. There are many applications of this particular prototype the first being highlighted as the college or universities one the next this particular prototype has been divided into 2 parts so we can provide the company part as per the requirements for example the indoor one can be installed in any organisation, hospitals who wants a sophisticated way to keep track of the their customers or patients respectivly.
Applications can be many but the highlighted one in this prototype is for students but this same things can be applied in either other organization for example in an office instead of implementing both the approaches as both the appraoches indoor and outdoor has been made in such a way that they can be implemented independently, we can only go forward with indoor so in the indoor part, we have a RFID system which helps for making a smart attendance system. Same thing can been acheived in an hospital but instead of tracking employees and students we are going to tracck the patients instead.

What concepts of OOPS have you used in this project? Explain. *

In the project many OOPS concepts has been used, but some of them is:
**Due to limited space not all of them has been listed**

Object :
Main m = new Main();
m.changeScene("chartsbj.fxml");

Classes:
public class Bj
public class charts
public class MultiUser

Interface:
public class charts implements Initializable

Overriding:
```
 @Override
    public void initialize(URL url, ResourceBundle resourceBundle) {
        engine = webViewcharts.getEngine();
        loadPage();
    }
```

Exception handling:
```
public void back(ActionEvent event) throws IOException{
        Main m = new Main();
        m.changeScene("timpal.fxml");
    }
```

Importing pacakges:
package prog.login_updated;

What libraries have you imported from Java and how have you integrated them in this project? *

**Due to limited space not all of them has been listed**
File #1 (Login):

```
import javafx.event.ActionEvent;
import javafx.fxml.FXML;
import javafx.scene.control.Button;
import javafx.scene.control.Label;
import javafx.scene.control.PasswordField;
import javafx.scene.control.TextField;
```

javafx.event.ActionEvent has been used to read if a event takes place.
javafx.fxml.FXML is one of the basic JavaFX libraries used to link the fxml file with the associated java class.
javafx.scene.control.Button is use to create a Button on the page.
javafx.scene.control.PasswordField is use to create a JavaFX password field which would be read later in order to tally wiht existing user.
javafx.scence.control.TextField is use to take the username input from the user.

File #2 (charts):

```
import javafx.event.ActionEvent;
import javafx.fxml.FXML;
import javafx.fxml.Initializable;
import javafx.scene.control.Button;
import javafx.scene.web.WebEngine;
import javafx.scene.web.WebView;

import java.io.IOException;
import java.net.URL;
import java.util.ResourceBundle;
```

javafx.event.ActionEvent has been used to read if a event takes place.
javafx.fxml.FXML is one of the basic JavaFX libraries used to link the fxml file with the associated java class.
javafx.fxml.Initializable is a interface use to extract the system information or resource bundle and initiate a URL variable which will hold our URL.
javafx.scene.control.Button is use to create a Button on the page.
javafx.scene.web.WebEngine is use to extract the default web engine from the user.
javafx.scene.web.WebView is use to create a window in the application which shows a web page.
java.io.IOException is one the exception libraries, IO or input output exception.
java.net.URL is one library use to trigger the URL in given web engine.
java.util.ResourceBundle is use to extract user device's information like language, time and date.

File #3 (Timpal):

```
import javafx.event.ActionEvent;
import javafx.fxml.FXML;
import javafx.fxml.Initializable;
import javafx.scene.control.Button;
import javafx.scene.control.TextField;
import javafx.scene.web.WebEngine;
import javafx.scene.web.WebView;

import java.awt.*;
import java.io.IOException;
import java.net.URI;
import java.net.URISyntaxException;
import java.net.URL;
import java.util.ResourceBundle;
```

javafx.event.ActionEvent has been used to read if a event takes place.
javafx.fxml.FXML is one of the basic JavaFX libraries used to link the fxml file with the associated java class.
javafx.fxml.Initializable is a interface use to extract the system information or resource bundle and initiate a URL variable which will hold our URL.
javafx.scene.control.Button is use to create a Button on the page.
javafx.scence.control.TextField is use to take the username input from the user.
javafx.scene.web.WebEngine is use to extract the default web engine from the user.
javafx.scene.web.WebView is use to create a window in the application which shows a web page.
java.awt.* has been used to access the desktop's default web browser.
java.io.IOException is one the exception libraries, IO or input output exception.
java.net.URI  is use to uniform resource identifier while a URL is a uniform resource locator.
java.net.URISyntaxException is a Expection library, the exception is raised when the URL is not found.
java.net.URL is one library use to trigger the URL in given web engine.
java.util.ResourceBundle is use to extract user device's information like language, time and date.

How did you display the data generated from the hardware in the GUI and store it? *

The hardware (NodeMCU + MRC522) sends the data when the RFID card is getting scanned. The data is being sent to two locations, a Google Sheet and a Thingspeak channel. The GUI has options for the user to view the charts that Thingspeak is generating from the data collected from the hardware or directly show the Google Sheet. Along with this we are using a Web view which which is basically a tool which shows a browser window and so as mentioned the thing speak and Google sheet has been shown in the webview. In short, Google sheets, thingspeak have been used to store data and make charts for the application.

Give a brief explanation of the ET201 learnings implemented in the project *

ET201 we learn to gather and use the infomration in much cleaner way. We learned to organise the information. We learnt to understand the survey and how to use it in order to make our application beeter in terms visual as well as the functionality terms.

Explain how you integrated communication systems, OOPS, and ET201 in this project. *

In our project comunication system has been used for an instance the IOT technologies, we have used are WiFi to transfer the information over to the cloud and RFID to read the user's information from the identity card. Next to show this information from the cloud we ahve used OOPS concepts to create the JAVA application which will retrive the information from the cloud and then display that information onto the cloud. now this OOPS application has been implementated and made more efficient using the concepts from ET201 like how the application should look and how we can organise the data and put it out to the user.

Mention your role(s) in this project and how you have contributed to it. *

In this project, I was the project lead and code developer. As the project, I have made sure that the communication between the team members remains seamless, also I have managed the asana and assigned the tasks required to be done with deadlines. As the software developer, I have created the hardware code which has been uploaded to the nodemcu along with this. I have used the appscript in google sheet to make it workable, In the Java section, I have created a number of features like the Login page, user selction page and one of oue user page (Tim Pal) which then has been used as a template by the other team member in order to reproduce the same for our other user (bobby Joe).

Attach Asana screenshots of the tasks you performed in your role (compile into a single DOC/PDF). *

tasks.pdf

Add file

A copy of your responses will be emailed to tanmay.patil21@st.niituniversity.in.

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