



Florida International University

Fall 2023 Capstone II Project



FIU IoTConnect

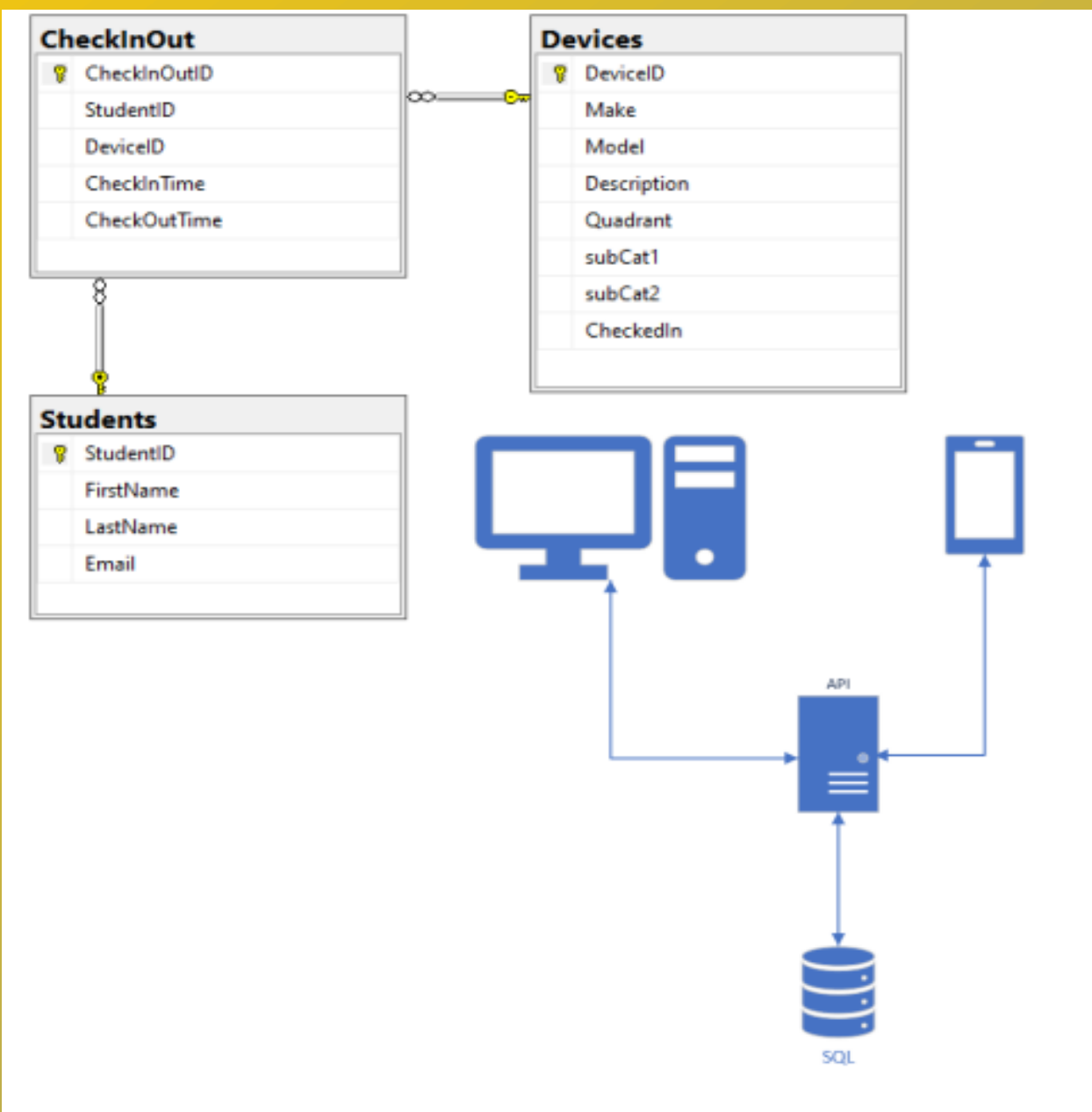
Zipporah Thomas
Mentor: Selcuk Uluagac

Instructor: Dr. Masoud Sadjadi, Florida International University

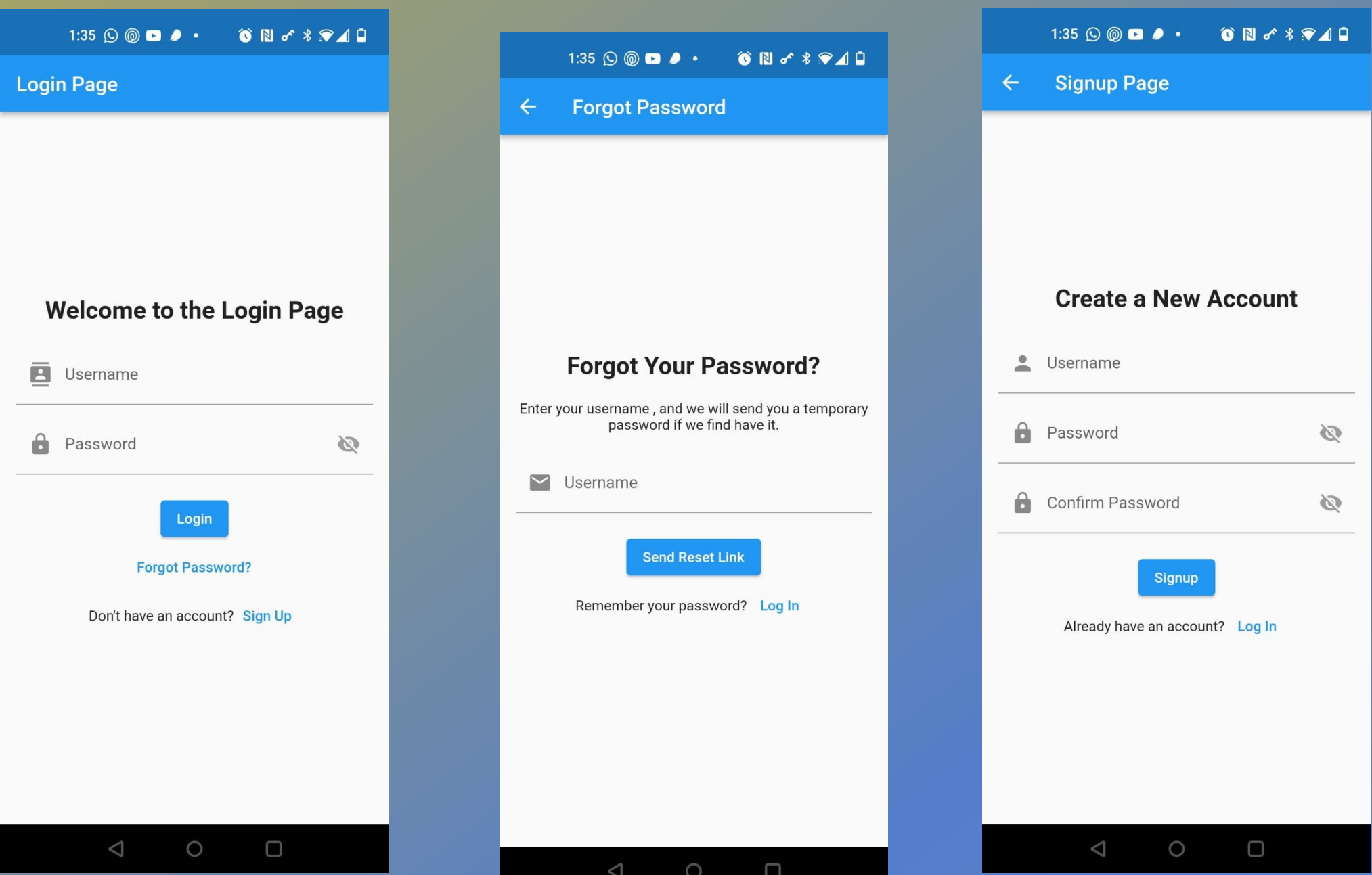
PROBLEM

The creation of the Cyber-Physical Systems Security Lab under the Electrical and Computer Engineering Department at FIU, spearheaded by Professor Selcuk Uluagac. This specialized lab has amassed a considerable collection of smart devices over time, becoming an invaluable resource for both students and research associates. This hands-on approach in creating the inventory management system has given way to the use of basic, less secure methods, such as manually updated Excel spreadsheets. While functional, these methods are not without drawbacks, primarily concerning the security of the data and the accuracy of the inventory records. These issues have understandably led to considerable difficulties in managing an accurate and reliable inventory, indicating a clear need for a more sophisticated and secure solution, for students or research associates to check out IoT devices

