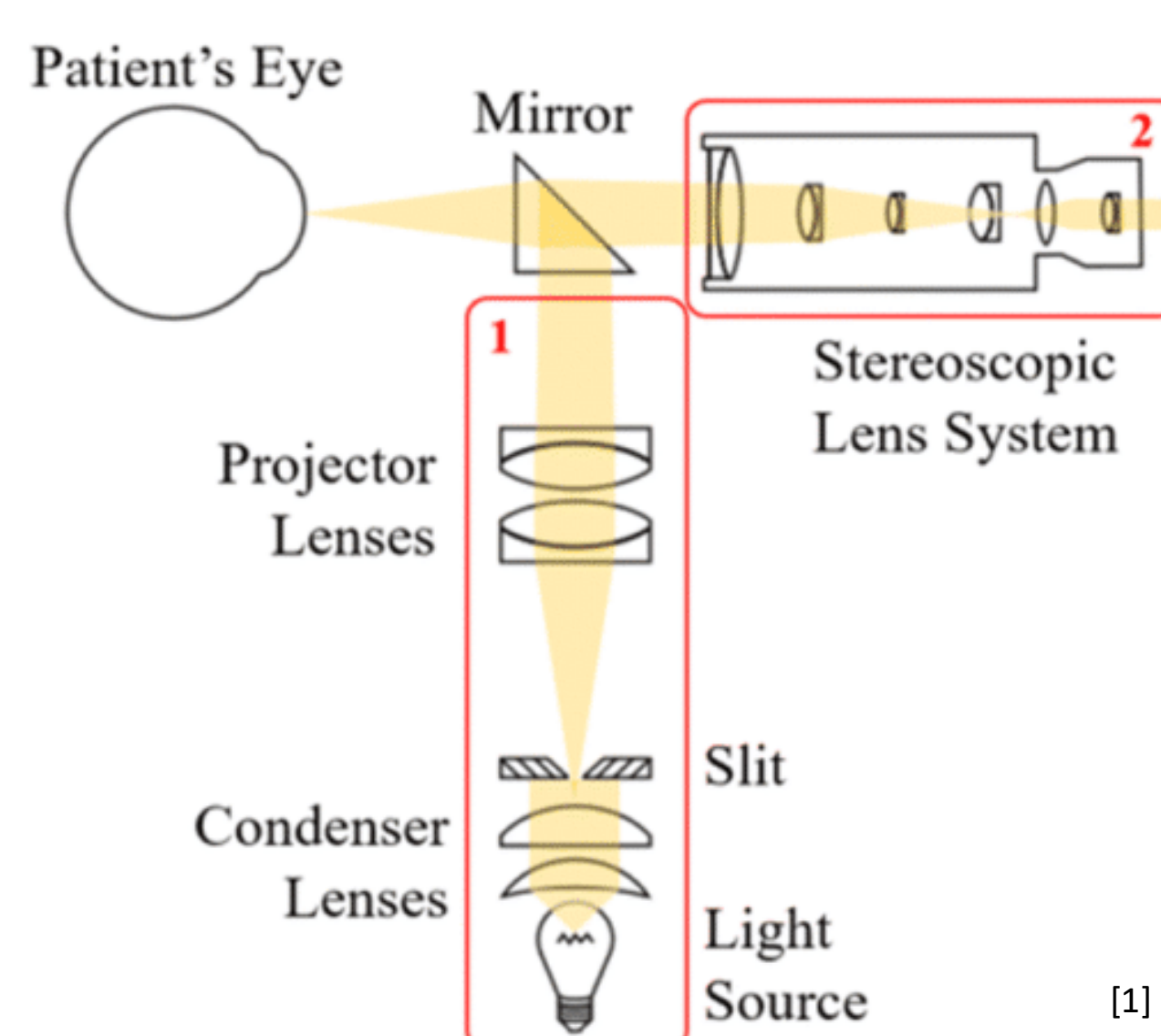


Slit Lamp Device

- A slit lamp is a device used during eye exams, consisting of a microscope with a high-intensity light that can be focused as a beam through a slit.
- Ophthalmologists use this device to examine different structures within the eye to check for any diseases or abnormalities.
- The smartphone-enabled slit lamp device is cost-effective and widens accessibility for users to take eye exams outside of clinic, especially for cancer patients monitoring the side effects of treatment.

