

Contactless Co.

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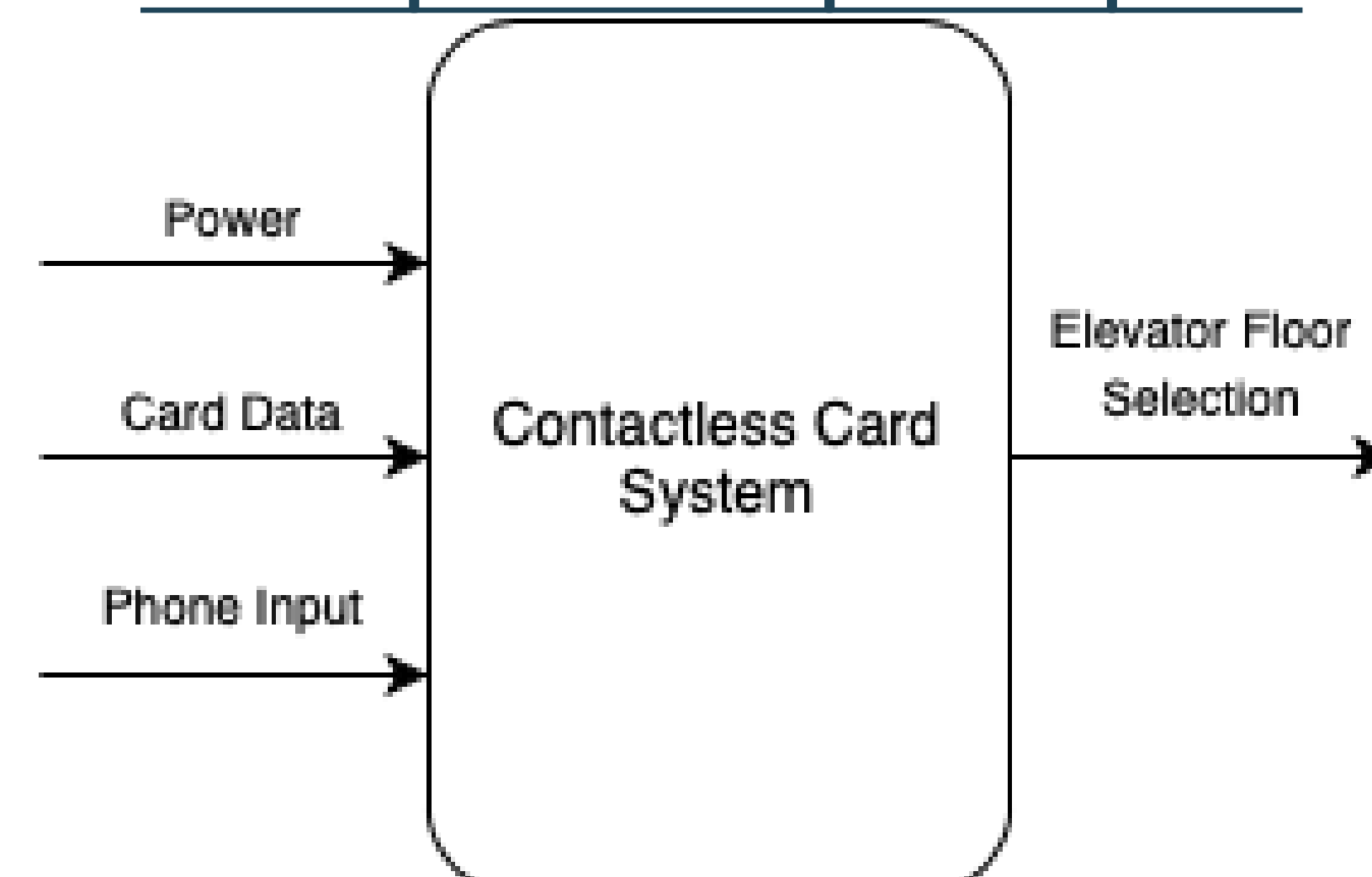
Abstract- Why Should You Use This Product

- Covid has shown us how often we come in contact with germ filled surfaces.
- In hotels and secure buildings, some of the surfaces that come in contact with many people are the elevator buttons and systems for swiping or tapping to enter.
- Contactless Card will allow for hands free access via Radio Frequency IDentification (RFID) communications using Ultra High Frequency(UHF) RFID signals to send user specific information to check and assign permissions.

