



Quiz App

Zian Zeng, Feiyi Chen, Galen Chang

Project Sponsor: Edoardo Biagioni, UH Manoa ICS Department

ICS 496
Spring 2024

Problem

When instructors have large class sizes, it is very difficult for them to maintain the integrity of their classroom during quizzes. Our Quiz App intends to help alleviate this issue by utilizing the instructor's and student's Wi-Fi connection to the same network, pictures taken by the student in class, IP logging, and other technologies to prevent students from taking the quiz at home or attempting to cheat.

Requirements

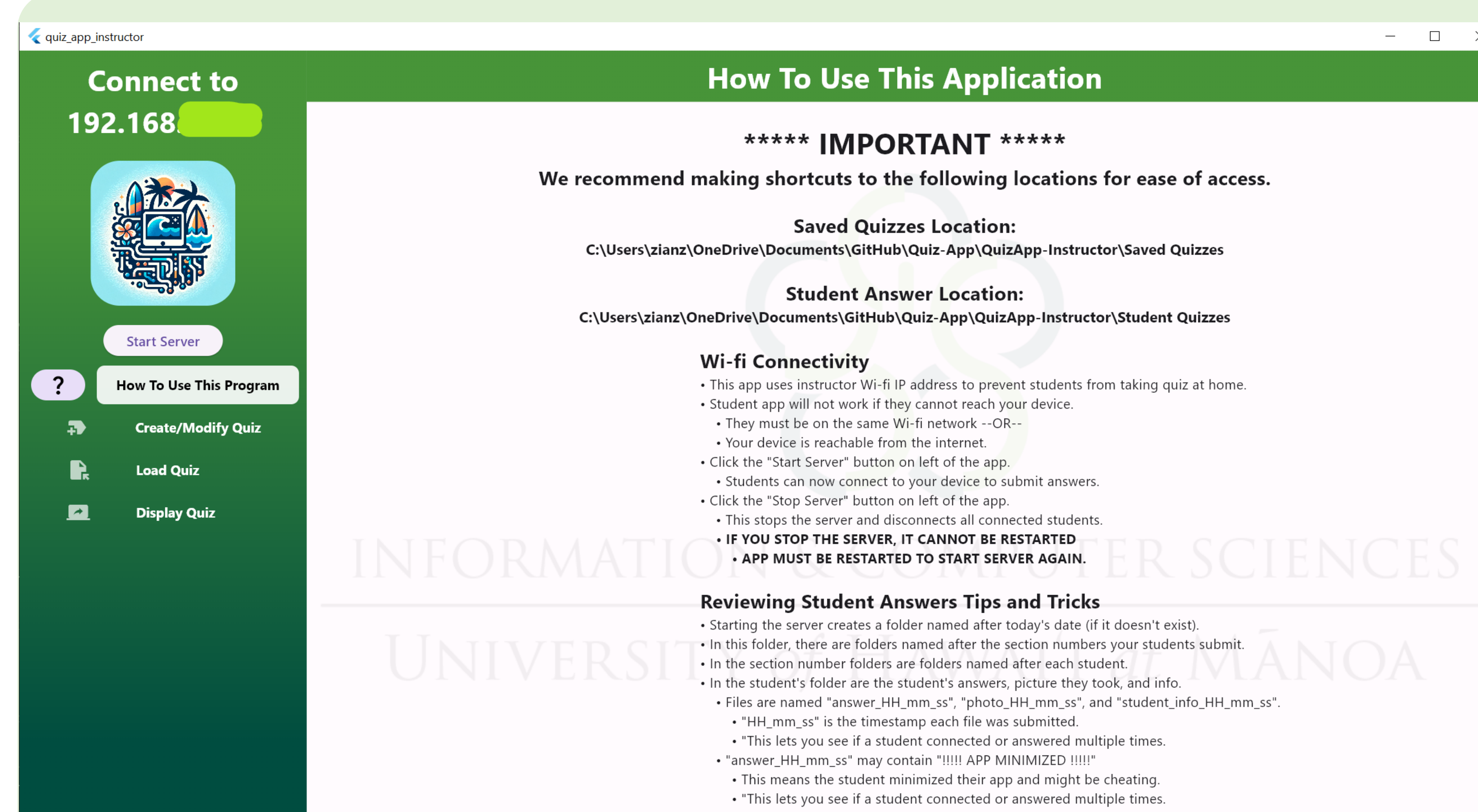
- Utilize short-range wireless communication.
- Student mobile app and Instructor desktop app.
- Feature that will help instructors verify student attended class in person and prevent cheating.
- Instructor desktop app should receive all quiz answers and separate them by section number.

