CAREDEX

A Data-exchange Platform to Enable Efficient Workflows of Senior Populations During a Disaster

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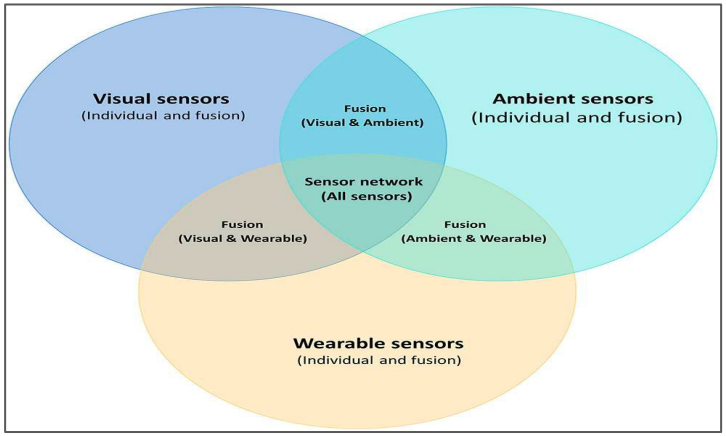
Project Summary

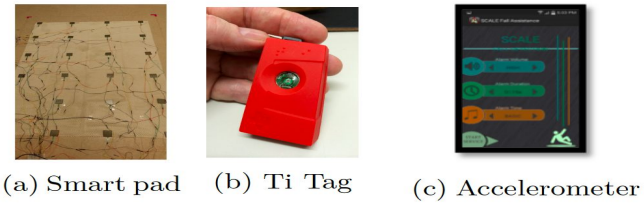
- The final goal of CareDex: enable the resilience of the senior care elderly population during a disaster.
- In this project:
  - We create simulated dynamic information about residents' occupancy of each room that changes over time for a day.
  - We create simulated static data (name, date of birth, room number, etc.) stored in a structural database that first responders can easily retrieve.
  - We use Grafana to demonstrate the occupancy in the floor plan with our simulated data.

Related Works

- Sensors used for monitoring Activities of Daily Living in the recent researches (visual sensors, ambient sensors, wearable sensors, or the fusion of sensors).



