Note: Please update the yellow highlighted area with your own project details and remove the highlight.

**Project Proposal**

**Gym Pod**

Diploma in Infocomm & Security

Academic Year 2023 Semester 2

| **Team Name** | Gym Pod | **Module Grp** : IT2666-02 |
| --- | --- | --- |
| **Role** | **AdmNo** | **Name** |
| Leader | 220274X | Olfsen |
| Member | 222836W | Pranav |
| Member | 224700J | Mark |
| Member | 222106N | Lucien |

#### Project Specification (Refer to Project Guide for more details)

#### Create a useful and smart solution using minimum of 2\* sensors to improve our lifestyle?

\* : min 2 sensors as follows

- min 1 x User Input sensor

- min 1 x Environment sensor

Your solution are expected to include the following

* Sensor supervisory control and data acquisition dashboard
  + All sensor development + Data communication with forms
  + A dashboard showing live sensor states and graphs
  + Control of sensors configuration
  + Monitor and event notifications handling
  + Alerts: Email and Messaging notifications
* Administrator View Data Analytic and Insights (Graphs)
  + Display of useful data and graphs to administrator
  + Allows administrator to query historical data and graphs
  + Administrator usually have more data insights (some project ideas may differs but generally true) as they can access all user’s data to generate total/average
* User View Data Analytic and Insights (Graphs)
  + Display of useful data and graphs to a user
  + Allows user to query historical data and graphs
* Account Management (Admin and User)
  + Includes both administrator and user accounts
  + Registration and login
  + Account maintenance like modification or deletion
* Project Specific features (Admin and User)
  + Configure parameters ((Eg. Time to on sprinkler, etc)
  + Relevant features like Blacklisting

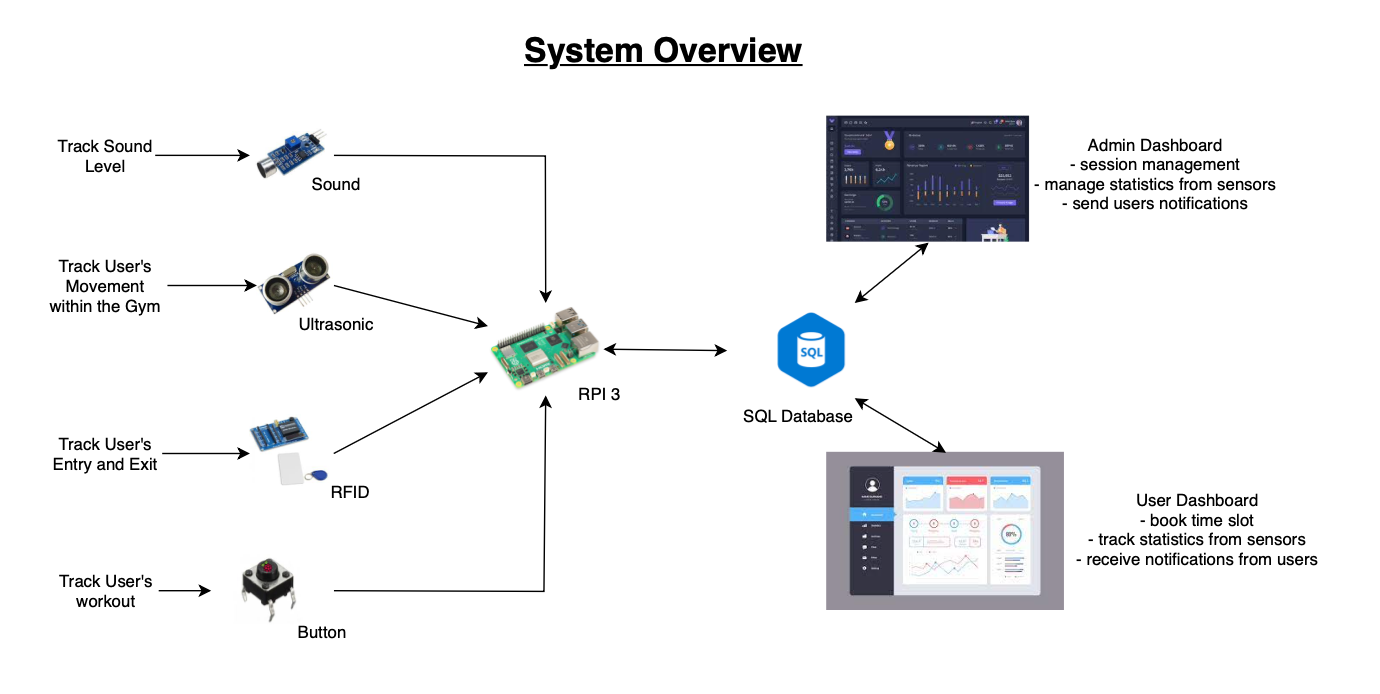
**Note:**

* Sensor supervisory control and data acquisition dashboard must be developed well before any student in that group can be considered for distinction.
* See Project Guide for the criteria for getting **A**s and **Distinction**
* Student aiming for better grades should be taking up these tasks to increase the chances
  + Sensor supervisory control and data acquisition dashboard
  + Administrator View Data Analytic and Insights (Graphs)
* Student aiming for better grades may consider taking up more tasks