Methodology

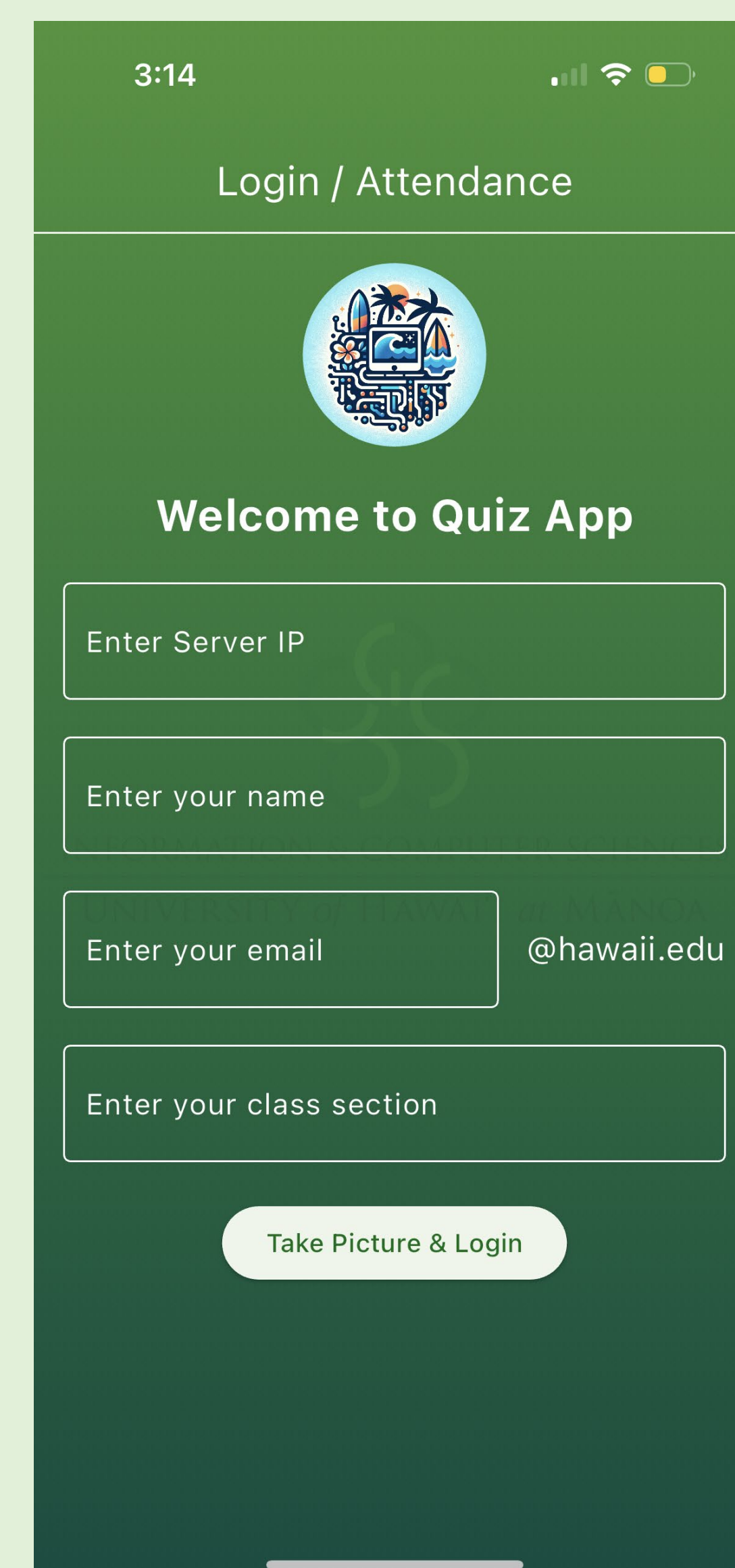
- **Project development and individual roles/responsibilities:**
 - Zian Zeng
 - Student App
 - Technical Lead
 - Requirements Lead
 - Feiyi Chen
 - Short Range Wireless Integration
 - Test Lead
 - Requirements Lead
 - Galen Chang
 - Instructor App
 - Communications Lead
 - Meeting Scribe
- **Scrum Based Development**
 - Each person was responsible for self-identifying goals for the upcoming weekly sprint.
- **Bi-Weekly Meetings via Zoom**
 - Alternated between team only and sponsor included.
 - Feedback from team members and sponsor on progress, weekly goals, problems, and general project direction.
- **Discord with Sponsor**
 - Preserved meeting notes and handling any issues, questions, and discussions between meetings.