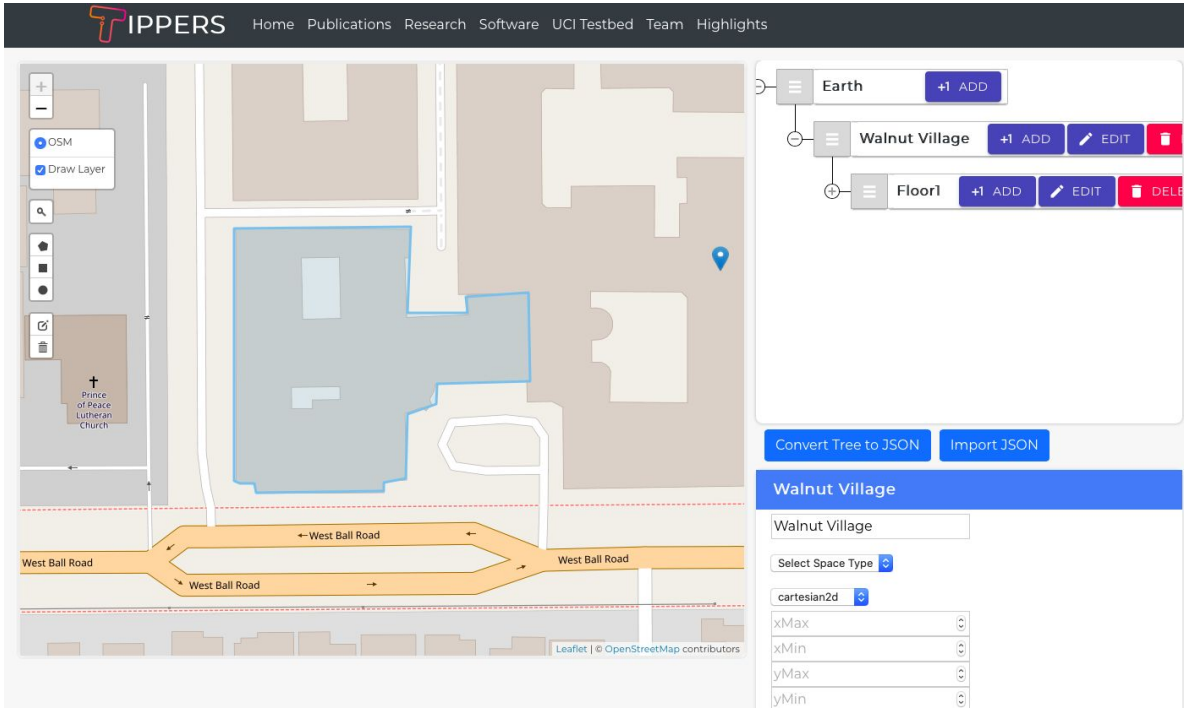
Different Types of Sensors



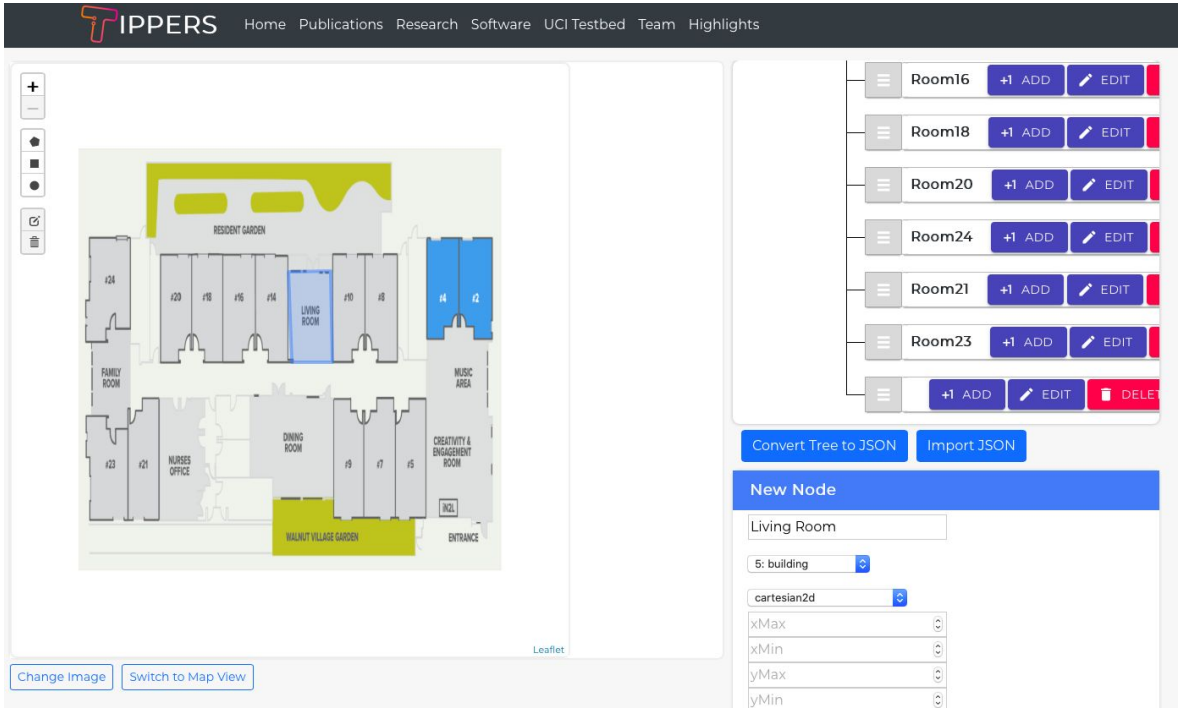
Wearable Sensors

Ambient Sensors

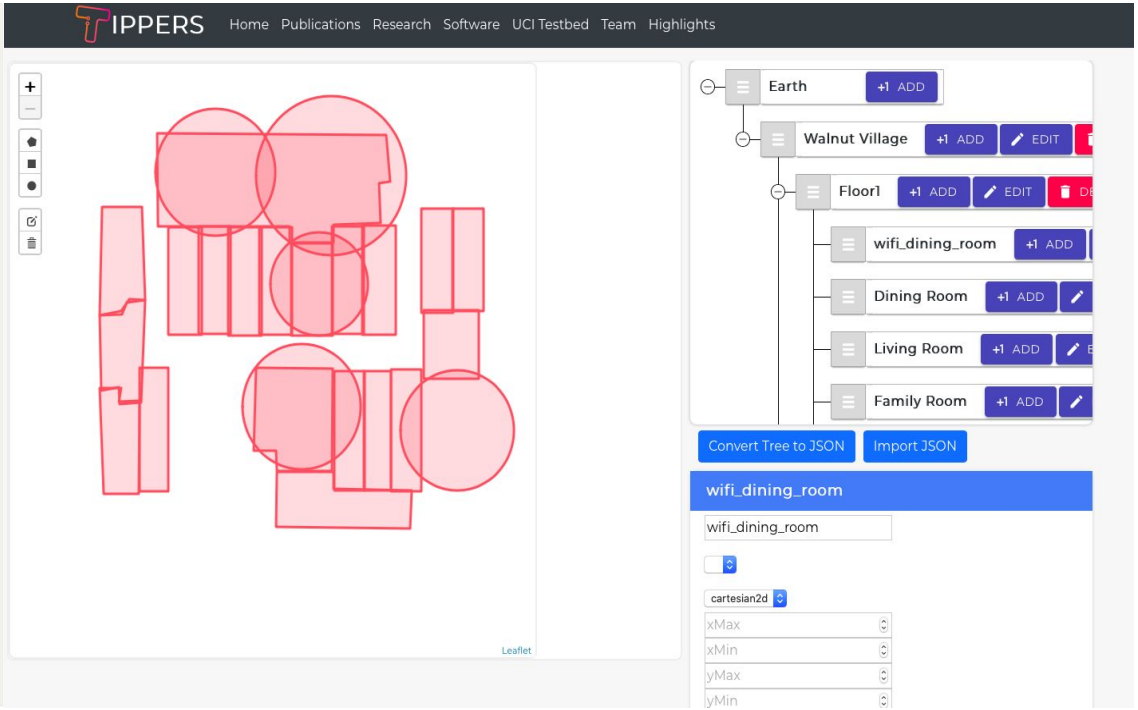
Specifying the borders of a Walnut Village in the map implemented in Tippers



Adding our floor plan and specifying the border of each room to the Tippers



Adding the first floor plan of Walnut Village with a few sensors (Wifis) in Tippers



Occupancy Table (PostgreSQL)

	space_id integer	space_name character varying	start_time timestamp without time zone	end_time timestamp without time zone	occupancy integer
1	101	Dining Room	Mon Jun 07 2021 13:30:02 GMT-0700 (Pacific Daylight Time)	Mon Jun 07 2021 13:35:02 GMT-0700 (Pacific Daylight Time)	1
2	102	Living Room	Mon Jun 07 2021 13:30:02 GMT-0700 (Pacific Daylight Time)	Mon Jun 07 2021 13:35:02 GMT-0700 (Pacific Daylight Time)	0
3	103	Family Room	Mon Jun 07 2021 13:30:02 GMT-0700 (Pacific Daylight Time)	Mon Jun 07 2021 13:35:02 GMT-0700 (Pacific Daylight Time)	2
