

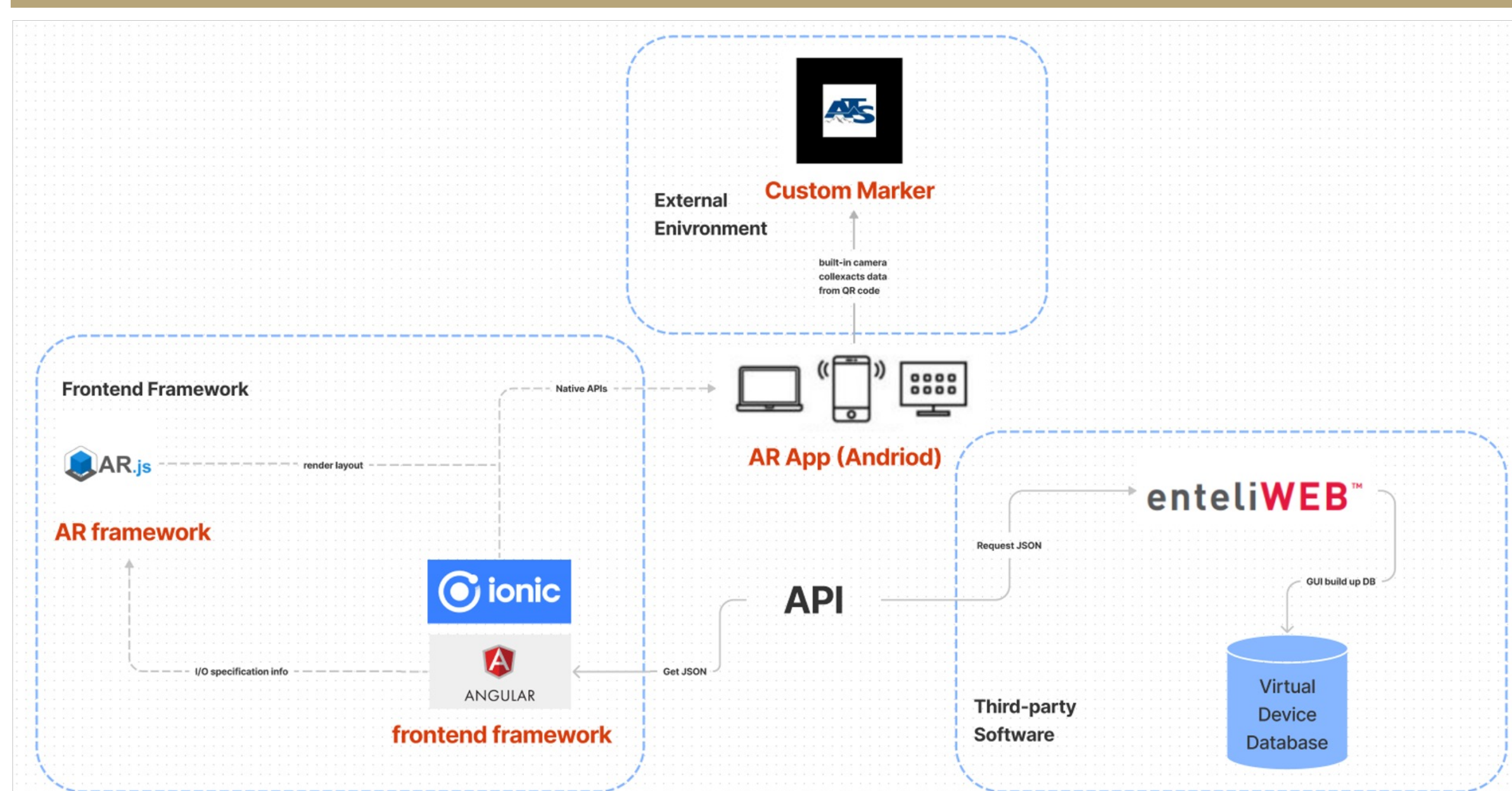
## INTRODUCTION

- ATS Global is a building automation company that designs and installs control systems in a building.
- During installation and checkout on a project, installers, electricians and field technicians are highly required to check the I/O interface on a PDF file from their laptop for each sensor or controller.
- To assist them during the installation phase of projects, the team would work to build a mobile augmented reality (AR) application on Android that can assists ATS in identifying I/O specifications on devices.

