Population Path

Expanding Your Safety Toolbox

The Team

Samuel Durkin
samjdurkin@berkeley.edu

Riley Mangubat
rileymangubat@berkeley.edu

Jennifer Kirby
jenniferkirby@berkeley.edu

Josh Chittick
joshchittick@berkeley.edu

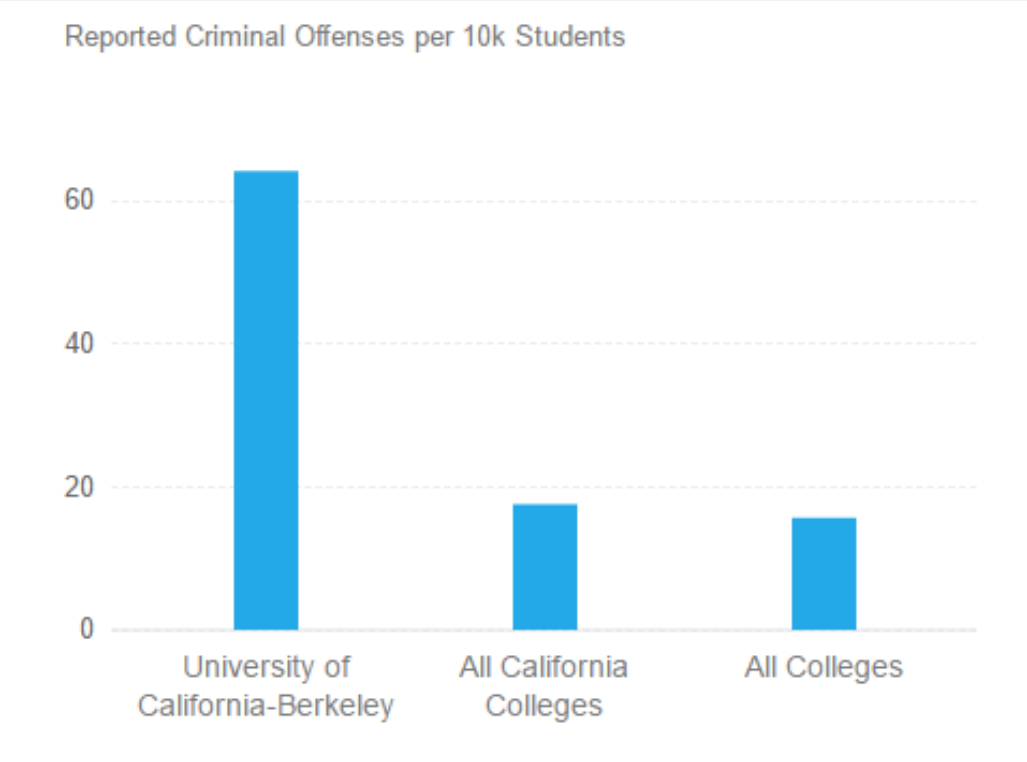
We're Motivated to Keep you Safe

"UC Berkeley has the highest robbery rate of all California universities." - CBS SF Bay Area; August 6, 2016

"Berkeley police warn community about robbery spree" - Berkeleyside; November 10, 2016

"UC Berkeley experienced the most of any of the 49 California public schools reporting to the FBI"
- Daily Cal; November 23, 2015

A Look at the Numbers



In 2014:

Total Students:
37,565 (undergrad and grad)