Slit Lamp Optics

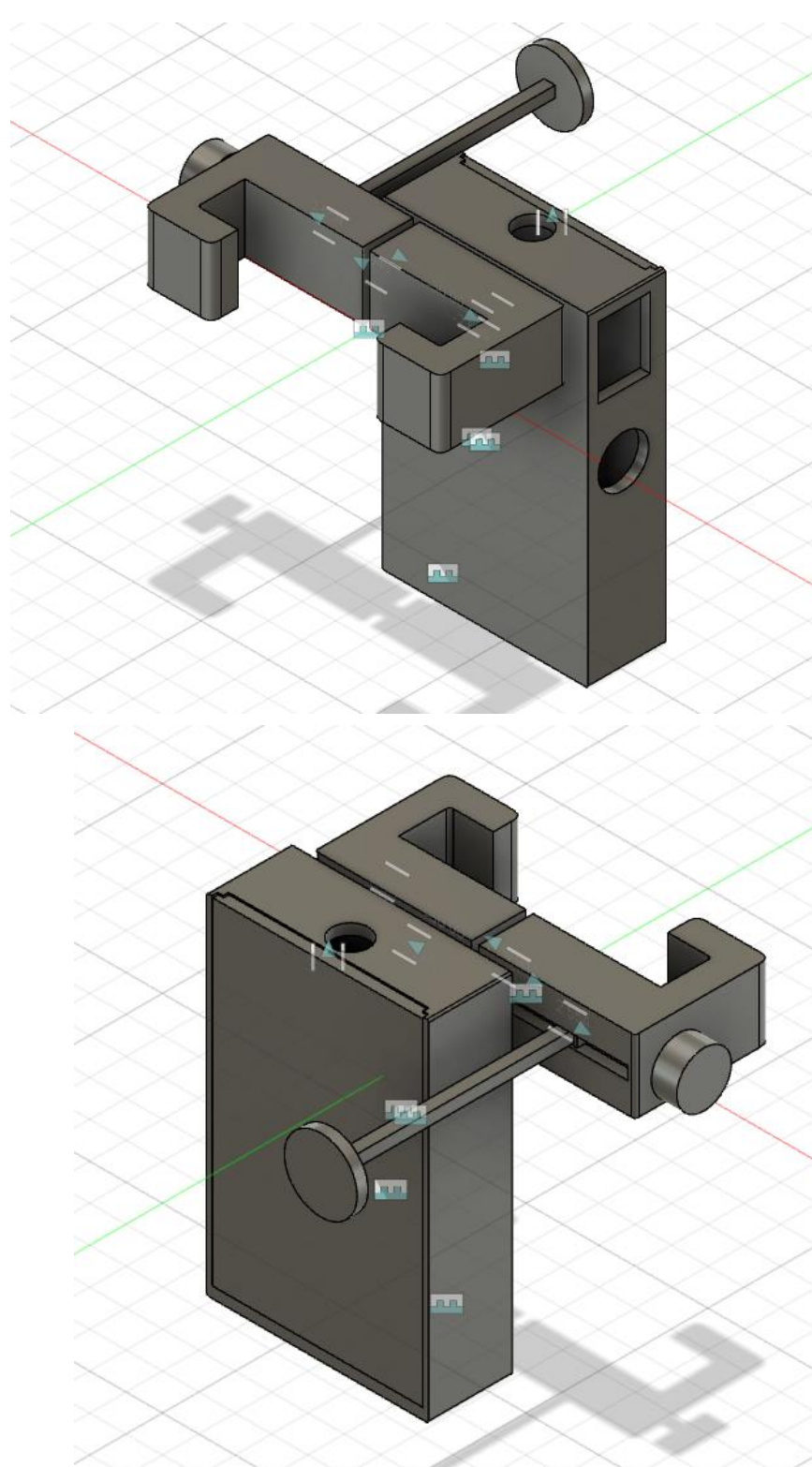
- The traditional slit lamp consists of a light source and lens system to focus on the eye.
- Our system utilizes a commercially-available 10x macro-lens attachment that clips directly onto smartphones.
- A double convex lens is used to focus the LED light through the slit onto the patient eye.
- In the future, an ideal light system will be able to scan.



