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#### Title

iLost -- Bluetooth Indoor Navigation System

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# iLost --- Bluetooth Indoor-Navigation System

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## Goal

To create a low cost, low power consumption and high accuracy indoor navigation system -- iLost that can guide customers from their current location to their destination in building.

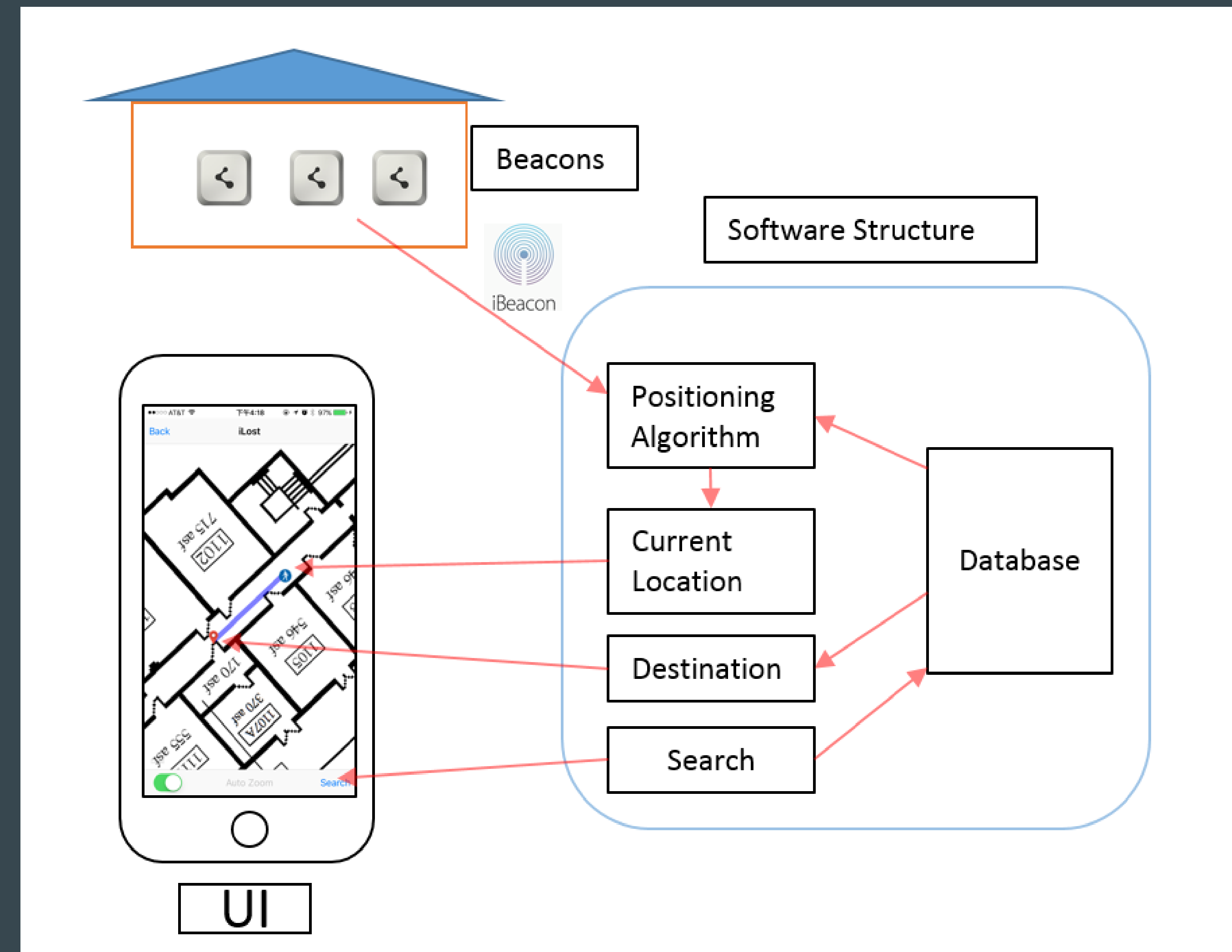
## Team Organization

| System                    | Subsystem             | Haoran Ma(EE)      | Jingliang Liao(EE) | Xiao Chen(EE) | Alan Zhang(EE) |
|---------------------------|-----------------------|--------------------|--------------------|---------------|----------------|
| Hardware                  | Beacon Implementation |                    |                    |               |                |
|                           | Function              | Zoom in & Zoom out |                    |               |                |
| Trilateration positioning |                       |                    |                    |               |                |
| Mapping                   |                       |                    |                    |               |                |
| Routing                   |                       |                    |                    |               |                |
| Search Destination        |                       |                    |                    |               |                |
| Software                  | User Interface        |                    |                    |               |                |
|                           | Database              |                    |                    |               |                |

## Background

- Today, indoor positioning and navigation become a high demand service. During the last decade, research in indoor localization and navigation has focused on techniques, protocols, and algorithms. This project is intend to combine those research and making a real application for user.
- Our system consists with hardware configuration and software development.
- Hardware: Beacons, devices using BLE technology and support by iBeacon protocol. iOS device (iPhone and iPad), one of the most common handheld device.
- Software: The App is developed in Swift programming, we use Xcode running on Mac OS as our IDE. The sub-system includes user interface, positioning system (combine with hardware), database and navigation routing system.