Total Reported Criminal Offenses: 241

Total Reported Sexual Assaults: 48

Total Reported Hate Crimes: 12

*Statistics and graphic are from a 2014 study done by Start Class

Our Motivation

The Problem

- Sentiment of students feeling unsafe on campus at night
- Dynamic campus

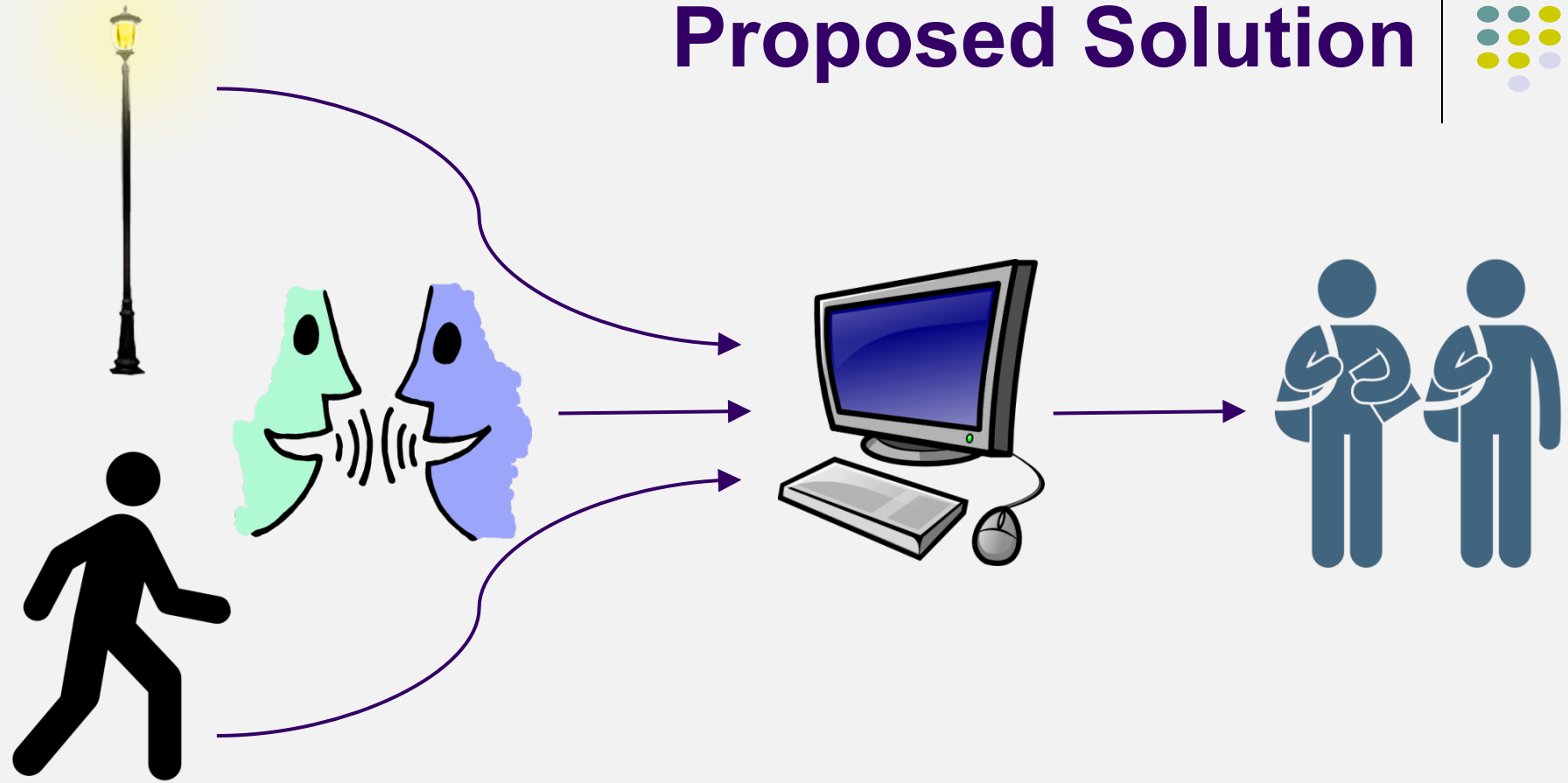
Current Options

- Campus light map
- Bear Walk
- Car sharing services
- Wildfire

Our Take

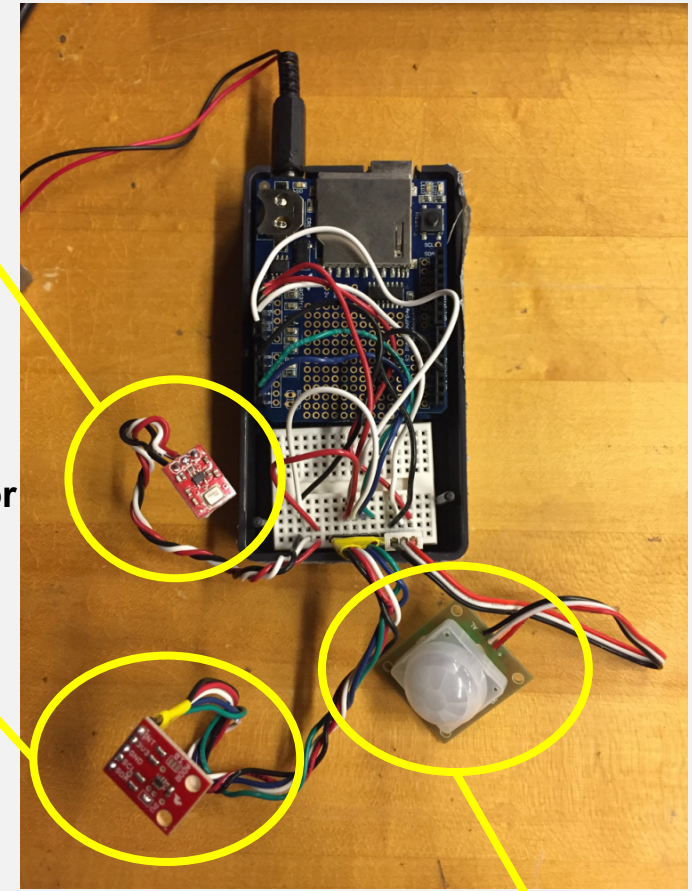
- Increase information flow
- Provide live stream of campus activity
- Benefit campus safety

Proposed Solution



Our Prototype

The Hardware



Data Analysis

Calculating the Safety Factor

$$SN_{N_i} = 0.4L_i + 0.3S_i + 0.3M_i$$

$$SF_{N_i} = 100 - SN_{N_i}$$

$$SF_{P_{ij}} = \frac{SF_{N_i} + SF_{N_j}}{2} * \frac{D_{ij}}{100}$$

SN - Safety Number from Arduino Safety Rating (high number is safest)

SF - Safety Factor from Python Safety Rating (low number is safest)