Summary/Takeaway

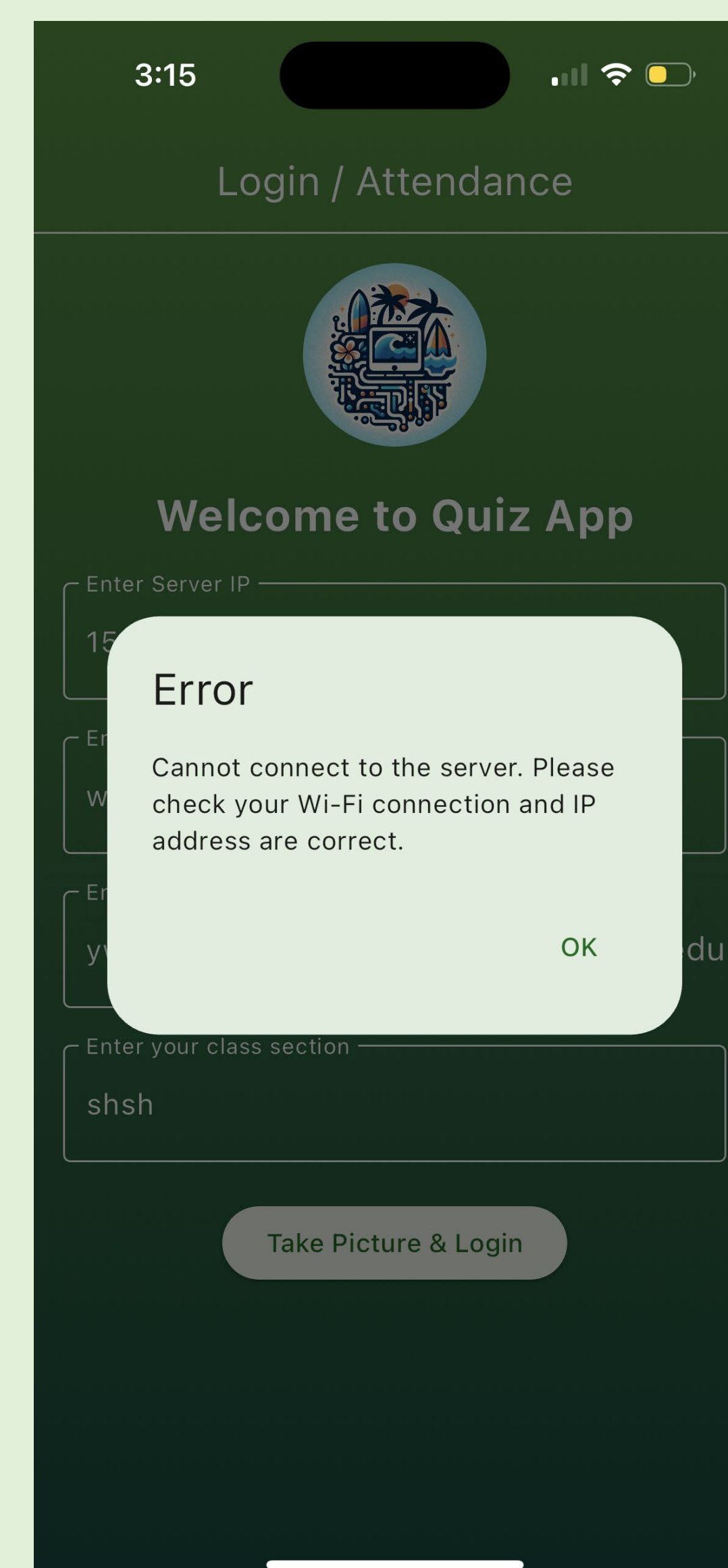
Quiz App uses singleton WebSocket + GPS verification via LAN for connection and real-time data transfer which help to track attendance and dissuade cheating while students take quizzes.