Product Instructions and Operations -

- The system allows for users to enter through doors and use elevators without having to touch a single surface.
- An RFID card will be assigned to each guest and linked to their information
- **How to use as a Clerk**
 - As a guest is checked in, use the Hub Attachment to read the card's ID, attach it to the user's account and set their default floor/room number.
 - If a guest requests access to another floor/room at a later time, this can be added to the guests information.
- **How to operate as a Guest or Standard Employee**
 - You will be given an RFID card that is attached to your information.
 - Put this card away in your pocket when you are not using it and take it out when you are expecting to use the elevator
 - The Card Reader will sense the user as they approach the door/elevator
 - When the user's RFID is read, the system will check an SQL database in order to verify the user and which doors/floors they are allowed to access.
 - The proximity sensor will track the person's location as they approach, in order to open the door automatically.
 - In the case of a secure door, this is the end of the process and is all that is involved in using our system.
 - In the case of an elevator, there are a few extra steps:
 - If the user is attempting to either go to their floor from any other floor, or are trying to go to the lobby from their own floor, the system will queue the needed floor by default.
 - If the user is attempting to access another floor or any other amenities at the hotel, a mobile app will allow them to select these options once they are in the proximity of the elevator.

Diagram of Subsystem - System Diagram High Level Input and Outputs Required



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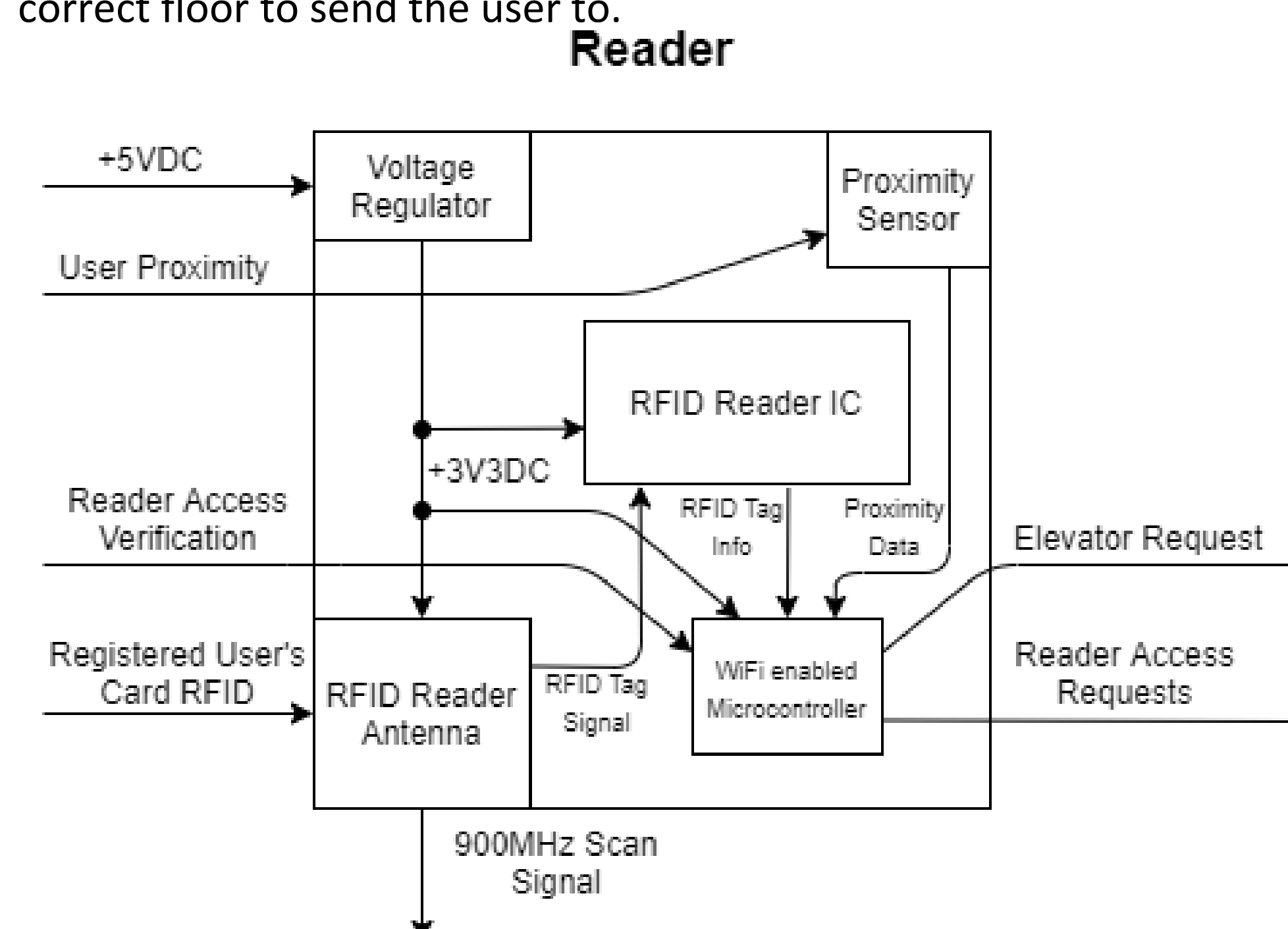
Where to Implement -