4	104	Nurses Office	Mon Jun 07 2021 13:30:02 GMT-0700 (Pacific Daylight Time)	Mon Jun 07 2021 13:35:02 GMT-0700 (Pacific Daylight Time)	2
5	105	Resident Garden East	Mon Jun 07 2021 13:30:02 GMT-0700 (Pacific Daylight Time)	Mon Jun 07 2021 13:35:02 GMT-0700 (Pacific Daylight Time)	2
6	106	Resident Garden West	Mon Jun 07 2021 13:30:02 GMT-0700 (Pacific Daylight Time)	Mon Jun 07 2021 13:35:02 GMT-0700 (Pacific Daylight Time)	0
7	101	Dining Room	Mon Jun 07 2021 13:20:02 GMT-0700 (Pacific Daylight Time)	Mon Jun 07 2021 13:30:02 GMT-0700 (Pacific Daylight Time)	2
8	102	Living Room	Mon Jun 07 2021 13:20:02 GMT-0700 (Pacific Daylight Time)	Mon Jun 07 2021 13:30:02 GMT-0700 (Pacific Daylight Time)	2
9	103	Family Room	Mon Jun 07 2021 13:20:02 GMT-0700 (Pacific Daylight Time)	Mon Jun 07 2021 13:30:02 GMT-0700 (Pacific Daylight Time)	3
10	104	Nurses Office	Mon Jun 07 2021 13:20:02 GMT-0700 (Pacific Daylight Time)	Mon Jun 07 2021 13:30:02 GMT-0700 (Pacific Daylight Time)	3