## OBJECTIVES

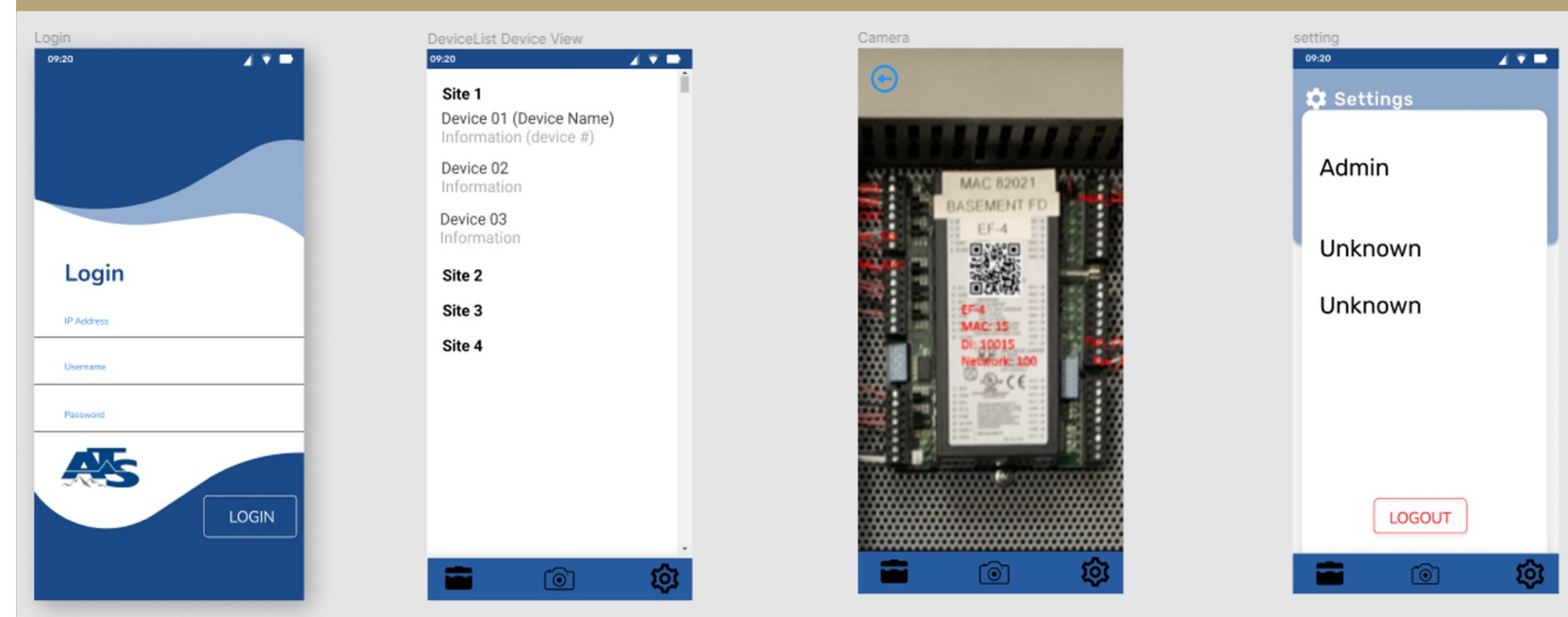
- Complete UI design with Figma.
- Fetch device data from server.
- Implement AR to visualize I/O interfaces.
- Save searched data in the app.
- Build fully functional android app.