- We planned to develop this as an attachment to be connected to existing elevator hardware, the device will send a request for a floor in a hotel and allow the users (hotel guests) to move between floors without physical contact
- In a general workplace, it will work almost exactly the same as the previous hotel case, however we will restrict floor access so that individuals only go to required floors as they will be only required to go to the floor that their office is on and the lobby.
- We also have the ability to be implemented in secure areas that require key card access but may have to interact with unsafe substances like a medical lab. It would read the card data from a distance and permit or deny access to the individual.

Physical Pictures of Parts

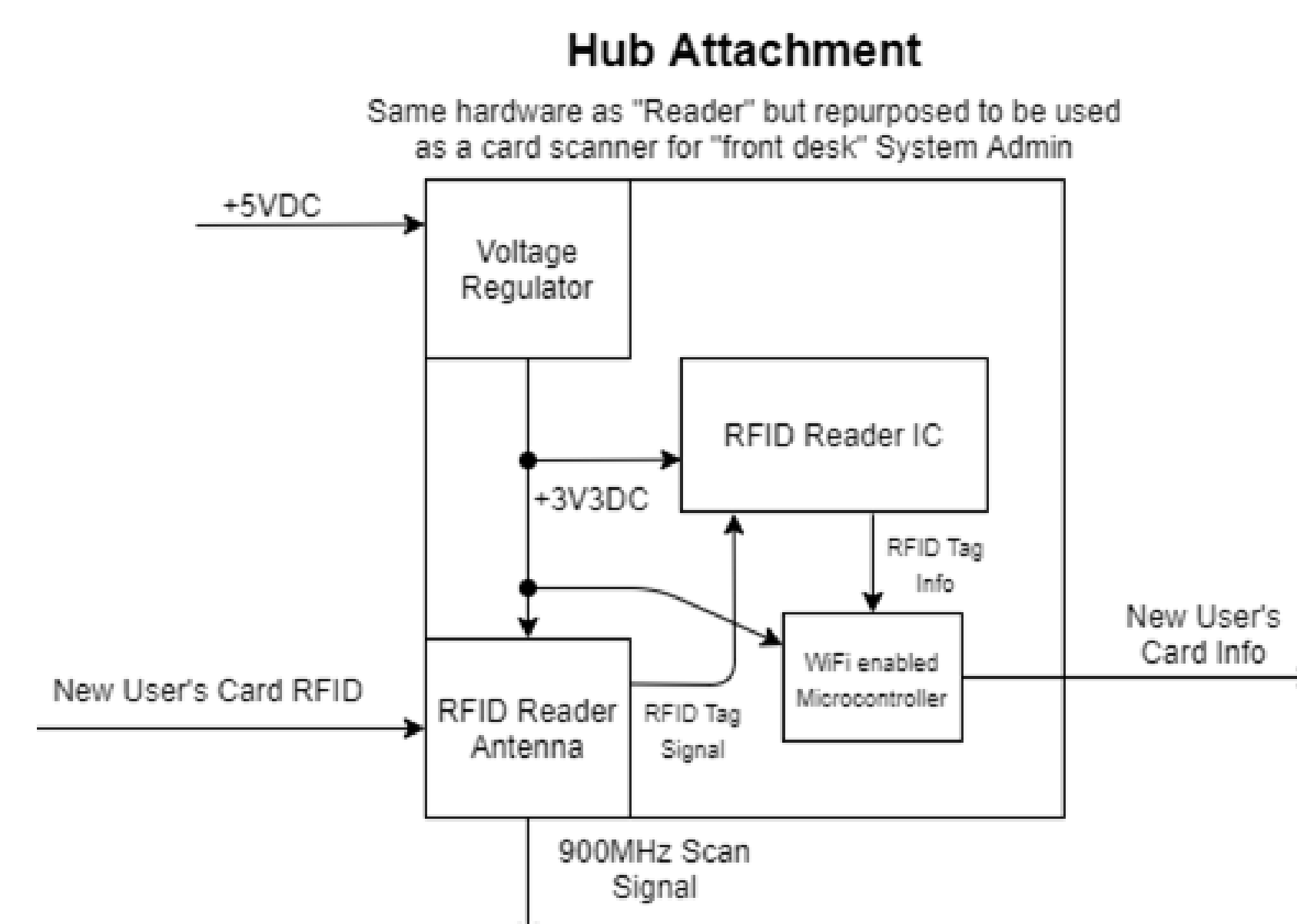
Subsystem One - RFID Card Reader

Send access requests to Hub when Card is detected in the range of a Reader. Receives instructions on where to send User. The device uses a circular antenna to ping for any RFID cards in range and when it receives the Card ID, it sends it to Microcontroller which then sends via WiFi to the Hub server. It then will receive a response on what is the correct floor to send the user to.