Residents Table (PostgreSQL)

	first_name character varying	last_name character varying	gender character varying	room integer	dob date	medicalinformation character varying	goodtoknow character varying
1	Mary	Cooper	Female	217	Thu Dec 25 1958 00:00:00 GMT-0800 (Pacific Standard Time)	Asthmatic	Mary's husband lives in the independent unit (room 107). Mary is a retired Registered Nurse.
2	Joe	Peterson	Male	221	Fri Jul 12 1963 00:00:00 GMT-0700 (Pacific Daylight Time)	Uses unary catheter	Joe likes to hide in the guest bathroom.
3	Joyce	McCreath	Female	219	Wed Sep 08 1926 00:00:00 GMT-0800 (Pacific Daylight Time)	Alzheimer disease	Joyce does not like to be touched.
4	Peter	Benediktsson	Male	203	Mon Jul 27 1942 00:00:00 GMT-0700 (Pacific Daylight Time)	Diabetic	*null*
5	Paul	Schutt	Male	302	Tue Aug 27 1929 00:00:00 GMT-0800 (Pacific Daylight Time)	Uses Hearing Aids and eyeglasses	Paul is out of the building all day every first Sunday of the month.
6	Greg	Banner	Male	207	Wed Feb 20 1952 00:00:00 GMT-0800 (Pacific Standard Time)	Osteoarthritis	Always call Greg's daughter before sending him to the ER. If you don't find Greg in his room check upstairs laundry room.
7	Hariette	Kingscote	Female	102	Thu Sep 30 1943 00:00:00 GMT-0700 (Pacific Daylight Time)	Partial Incontinence	*null*

Other Attributes

- Resident's photo
- Telephone number
- Weight
- Emergency contacts
- Walking Assist
- Transferring Assist
- etc..

Some Useful Queries

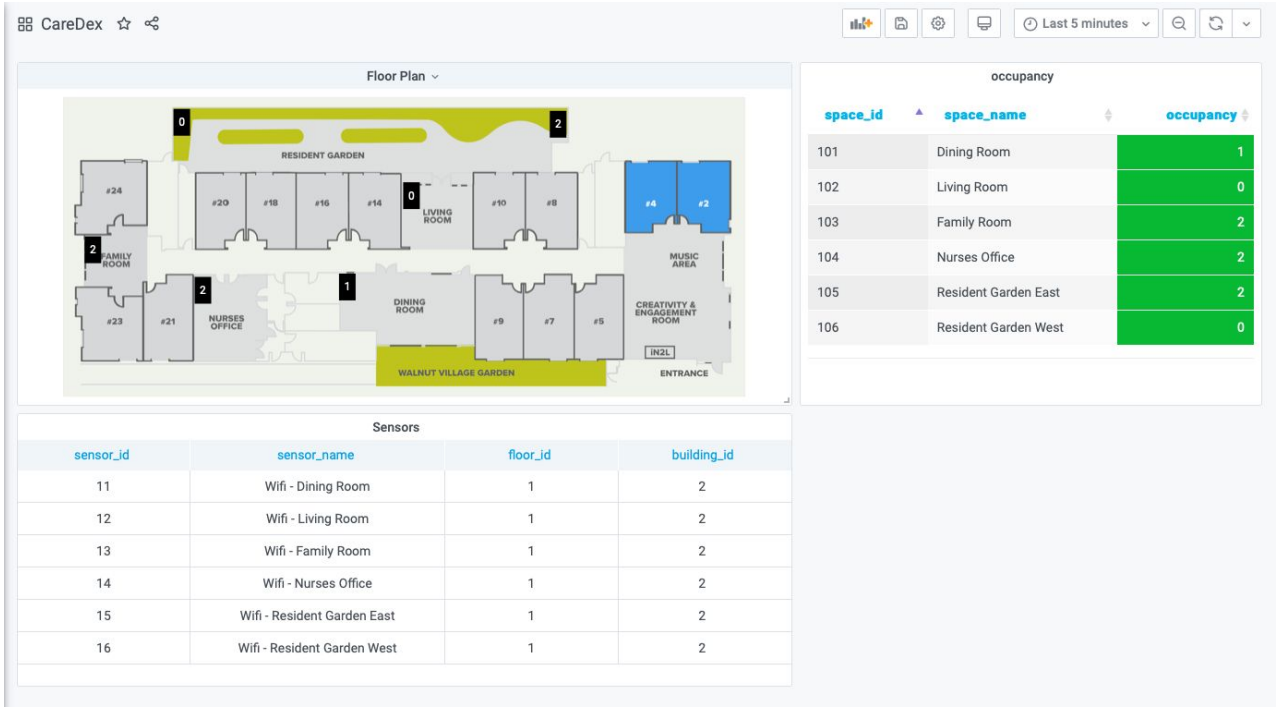
- Classify residents based on their needs (Maximum - Moderate or Minimum Assistance)
- Get resident’s current location (in real-time)
- Resident’s most recent ADL

	maximum_assistance character varying
1	Eugine Barnes
2	Hariette Kingscote
3	Mary Cooper
4	Peter Benediktsson