L_i – Luminosity rating at node i

S_i - Sound rating at node i

M_i - Motion rating at node i

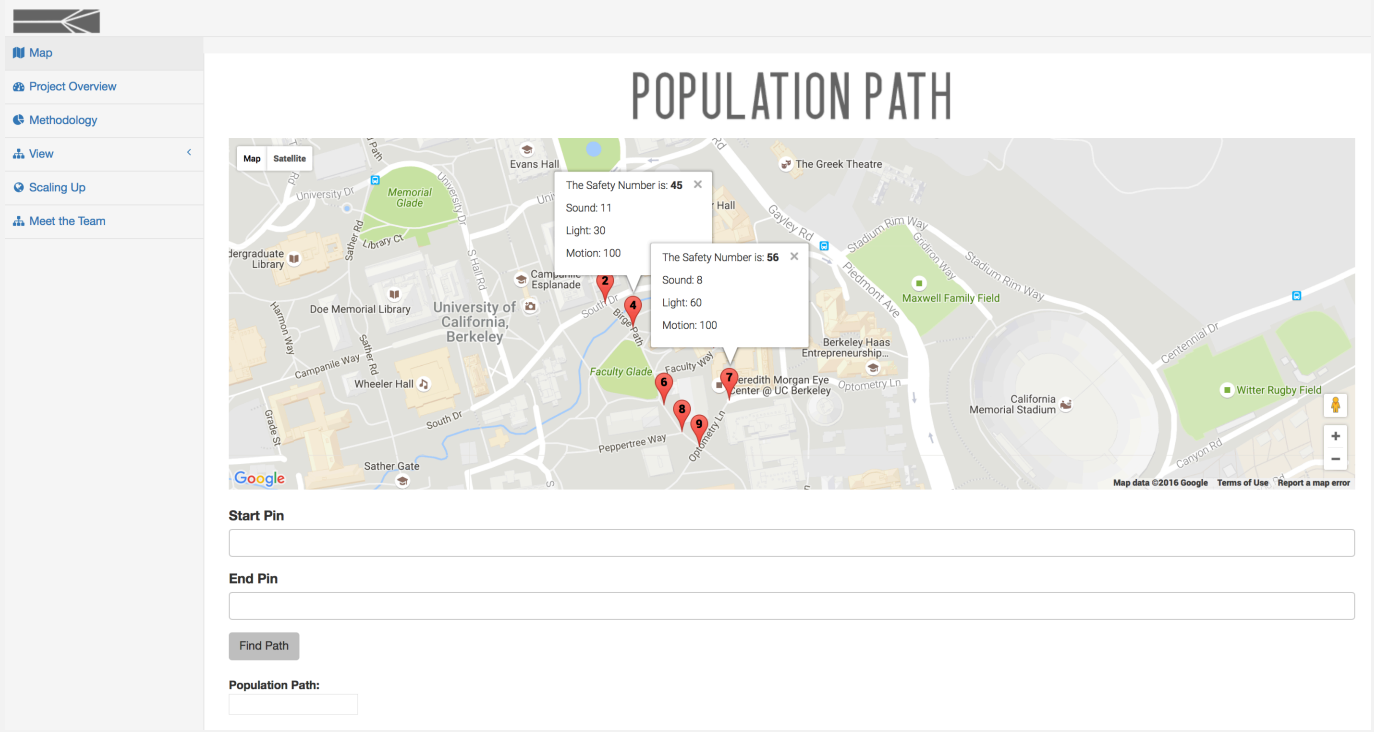
P_{ij}- Path from node i to j

D_{ij}- Distance from node i to j

Dijkstra's Algorithm

- Shortest path algorithm
- Progressively steps from node to node by looking for the neighboring node with the highest "safety factor"

Cyber Layer


Map
Project Overview
Methodology
View
Scaling Up
Meet the Team
POPULATION PATH
Map
Satellite
The Safety Number is: 45
Sound: 11
Light: 30