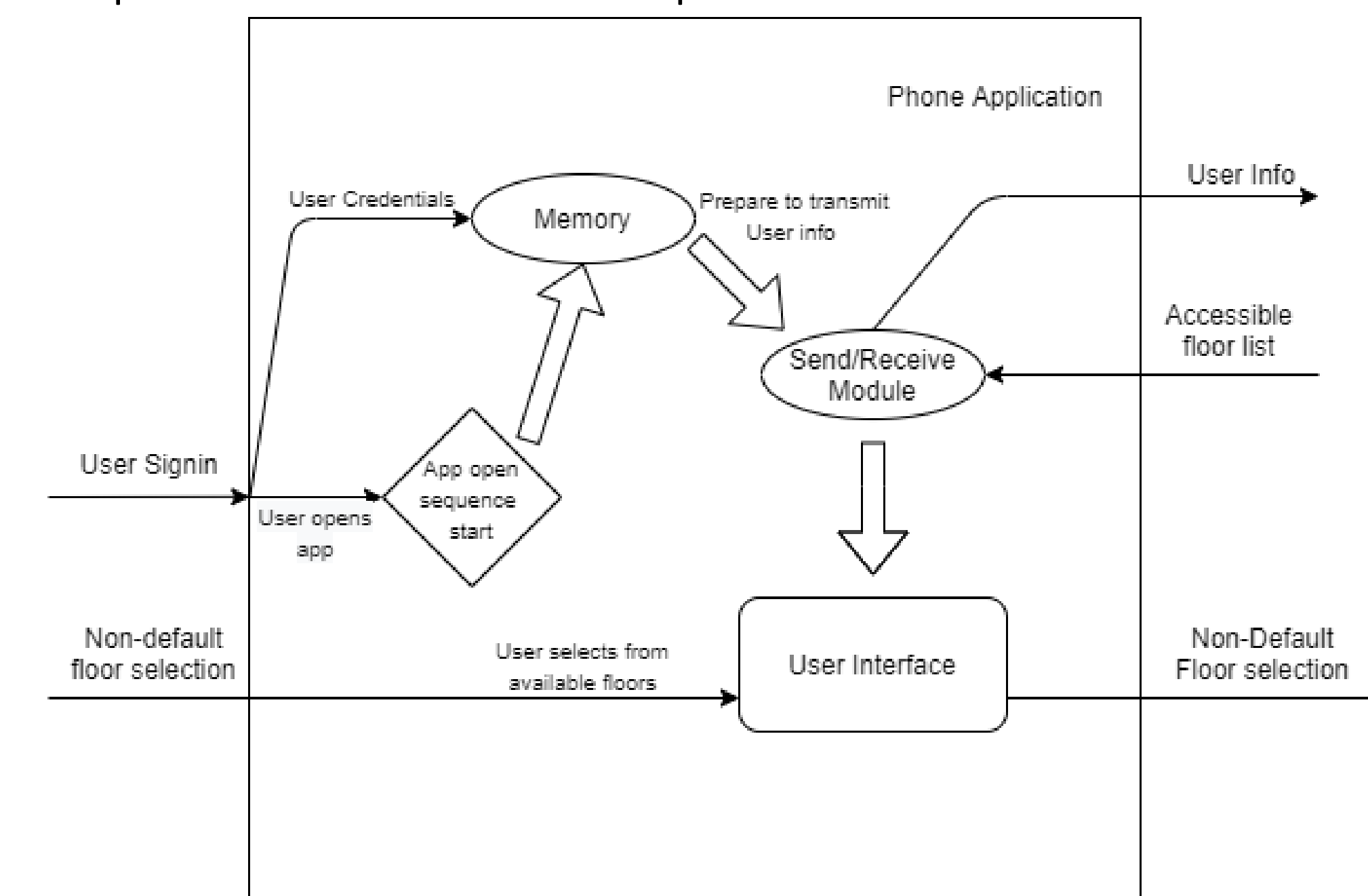
Subsystem Two - Hub Attachment Module

Send new User Card info to the Hub to be associated with a User profile. This unit is very similar to the reader however instead of sending information to the hub for checking where the user goes, the clerk will use this to input a new RFID tag into our SQL database by sending information over WiFi from our microcontroller to the Server Hub.



Subsystem Three - Mobile Application

The mobile app is used to send users to a floor that is not their primary floor (lobby) or their secondary floor (Room Floor or Office Floor). This interaction will check if a user has access to floors by pinging the Server Hub and getting a response from the Hub. Once it gets a response it will display the allowed floors to the User on the mobile device. When prompted they will be allowed to select a valid floor and then send a response to the hub which will update the user's "selected floor" value.



Server Hub and SQL Database

The modules make use of the c++ socket library to handle communication over wifi. Each of the reader modules will scan for a card to be passed in front of it. When a card is detected it will send that card ID back to the server hub. This hub will run the libpqxx library to communicate with a local SQL database. In this database the Username, Password, Name, Card ID, floor permissions, primary default floor, secondary default floor, and floor selected in the app are stored. The server parses this information to determine which floor to send the user to.