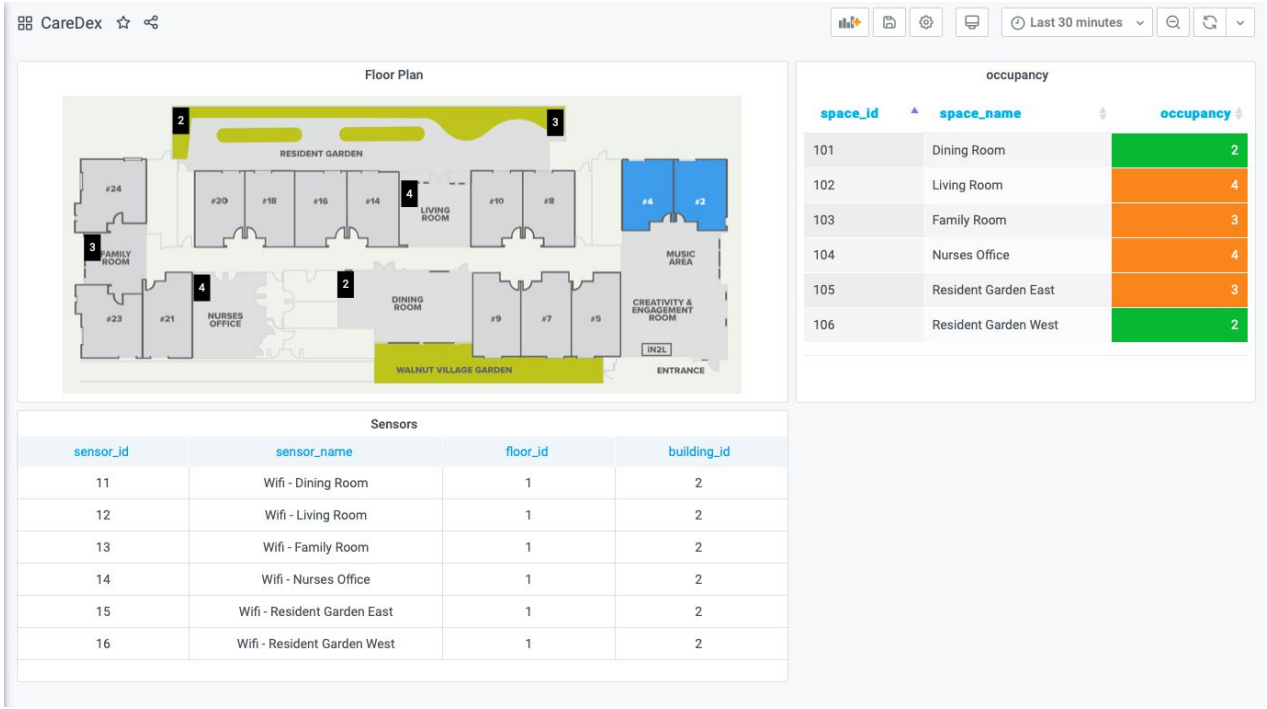
	moderate_assistance character varying
1	Bill Wherry
2	Paul Schutt

	minimum_assistance character varying
1	Carol Rasmusson
2	Greg Banner
3	Joe Peterson
4	Joyce McCreath

CareDex Dashboard (Last 5 minutes)



CareDex Dashboard (Last 30 minutes)



Future works: HIPAA and Responders' Access to Information

HIPAA (Health Insurance Portability and Accountability Act): standards for the electronic exchange, privacy, and security of medical information.

- **Privacy**: What information is shared? Who has access to confidential medical records.
- **Security**:How is data stored? Is data encrypted? What data breach mitigations are implemented? Notifications of potential data breaches.
    - Encryption: Protected Health Information (PHI) must be encrypted at rest and in transit (data must be stored on encrypted volumes and transmitted over TLS/SSL).
    - Audit Logging: HIPAA compliant databases must log queries and all accesses to PHI to detect potential malicious activity.
- **Backup and Disaster Recovery**: HIPAA requires that organizations implement backups in case of a service outage.