## System Design Schematic



## Sub-System Description

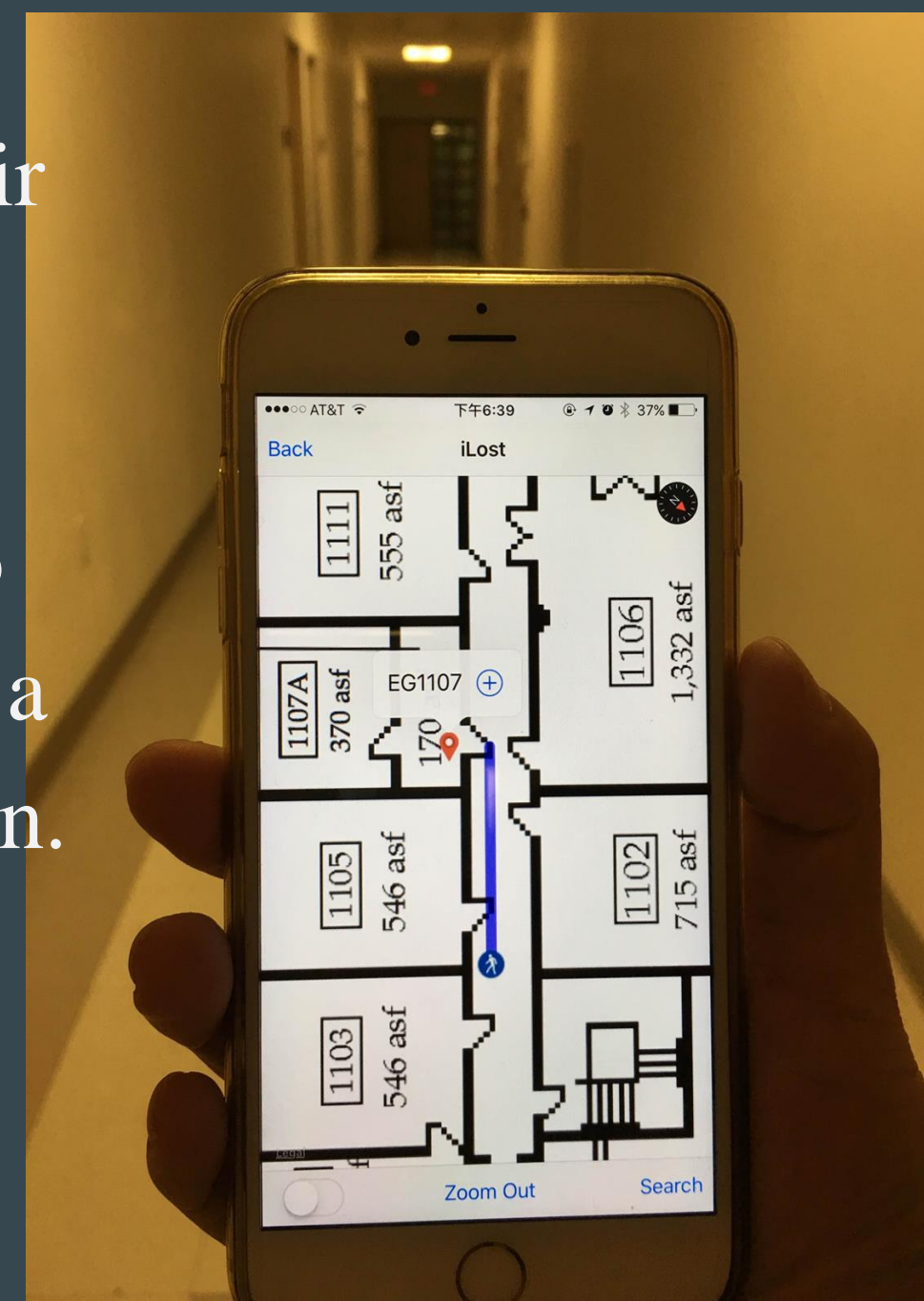
- **Positioning:** Signal received from multiple beacons via iBeacon protocol indicates the distance, and computes the user location by trilateration algorithm.
- **Database:** Contain all the maps (graph and structure), site info and beacon location info. Maps are in PDF format and other info in JSON format.
- **Navigation:** Calculate the route by current location and destination, visual the route on map interface.
- **User Interface:** Display current position on the map, feature the room search, route drawing and auto zoom in, similarly as a common map app.

## Parts List and Budget

- The system consists with two parts: iPhone and Beacon
- Cost: 12 Beacons \* \$20 = \$240 (500 ft<sup>2</sup>)
- Budget: Less than \$400

## Results, Innovation and Business Opportunity

- Our system uses Bluetooth as our transmission signal.
- The benefits of Beacons are that they require very little power due to the Beacons low energy, therefore the smart device will cost less power when navigating. Customers simply glance at their mobiles to know their exact location in real time. Indoor "GPS" means they never get lost. Customers search the interactive directory to find what they looking for, and iLost draws them a path from their current location to their destination.
- It targets on the supermarket, airport, museum, and campus. For instance, Costco can take advantage of our system so that customers can conveniently find their items. Each beacon can cover 100 sq feet, so 500 beacons can set up an accurate network to direct customers. We use Kontakt.io beacon, which cost \$20/each. So total cost is \$ 5000, which can give better user experience.



"iLost" Concept Demo

## Future Plan

- We are improving precision of our system, and will apply to commercial use if our system can meet the business needs.
- Here is our website: <https://sites.google.com/a/uci.edu/eecs-cse-srproj-15-16/team46>

## Team Member



Haoran Ma



Jinliang Liao



Xiao Chen



Alan Zhang