#### Proposed System

* 1. **System Overview Diagram**

[Replace the below sample System overview with the system overview diagram of your proposed system. It should depict the interfaces between your proposed system and databases, hardware devices, etc]



* 1. **Functions**Raspberry Pi (**Cannot** be done by more than 1 person)

The following components will be used:

* RFID
* Temperature
* Ultrasonic Distance
* Button
* Sound

RFID

Assigned by an Admin to a user before they an tap into the Gym Pod. RFID is checked between all known users and their booking date and time. RFID and booking date must be valid

Ultrasonic Distance

The Ultrasonic Distance sensor is responsible for tracking the user’s movement into the weights section of the Gym Pod. Two states are used to track entering and exiting that area

Button

A button is used to change states between Tapping Mode and Tagging Mode.

Sound

Checking for a certain threshold before warning the user that they’re making too much noise within the Gym Pod, possibly dropping weights before alerting an Admin and logging the occurrence for future reference.

Information is then logged and can be viewed by the Admin consisting of the volume recorded, date and time, the username, and which gym

Temperature

Checking for a certain threshold before alerting the admin and sending a warning email to the user that the temperature of the Gym Pod is too high and they should drink more water. The occurrence is also logged for future reference.

The information is logged containing the recorded temperature, date and time, and gym location.

Windows Form (Admin)

* Session management
  + Admin will manage and confirm user bookings based on timeslots
* Notifications
  + Send users warnings the temperature is too high via email
  + Use statistics from RFID to see if it is a valid tap, and if the user has a booking within the valid time frame
  + Use sound sensor to see if user are misusing equipment
  + Use ultrasonic sensor to see when users are moving to which section so that admin can see which facilities in the gym is mostly used
* RFID
  + Admins can assign users their RFID
    - Can be overwritten if its found that a user already has an existing RFID linked to them
* Blacklist
  + Admins can blacklist and whitelist a user
  + Blacklist users are not allowed to log into the application and would be prompted with a general error message
* Audit Log
  + All activities done by regular admin accounts are logged and can only be viewed by the superuser
* RBAC (Role Based Access Control)
  + Only the superuser is allow to view the audit logs, create, and delete admin accounts
  + Regular admin users cannot do tasks of the superuser
* Feedback
  + All admins can retrieve feedback sent from the users and reply to them

Windows Form (User)

* Register/Login
  + Allow new users to register and existing users to login
* Track Gym Entries
  + View all entries to the gym in a weekly format in a bar chart
* Session Creation
  + Allows user to book a timeslot to use the Gym
  + Allow users to create additional bookings (Class or Trainer) under their existing Gym Booking.
* Create specialised Workout Plans
  + Create user-specific workout plans by day
* Edit personal information
  + Allow users to edit their email and password that they used when they first registered.
* Display statistics
  + Allows users to track:
    - Workout Plans
    - Booking history
    - Personal Information
* Notifications
  + User would receive a notifications on their confirmed booking slot
  + User would also received a notifications if they were to violate any rules

#### Benefits of Proposed System

#### Personalised Experience:

* The Gym Pod gives a personalised experience as a session only contains a single user per Gym Pod

**Time Management and Training Patterns**

* It allows users to book different time slots which are best catered to their daily schedule and also allows users to track the training patterns for ex. (How many times they have entered the weight sections)

**Better budget allocation**

#### For the company side, by using the sensors, specifically the ultrasonic sensors and sound sensors, they can check which equipment is being frequently used and hence allocate more budget towards the more frequently used equipment for maintenance.

**Security**

* By implementing RFID, it ensures that only authorised users are allowed in the gym based on the timeslots that the users has booked
* Logins for Admin and Users
  + This ensures that only authenticated accounts can access and utilise the service

#### Technology Used

The following technologies are used:

* C# using Visual Studio
  + For programming the devices with Raspberry Pi
  + For Admin and User Winforms
* SQL within Visual Studio
  + Database to display admin and user statistics
* Raspberry Pi
  + Sound Sensor
  + Ultrasonic Sensor
  + RFID
  + Button