[1]

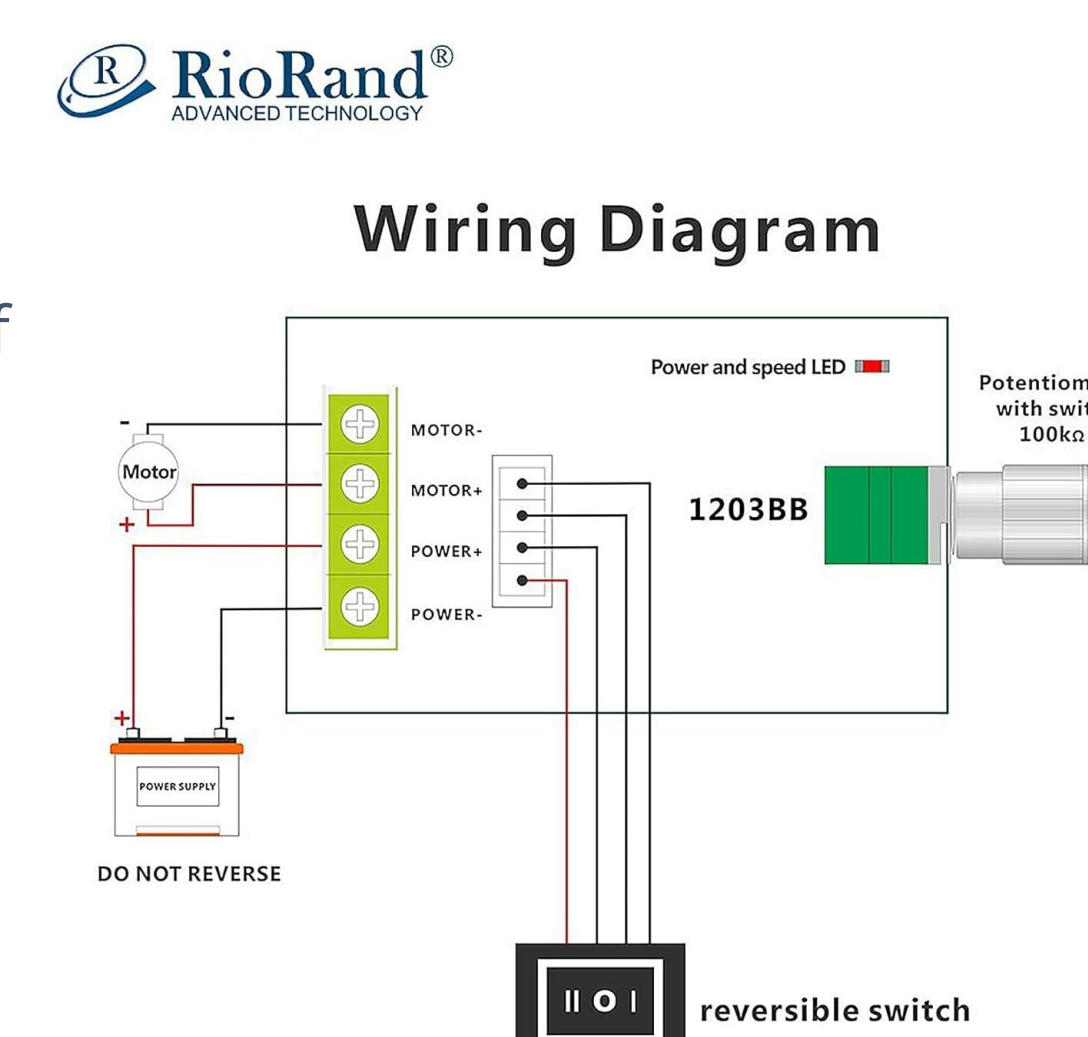
Smartphone Slit Lamp Casing

- The phone mount and casing for the lamp was modeled in Fusion 360.
- The aim is to build a casing that can fit a variable width of smartphones.
- The slit width for the light casing is made to be less than 1 mm to examine the anterior segment of the eye.
- The face mount ensures that the macrolens focuses on the eye in its working distance.
- The design was produced from a 3D printer using PLA.



Lamp

- The lamp on this project is a simple LED diode which has a supported range from 9 Volts to 12 Volts.
- The lamp is powered by a 9/12 (need to finalize) Volt battery which is directly connected to the controller of the LED.
- The controller allows for Pulse Width Modulation (PWM) functionality with a potentiometer.
- The potentiometer on the controller changes the resistance passing through to the LED, which changes the intensity of the light.