SYSTEM DESIGN



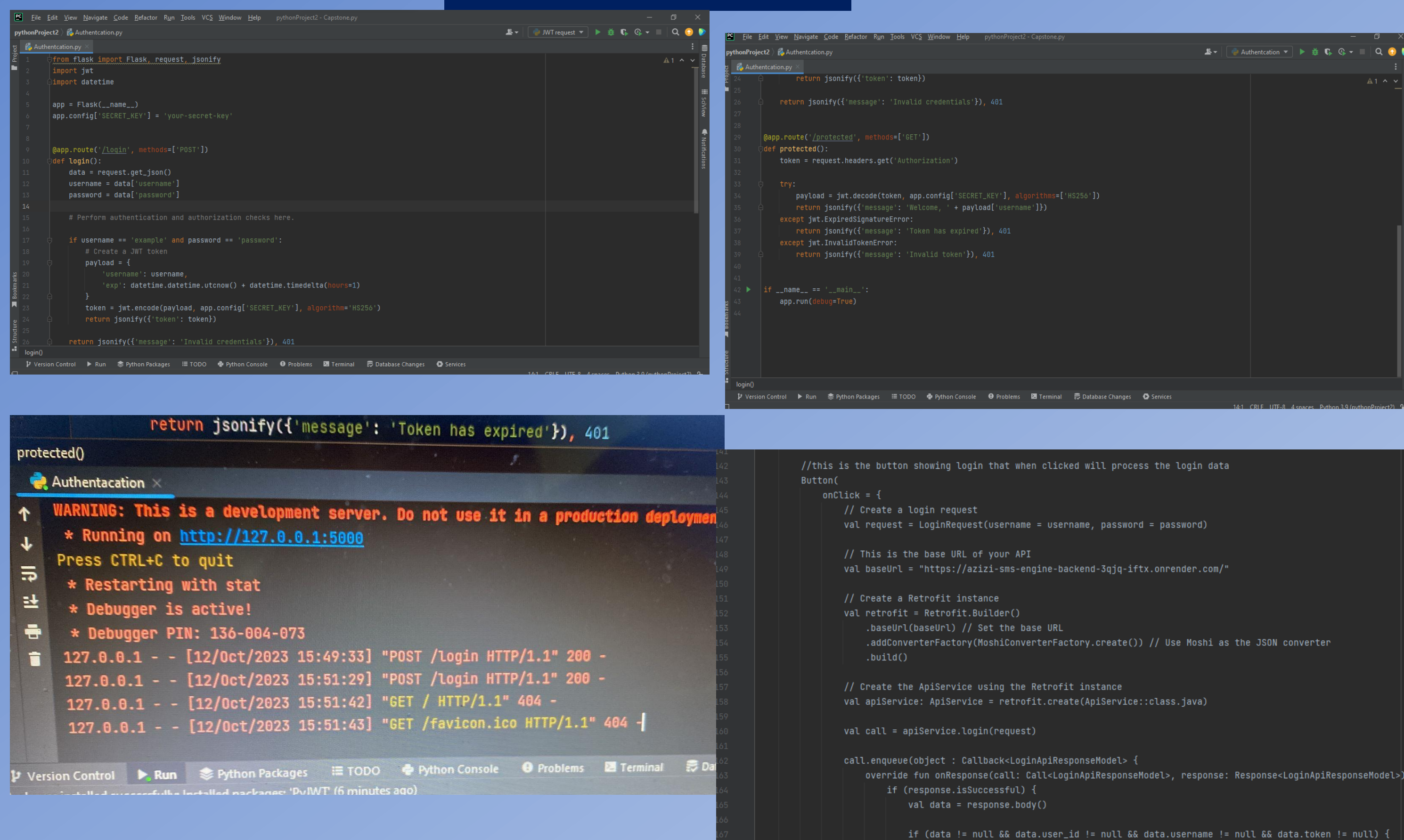
OBJECT DESIGN



IMPLEMENTATION



Screenshot



SUMMARY

Our project was partially successfully developed an initial prototype for the Inventory Management System of the CyberPhysical Systems Security Lab. Our prototype includes a Python-based API backend, a well-structured SQL server, and an Android mobile application. While this prototype incorporates most of the desired functionalities, we have plans for future enhancements. These enhancements will involve integrating NFC scanning to enhance user interaction and implementing SSL encryption for improved system security. The SSL encryption could be facilitated by either utilizing an FIU certificate or a self-signed certificate from a Public Key Infrastructure (PKI). These planned upgrades aim to further refine and bolster the security of the system. In the future, separating the feature of the website where it will show a detailed graph on which devices where check-out and check-in and also show which students have which devices from the Lab that way it will facilitate Professor Selcuk devices inventory and incorporate FIU two-factor authentication with that way they can login with their students credentials

Individual Contribution

My primary contributions were instrumental in establishing secure user authentication and developing the frontend login page using Flutter in Android Studio. I implemented a robust authentication system utilizing JSON Web Tokens (JWT) on the server side, employing Python to generate and handle these tokens securely. Additionally, I played a pivotal role in organizing and managing the inventory of IoT devices within the lab, contributing to the establishment of a comprehensive inventory management system. Furthermore, I assisted in the implementation of the SQL database, actively participating in the creation of tables essential for the proper functioning of the database. These combined efforts underscore my versatile contributions to both the frontend and backend aspects of the project, ensuring a seamless and secure user experience while enhancing the functionality of the IoT device inventory management system.

ACKNOWLEDGEMENT

The material presented in this poster is based upon the work supported by Selcuk Uluagac. Thank you Professor Selcuk Uluagac for assistance, cooperation and mentorship that we received throughout. Along with Esteban Luques with this process.