## MODULES



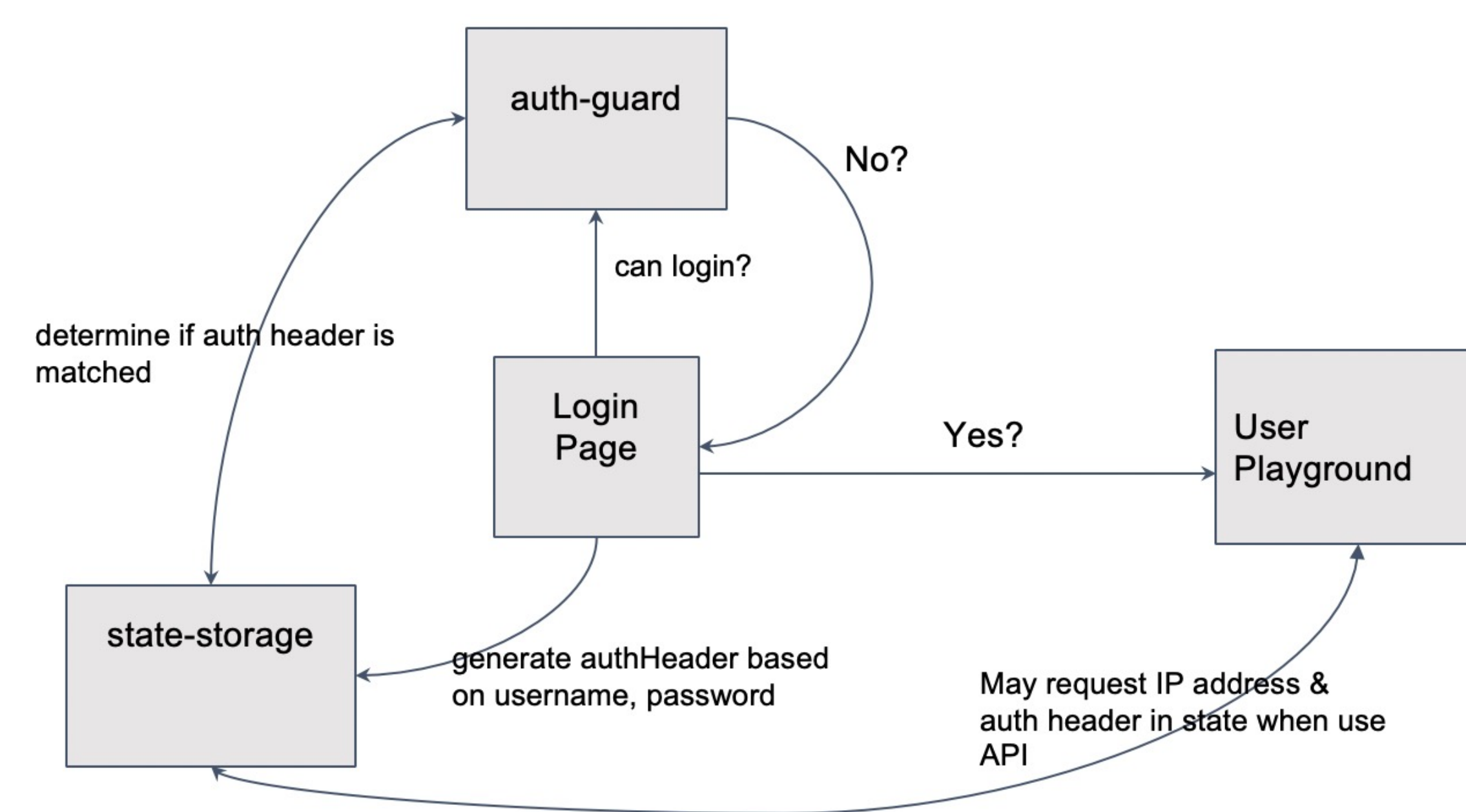
- **Angular** is a web framework for building applications using HTML and TypeScript. Its excellent cross-platform performance and high quality make it a popular web framework.
- **Ionic** is a platform for building mobile experiences with the web. Its open source mobile APK allows users to build Android applications with familiar web tools, frameworks, and languages.
- **AR.js** is a JavaScript library that allows developers to introduce AR features and functionality to any website using a few lines of HTML. It's featured as open-source, cross-browser compatibility, high-speed performance.
- **enteliWEB** is a web-based application that combines the power of enterprise dashboards with easy-to-use facility management tools.

## UI DESIGN



- **Login Page:** Users need to enter correct IP address, username and password to log in to the app.
- **DeviceList Site & Device View Page:** For different sites, ATS Global may have various devices. The page helps to check and store data of devices.
- **Camera Page:** Users can open the camera and it'll show corresponding I/O interfaces information of the device by AR functionality.
- **Setting Page:** It can display user information.

## DATA COLLECTION



- Since the app is designed exclusively for employees of ATS Global, the app need to verify the identity of users.
- We use auth-guard, which is route guards of Angular framework. It can help decide if the user has access/permission to view specific page of the app.
- Through auth-guard, we have access to data, which will be displayed in our marker-based augmented reality functionality. The data is about object name and its corresponding value. They're stored in JSON format on the server.

## AUGMENTED REALITY

- A-Frame is an open-source web framework designed for building augmented reality experiences. It is maintained by developers from Supermedium and Google. Users can create VR and AR scenes using HTML easily.
- We combined both A-Frame and AR.js to implement our AR functionality.
- In order to identify and display I/O data of devices, we create a custom marker, which is based on the logo of ATS Global.
- Once A-Frame detects the specified marker, it'll display the related data we obtain from the servers.



## SUMMARY

- We designed and implemented the augmented reality app for ATS Global successfully.
- The android app can verify user identity, obtain I/O data from servers, open camera to track and display I/O interface information and save data.
- Through this project, we become familiar with many useful frameworks and tools. The front-end web frameworks: Angular and Ionic, UI design tool: Figma, augmented reality library: AR.js and A-Frame.

## FUTURE WORK

- Achieve compatibility on different Android phones.
- Improve the AR recognition and tracking speed.
- Deploy the app on Google Play Store.
- Complete more practical performance tests.

## ACKNOWLEDGMENTS

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