Motion: 100
The Safety Number is: 56
Sound: 8
Light: 60
Motion: 100
Evans Hall
The Greek Theatre
Memorial Glade
Doe Memorial Library
University of California, Berkeley
Wheeler Hall
Faculty Glade
Maxwell Family Field
Berkeley Haas Entrepreneurship...
Meredith Morgan Eye Center @ UC Berkeley
California Memorial Stadium
Witter Rugby Field
Sather Gate
Google
Map data ©2016 Google
Terms of Use
Report a map error
Start Pin
End Pin
Find Path
Population Path:

User Interface

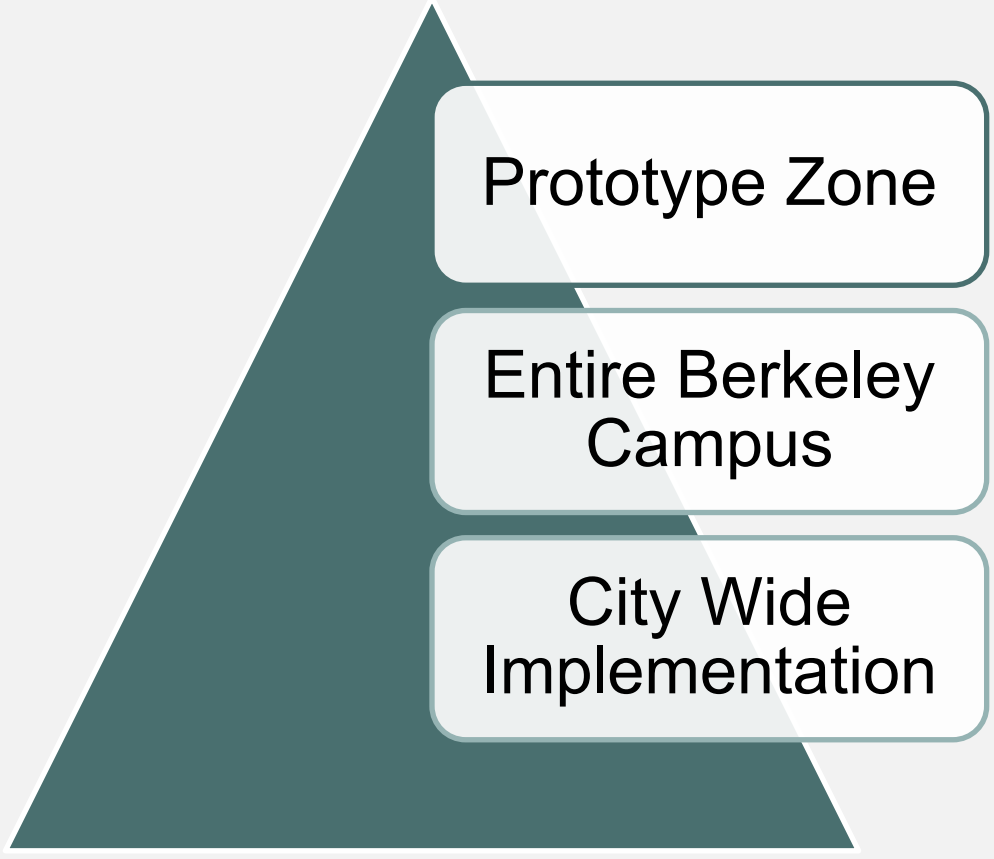
Demo!