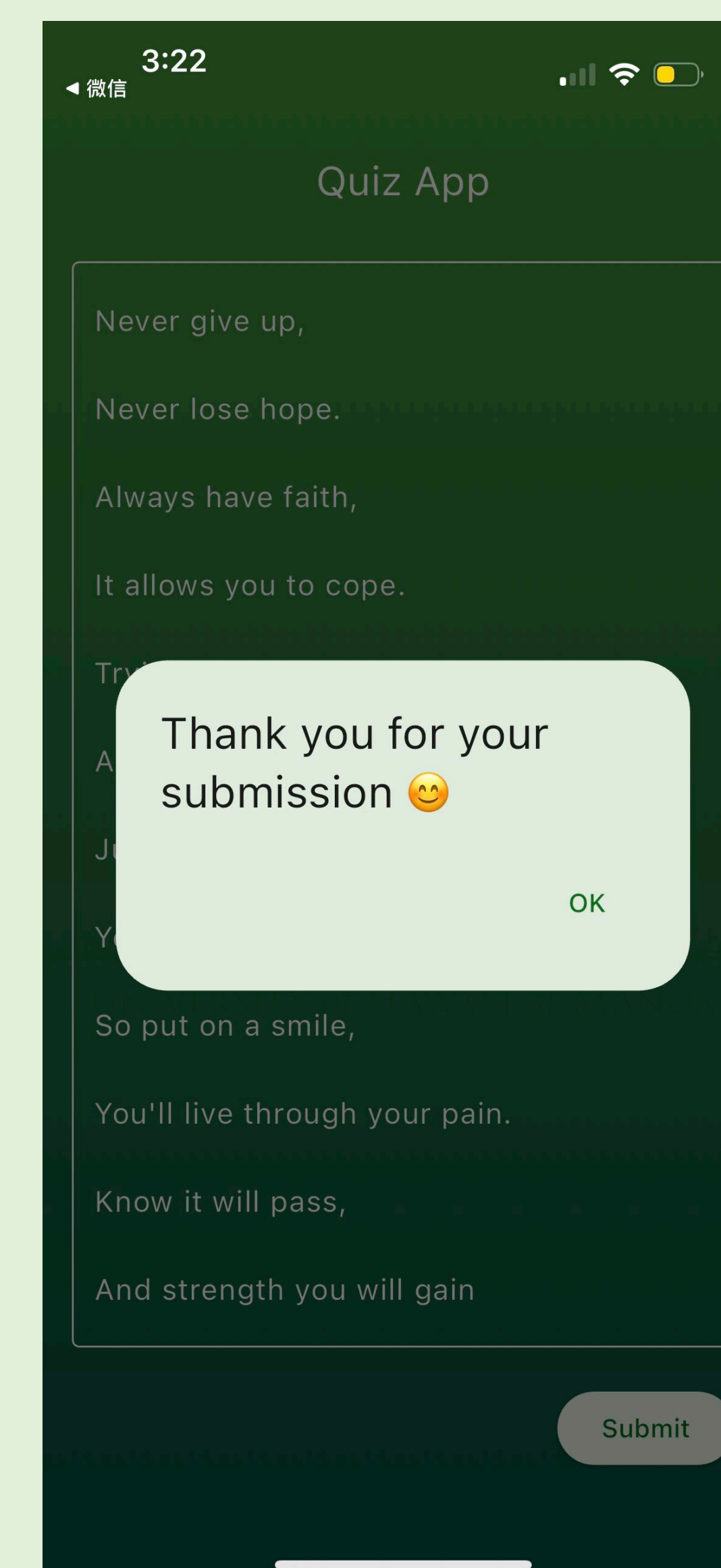
Instructor App – Instruction Page



Student App - Login Screen



Student App – Network Detection



Student App - Submission

Solution

- **Flutter/Dart cross-platform development & compatibility.**
 - Mac, iOS, Windows, and Android.
 - Maintaining and upgrading code significantly easier.
 - Wide range of free to use packages.
- **Student App Features:**
 - Enable large amount of connections (over 50) and real-time data transfer through singleton WebSocket and GPS verification under the same Wi-Fi network.
 - Students connect to the instructor's device via IP address only if they are on the same network and at same GPS location.
 - App opens camera when student tries to log in.
 - Students are required to take a picture, which will be submitted along with their quiz answer.
 - Device acts as a client that submits quiz answers and picture.
 - Anti-cheating measures.
 - App detects minimization, no split screen.
- **Instructor App Features:**
 - Create, modify, and save quizzes to memory or to disk.
 - Display quiz and timer to students via projector.
 - Device acts as a server that accepts quiz answers.
 - Export quiz answers and student pictures to disk.
 - Sorted based on class section.

Technology Stack

- Flutter/Dart – Cross-Platform
- Visual Studio Code
- GitHub
- Singleton WebSocket + GPS

Challenges

- **Build app from scratch with no experience with Flutter, UI design, and short-range wireless technologies.**
 - Significant amount of time spent researching/testing.
 - Ex. multi-hop BLE: failed due to limited features supported by the flutter usable libraries and Window's API modification since 2022 .
- **Compromising schedules and getting productivity through working in online environments**
 - Overcame by effectively communicate via email, discord, and zoom.

Learnings

- Experience with Flutter/Dart programming.
- Improved proficiency with UI design.
- Knowledge on how short-range communication technologies works and implementation into apps.