Ubiquitous and Mobile Computing
CS 528: SpaceFinder

Team 3
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Introduction

- Finding a study or lab space with the current pandemic restrictions is very difficult
- Need to control the spread of germs to allow students to stay on campus
- Students need access to resources they pay for
- Why a mobile solution?
  - know on the go
  - location aware
Related Work

Many college campuses have created applications for students to view and reserve study spaces on campus:

- Scout, IlliniSpaces, SmithScape, and Student Study App
- Unfortunately, they cannot accommodate for COVID-19
Related Work

- NYU App
  - Integrated study space reservations, using QR code
  - Adapted to work even during the pandemic
- India
  - Created an app that uses Firebase to track when an individual crosses a red zone location in West Bengal
Methodology

- Our approach satisfies the needs of campus staff/lab managers and students while respecting COVID-19 restrictions
- **Staff**: Create shared space entries in the app for students to use
  - Use the camera with AR to measure room floor space and determine the **maximum occupancy without violating COVID-19 restrictions**
  - Create a QR code for prospective occupants to scan before they enter the room.
  - Upload photos, title and a description for the space
  - Track anonymous usage to help understand traffic patterns
Methodology (2)

- **Students:**
  - View available spaces on a map
  - Know number of available spaces before you leave!
  - Access spaces by scanning QR code
  - Enforces occupancy limits with a no-contact approach
  - Geofences around spaces automatically will track when you leave.
Implementation Plan

Firebase
- Database
- Save room configurations
- Track number of people in a room

Google Maps
- Set room location
- Show all rooms geographically for users
- Geofence users within a room

AR Core
- Measure distance using device camera
- Calculate the square footage of a room with measurements

QRGenerator
- Creates QR codes for each room

ML Kit
- Scan QR codes for users to enter a room
## Project Timeline

<table>
<thead>
<tr>
<th>Week</th>
<th>Deliverables</th>
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<tbody>
<tr>
<td>Oct 25</td>
<td>Prepare project proposal and create development plan</td>
</tr>
<tr>
<td>Nov 1</td>
<td>Set up application framework, create database, layout screens</td>
</tr>
<tr>
<td>Nov 8</td>
<td>View study spaces workflow, QR code scanning, and geofencing</td>
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<tr>
<td>Nov 15</td>
<td>Admin create study spaces workflow, photo uploading, and AR floor space calculations</td>
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<tr>
<td>Nov 22</td>
<td>Finish demo version of application</td>
</tr>
<tr>
<td>Nov 29</td>
<td>Conduct user studies, make changes based on feedback</td>
</tr>
<tr>
<td>Dec 6</td>
<td>Prepare final submission &amp; Present report</td>
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Evaluation Plan

● We plan to test our application by recruiting students on campus to use our service throughout campus
  ● This will get us feedback from the actual users that would download our app
● Efficiency will be evaluated by how quickly it can update availability, space capacity per room, and how accurate the geo-fencing can recognize rooms nearby each other
Difficulty Points

Difficulty Level 1
- Maps
- Location Sensing
- 5 Screens (2 viewfinder-based screens)

Difficulty Level 2
- GeoFencing
- Mobile Vision API: QR Code Reading


University of Illinois. 2015. IlliniSpaces: Discovering Spaces at the University of Illinois. Retrieved from https://publish.illinois.edu/illinispaces/

University of Illinois Board of Trustees. 2012. Illinispaces. Retrieved from https://illinispaces.illinois.edu/uiuc