Scaling Up

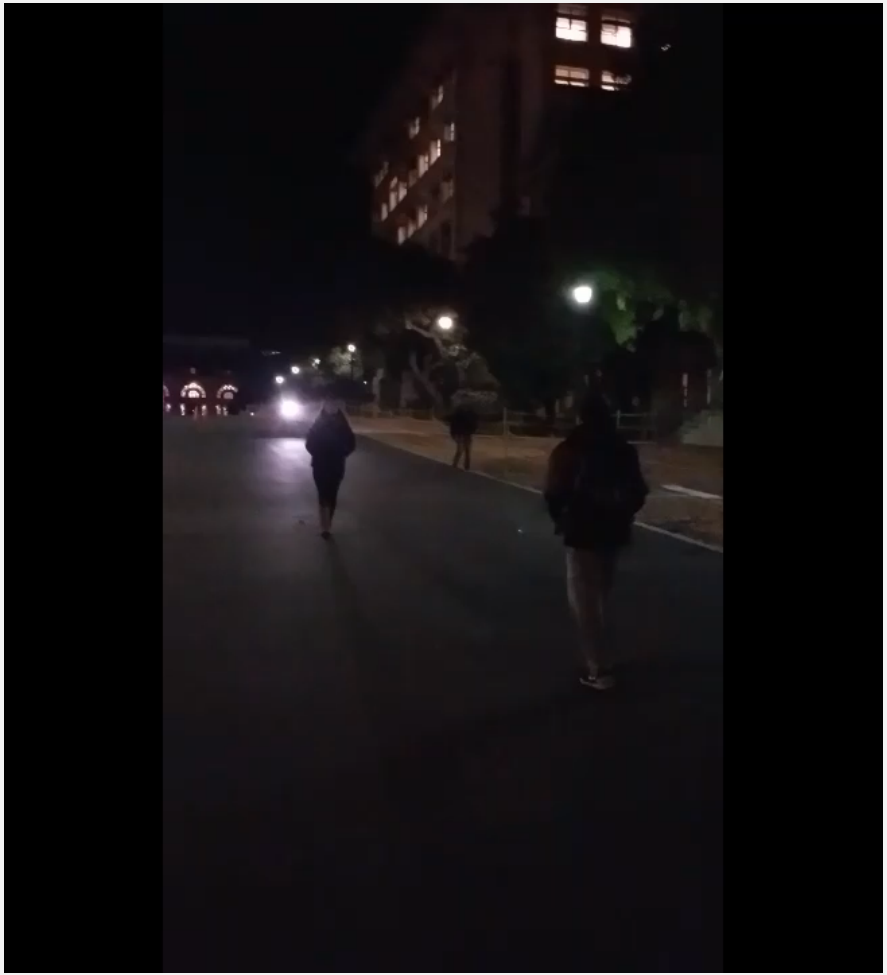
On the Berkeley Campus

- Campus-wide implementation
- Permanent sensors with 24/7 live stream of data
- Internet connectivity

And Beyond!



- Modular design allows for infinite scalability
- Connection with local police authorities and city safety infrastructure
- Affordable public service



POPULATION PATH