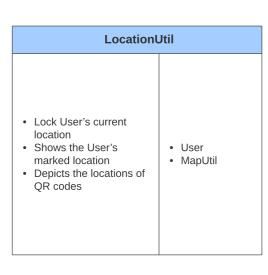
Represent the player Login / Registration Use Camera to Scan QR codes on different locations Mark specific locations on map Set & check user profile Check overall score and current rank Send friends messages to chat Add / Delete friends Walk on the map Have a list of Owned codes Check Owned codes	UserController Invitation Friend Chat MapUtil Code AuthUtil Rank
AuthU	til



Rank	
 Create the rank of the top 200 players Sort the top players Update top players based on real-time score 	User RankController

Message< <abstract>></abstract>	
 Abstract class to represent one message in a chat conversation Include two subclasses TextMessage and LocationMessage Ability to share code information between users Ability to share location information Shows "Read" / "Unread" Stored in Chat class 	• Chat

TextMessage	
 subclass of Message class, represent the Text message Contains a string to represent th e message TextMessage can be shared between friends 	• Message

AuthUtil	
 User can Login New User registration Enforce user to register using google email Enforce user to set name, photourl, uid Avoid duplication in account name, uid User Login should using Google account 	User DatabaseControlle

MapUtil	
 Visual representation of game world Integrated GoogleMap Shows players' locations Shows QR codes locations Allows Users to move on the map 	User LocationUtil

Code	
 Have QR codes Have a Text description of the code Have corresponding code picture(optional) Can Be deleted after a scan Generate auto-calculated score Can be owned by multiple Users 	User CodeController

LocationMe	ssage
subclass of Message class, represent the Location message Contains a hashcode LocationMessage can be shared between friends	• Message

Chat	
 Represent a chat between friends Contiains a list of Messages Chat can be owned by multiple users 	User ChatController Message Friend

Friend	
Represent the firends of a user Contains biographic information similar to user class Contains chat history	User FriendController Chat

Invitation	
 When two users want to become friends, one of them must send an invitation A string can be attached in the invitation Able to check a list of send invitations 	User InvitationController

DatabaseController	
 Connect with external Firebase Manage database instance collaborate with all other controllers to do database operations 	UserController InvitationController FriendController CodeController RankController ChatControlle AuthUtil

UserController	
Connect with User class to achieve create, update, delete, read operations in Firebase	User DatabaseController

InvitationController	
Connect with Invitation class to achieve create, update, delete, read operations in Firebase	Invitation DatabaseController

FriendController		oller
	Connect with Friend class to achieve create, update, delete, read operations in Firebase	Friend DatabaseController

ChatController	
Connect with Chat class to achieve create, update, delete, read operations in Firebase	Chat DatabaseControlle

CodeController	
Connect with Code class to achieve create, update, delete, read operations in Firebase	Code DatabaseController

RankController		ller
•	Connect with Rank class to achieve create, update, delete, read operations in Firebase	Rank DatabaseController