#### Tasks Allocation Matrix

[Provide a detail table of the breakdown of various tasks needed for the project and the allocation of each task to team members here]

| **Tasks** | **Names** | | | |
| --- | --- | --- | --- | --- |
| Leader  Olfsen | Pranav | Lucien | Mark |
|  |  |  |  |
| **Database** |  |  |  |  |
| Design and Create User Table | **√** | **√** | **√** |  |
| Retrieve data from User Table | **√** | **√** | **√** | **√** |
| Update (Insert/Delete) data for Admin table |  |  |  | **√** |
| Design and Create User Activities Table | **√** | **√** | **√** |  |
| Retrieve data from User Activities Table | **√** | **√** | **√** |  |
| Update (Insert/Delete) data for User Activities table | **√** | **√** | **√** |  |
| Design and Create Admin User Table |  |  | **√** | **√** |
| Raspberry Pi Hardware |  |  |  |  |
| * Implement RFID | **√** |  |  |  |
| * Implement Sound Sensor | **√** |  |  |  |
| * Implement Ultrasonic Distance | **√** |  |  |  |
| * Implement Button | **√** |  |  |  |
| * Data Communication | **√** |  |  |  |
| * Hardware + Software Integration | **√** |  |  |  |
| **Windows Form (Admin)** |  |  |  |  |
| * Login Form |  |  |  | **√** |
| * Blacklist System |  |  |  | **√** |
| * Feedback System |  |  |  | **√** |
| * Home Page |  |  |  | **√** |
| * Dashboard Visualisations | **√** |  |  |  |
| * RFID Tagging | **√** |  |  |  |
| * RFID Validation is user is already assigned an RFID | **√** |  |  |  |
| * Retrieval of user, temperature, and sound data | **√** |  |  |  |
| * Imagery of Gym Pod to show current location | **√** |  |  |  |
| * Validation to check if RFID is valid from a user with booking | **√** |  |  |  |
|  |  |  |  |  |
| * Audit Log (Display Admin’s activity) |  |  |  | **√** |
| * RBAC (Super Users) |  |  |  | **√** |
|  |  |  |  |  |
| **Windows Form (User)** |  |  |  |  |
| * Register Form |  | **√** | **√** |  |
| * Login Form |  | **√** |  |  |
| * Blacklist Function |  | **√** |  |  |
| * Home Page |  | **√** |  |  |
| * User Entry Chart |  | **√** |  |  |
| * Dashboard Visualisations |  | **√** | **√** |  |
| * User Gym Entries Bar Chart |  | **√** |  |  |
| * Quarterly Weight Line Chart |  |  | **√** |  |
| * Workout Page |  | **√** | **√** |  |
| * Create Workout Plans by Day |  | **√** |  |  |
| * Display Workout Plans by Day |  | **√** |  |  |
| * BMI Calculator |  |  | **√** |  |
| * Quarterly Predictions |  |  | **√** |  |
| * Booking Page |  | **√** |  |  |
| * Create Gym Booking |  | **√** |  |  |
| * Create Trainer Booking |  | **√** |  |  |
| * Create Class Booking |  | **√** |  |  |
| * View all User Bookings |  | **√** |  |  |
| * Membership Page |  | **√** |  |  |
| * Edit User Information |  | **√** |  |  |
| * Feedback Page |  |  | **√** |  |
| **Documentation** |  |  |  |  |
| Project Proposal | **√** | **√** | **√** | **√** |
| Database Diagram | **√** | **√** | **√** |  |

#### Project Plan Overview

Provide an overall project plan and milestones of your project here. Evaluate resources needed to develop and deploy your project idea

You need to plan as detailed as you could to ensure you can estimate the time required to manage your progress correctly.

You may continue to update as you work on your project.

(Below is a sample, please make changes according to your project)