Software Structure

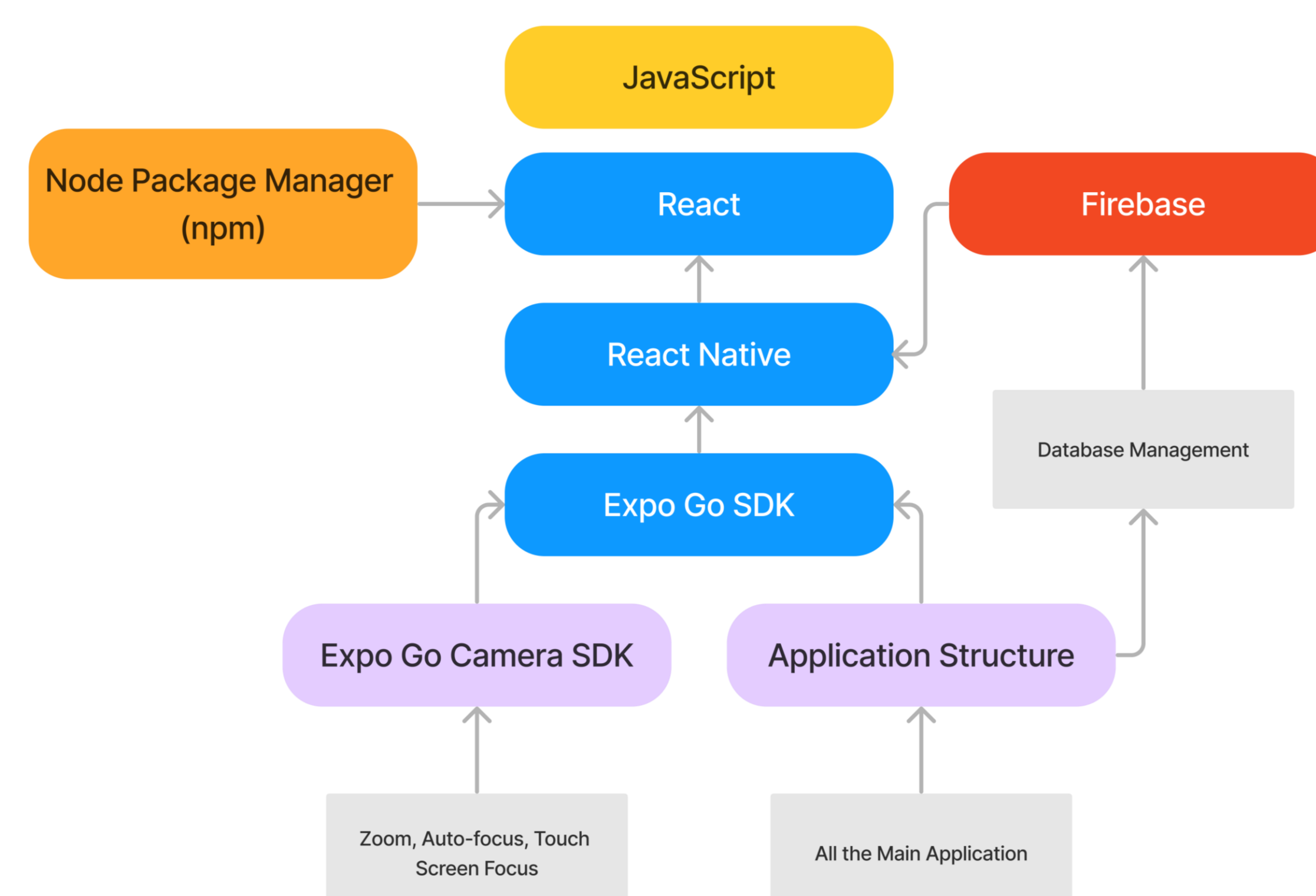
- Our app utilizes React Native to facilitate rapid development and iteration.
 - The app runs on both iOS and Android.
- Cross-Platform Development**
- We leverage the cross-platform Expo Go SDK, which simplifies the development process and supports quick testing on mobile devices.

Backend Integration

- Firebase powers backend for data storage and real-time messaging between clients and doctors.
- Allows for secure storage of user information and facilitates direct communication, including image exchange.

