**Background**

We are building a detection and monitoring system that works to detect both the risk of a fall and a fall event through edge detection and video monitoring. Designed to reduce the time patients are unattended in the event of a fall.

**The System**

**Key Features**
- Bed with an array of force sensors capable of edge detection
- Sensors are mapped to a GUI and display the location of the patient with RGB color

**Use Cases**

**Bed Occupancy**
1. Patient’s absence is noticed by bed sensors
2. System sends push notifications to all active web sessions.
3. User is alerted that a patient needs checking
4. User clears patient or snoozes alert.

**Status Check**
1. Caregiver wishes to remotely monitor/check patient
2. User accesses UI through URL.
4. User can view patient location in bed, as well as video feed of the room.

**System Overview**

NodeRED acts as the back-end software. It creates sockets and holds code modules. It also allows us to host our front-end web GUI to allow for a single deployable package.

**Web-Based GUI**

- The system is platform independent
- The system can be easily integrated into existing systems.

**References:**

**Approach**

**Hardware**

One of the most important components in the design is the Raspberry Pi, which is a small single board computer that offers several tools to facilitate device interconnections and simple signal processing. As well as being an excellent device for data collection and transmission, it is also a sponsor requirement for the Smart Cities projects. However, many peripheral devices are employed as well.

**Hardware Components:**
- Flexiforce A301 Force Sensors
- Raspberry Pi 3 Model B
- Raspberry Pi Zero
- 16 Pin ADC
- Raspberry Pi Cam V2
- Server

**Pressure Sensing Mat**

The fall detection system is fueled by several existing hardware packages. Along the mattress, sixteen Flexiforce A301 force sensors are employed in an array across the surface of the mattress. This is to detect where the patient is at any given time.

**Next Semester**

- Build user interface
- Code out sensor heatmap
- Assemble the sensors array
- Build back-end database
- Determine weight threshold for sensors’ alarm
- Test each component individually and commutatively

**Stretch Goal:** Image processing for fall detection (version 0.1 complete)