|  | | Week No | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| (Leader)  Olfsen | |  | | | | | | | | | | | | | | | | |
| Documentation | |  | | | | | | | | | | | | | | | | |
|  | Project Proposal | **√** | **√** | **√** | **√** |  |  |  |  |  |  |  |  |  |  |  |  | **√** |
|  | Database Diagram |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** |
|  | System Overview | **√** | **√** | **√** | **√** |  |  |  |  |  |  |  |  |  |  |  |  | **√** |
|  | User Documentation |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** |
| Raspberry Pi | |  | | | | | | | | | | | | | | | | |
|  | Ultrasonic Distance sensor logic |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |
|  | Sound sensor logic |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |
|  | RFID sensor logic |  |  |  |  |  | **√** |  |  |  |  |  |  |  |  | **√** | **√** |  |
|  | Button sensor logic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |
|  | Sending data to User Database |  |  |  |  |  | **√** | **√** |  |  |  |  |  |  |  |  |  |  |
|  | Integrating hardware with user features |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** |
| Windows Forms  (Admin ) | |  | | | | | | | | | | | | | | | | |
|  | Receiving data User database, displaying RFID information |  |  |  |  | **√** | **√** | **√** |  |  |  |  |  |  |  |  |  |  |
|  | Receiving logged temperature and sound data |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |
|  | Imagery of Gym Pod |  |  |  |  |  |  |  | **√** |  |  |  |  |  |  |  | **√** | **√** |
|  | RFID Tagging and Validation |  |  |  |  | **√** | **√** |  |  |  |  |  |  |  |  |  |  |  |
|  | Live charts for Temperature and Sound |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |
|  | State of image change by Distance sensor |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |
|  | Logging of temperature and sound data if threshold exceed |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |
|  | Email user if temperature has exceeded |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |
| Pranav | |  | | | | | | | | | | | | | | | | |
| Documentation | |  | | | | | | | | | | | | | | | | |
|  | Project Proposal | **√** | **√** | **√** | **√** |  |  |  |  |  |  |  |  |  |  |  |  | **√** |
|  | Database Diagram |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** |
|  | System Overview | **√** | **√** | **√** | **√** |  |  |  |  |  |  |  |  |  |  |  |  | **√** |
|  | User Documentation |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Windows Forms  (User ) | |  | | | | | | | | | | | | | | | | |
|  | Chart live sound sensor data |  |  |  |  |  |  | **√** |  |  |  |  |  |  |  |  |  |  |
|  | Chart RFID scans by user on a weekly basis |  |  |  |  |  |  |  | **√** |  | **√** | **√** | **√** |  |  |  |  |  |
|  | Create Gym Booking Function |  |  |  |  |  |  |  | **√** |  |  |  |  |  |  |  |  |  |
|  | Created Additional Booking (Class and Trainer) |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |  |
|  | Created View Booking Function |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |  |
|  | Created Login function with validation |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** | **√** | **√** |  |  |
|  | Created Blacklist function in Login |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |  |
|  | Created UI for Login/Register and HomePages |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |  |  |  |
|  | Created Workout Page |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** | **√** |  |
|  | Created View Workouts |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** | **√** |  |
|  | Created Membership Page |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |
|  | Created Booking, Workout, Users and RFIDScans Table |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** | **√** | **√** | **√** |  |
| Lucien | |  | | | | | | | | | | | | | | | | |
| Documentation | |  | | | | | | | | | | | | | | | | |
|  | Project Proposal | **√** | **√** | **√** | **√** |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Database Diagram |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** |  |  |
|  | System Overview | **√** | **√** | **√** | **√** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Windows Forms  (User ) | |  | | | | | | | | | | | | | | | | |
|  | Create Admin database |  |  |  |  | **√** |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Create User and Admin Tables |  |  |  |  |  | **√** |  |  |  |  |  |  |  |  |  |  |  |
|  | Create Admin Dashboard Visualisations |  |  |  |  |  |  | **√** | **√** | **√** |  |  |  |  |  |  |  |  |
|  | Display All User’s Information |  |  |  |  |  |  |  |  | **√** | **√** | **√** |  |  |  |  |  |  |
|  | Search for specific user |  |  |  |  |  |  |  |  |  |  |  |  | **√** |  |  |  |  |
|  | Display Admin Activities |  |  |  |  |  |  |  |  |  | **√** | **√** | **√** |  |  |  |  |  |
|  | Display Charts in Admin |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |  |  |  |
|  | Implement Push Notifications |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** |  |  |  |
|  | Account management (Deleting User/Admin accounts) |  |  |  |  |  |  |  |  |  | **√** |  |  |  |  |  |  |  |
| Mark | |  | | | | | | | | | | | | | | | | |
| Documentation | |  | | | | | | | | | | | | | | | | |
|  | Project Proposal | **√** | **√** | **√** | **√** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Windows Form (Admin) | |  | | | | | | | | | | | | | | | | |
|  | Create a login page for admin |  |  |  |  | **√** |  |  |  |  |  |  |  |  |  |  |  |  |
|  | create a homepage for admin |  |  |  |  |  | **√** |  |  |  |  |  |  |  |  |  |  |  |
|  | Create Admin database |  |  |  |  |  | **√** |  |  |  |  |  |  |  |  |  |  |  |
|  | Create User and Admin Tables |  |  |  |  |  | **√** | **√** |  |  |  |  |  |  |  |  |  |  |
|  | Display All User’s Information (Blacklist System) |  |  |  |  |  |  |  | **√** | **√** | **√** |  |  |  |  |  |  |  |
|  | Created Super Users |  |  |  |  |  |  |  |  |  |  | **√** |  |  |  |  |  |  |
|  | Display User’s feedback and replies from Admin |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |  |  |  |
|  | Display Admin Activities (Audit Logging) |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |  |  |
|  | Created a Delete/Create Admin table with duplication check |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **√** | **√** |