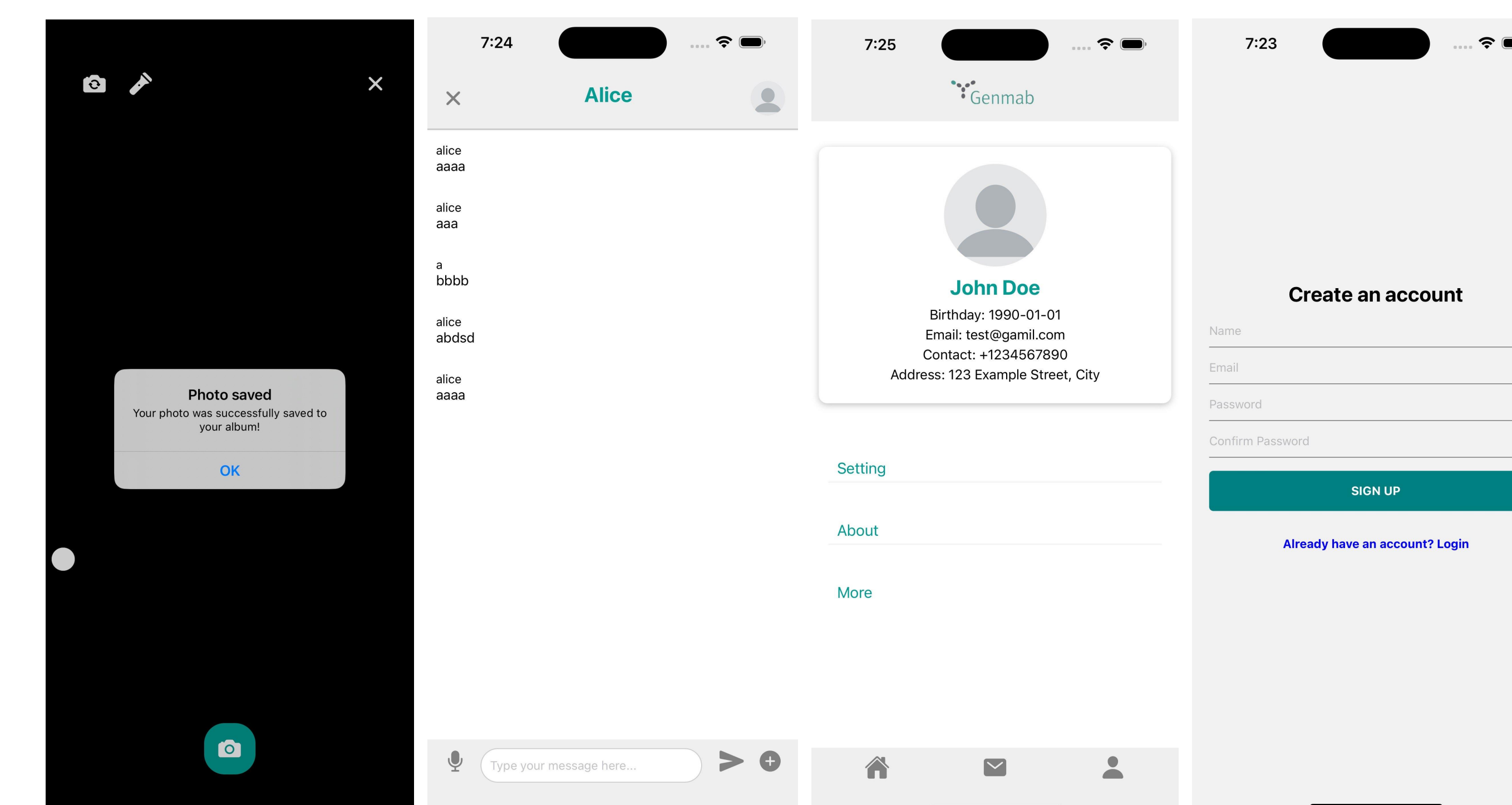
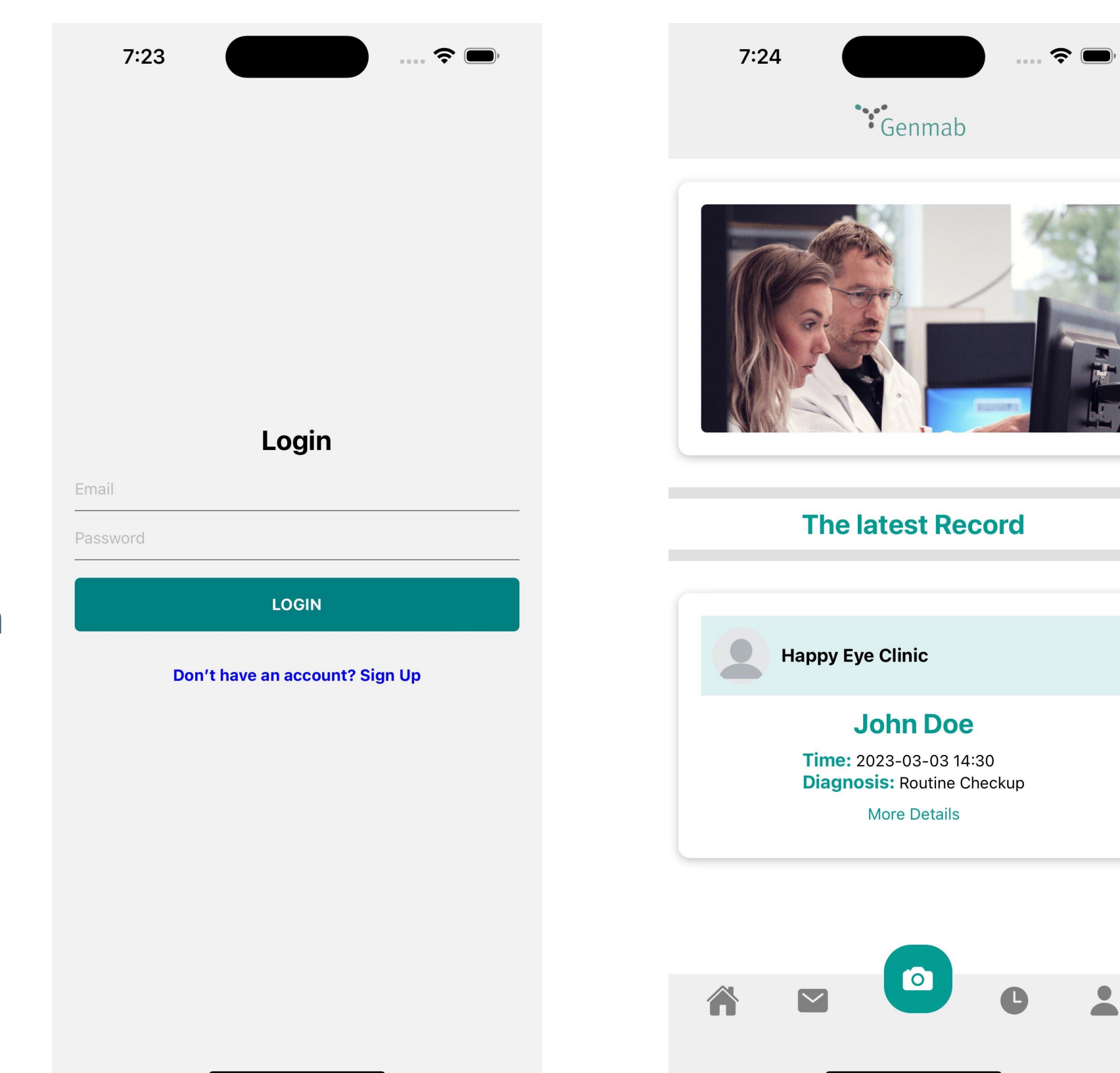
Camera Functionality

- Camera component utilizes Expo Go Camera SDK.
- Lacks features such as zoom, autofocus, and touchscreen focus.
- These functionalities had to be custom-developed, increasing the project's complexity and development time.



App Layout

- There are several key pages:
- Auth Screen manages user authentication, ensuring secure access
- Home Screen as the main page
- Camera Screen for high quality image capture
- Chat Detail and Chat List Screens for communication with doctors
- Profile Info Screen for detailed user info
- Profile Screen allows users to update their personal data
- Record List Screen for examination history



Future Work, References, and Acknowledgments

- Ability for slit beam to scan patient eyes
- Modifications on slit width and/or light intensity
- Adaptation to fit medical standards
- Human/Animal testing
- Phase out Expo Go SDK for React Native vision camera SDK

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 [1] Truong, P., Phan, A., Truong, B. et al. A smartphone attachment for remote ophthalmic slit lamp examinations. Microsyst Technol 26, 3403–3407 (2020). <https://doi.org/10.1007/s00542-020-04894-7>