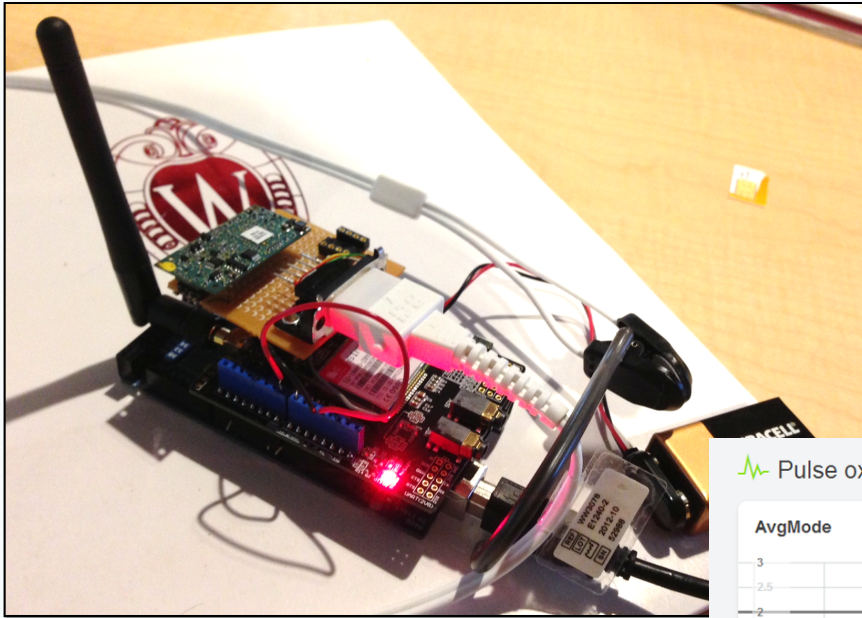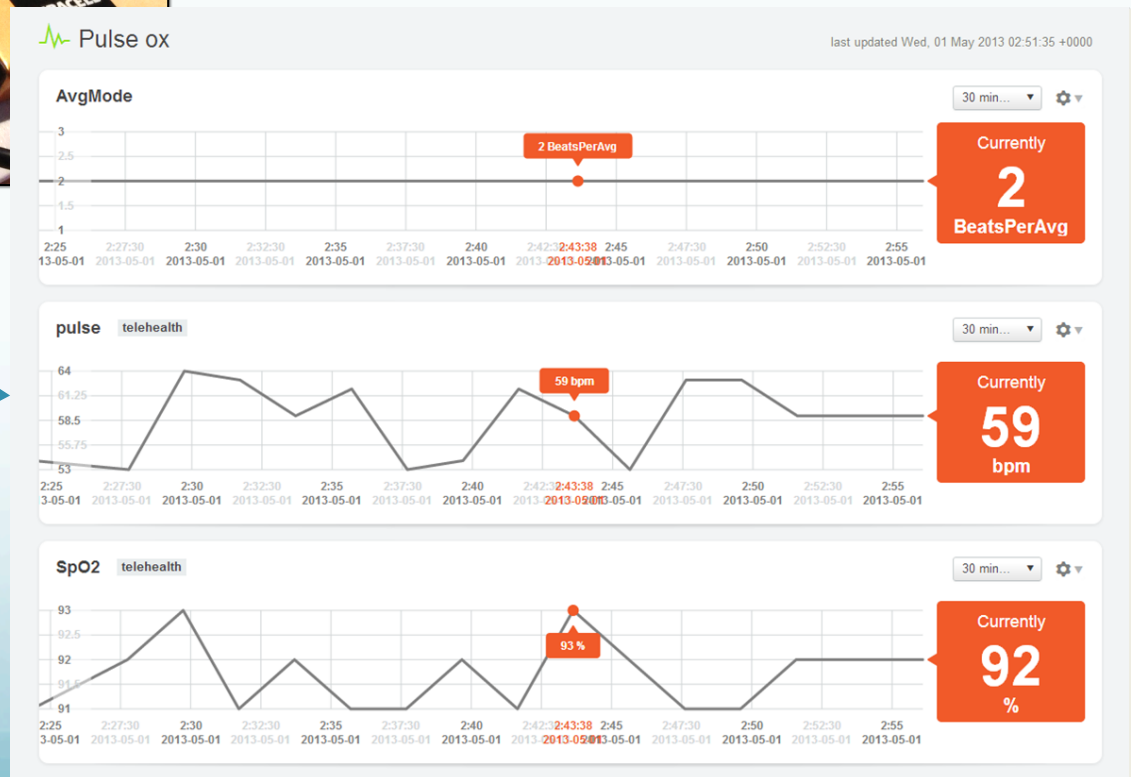# Pogo
Pulse Oximetry, on-the-go

Chris Fernandez ● Olivia Rice ● Rafi Sufi ● Nick Glattard

Progress to date

GSM Network

Problem Statement

- Last semester, a portable, cellular network enabled, pulse oximeter device was prototyped and tested. Although the device met key client specifications, an application and interface are needed for viewing patient oximetry data in real time.
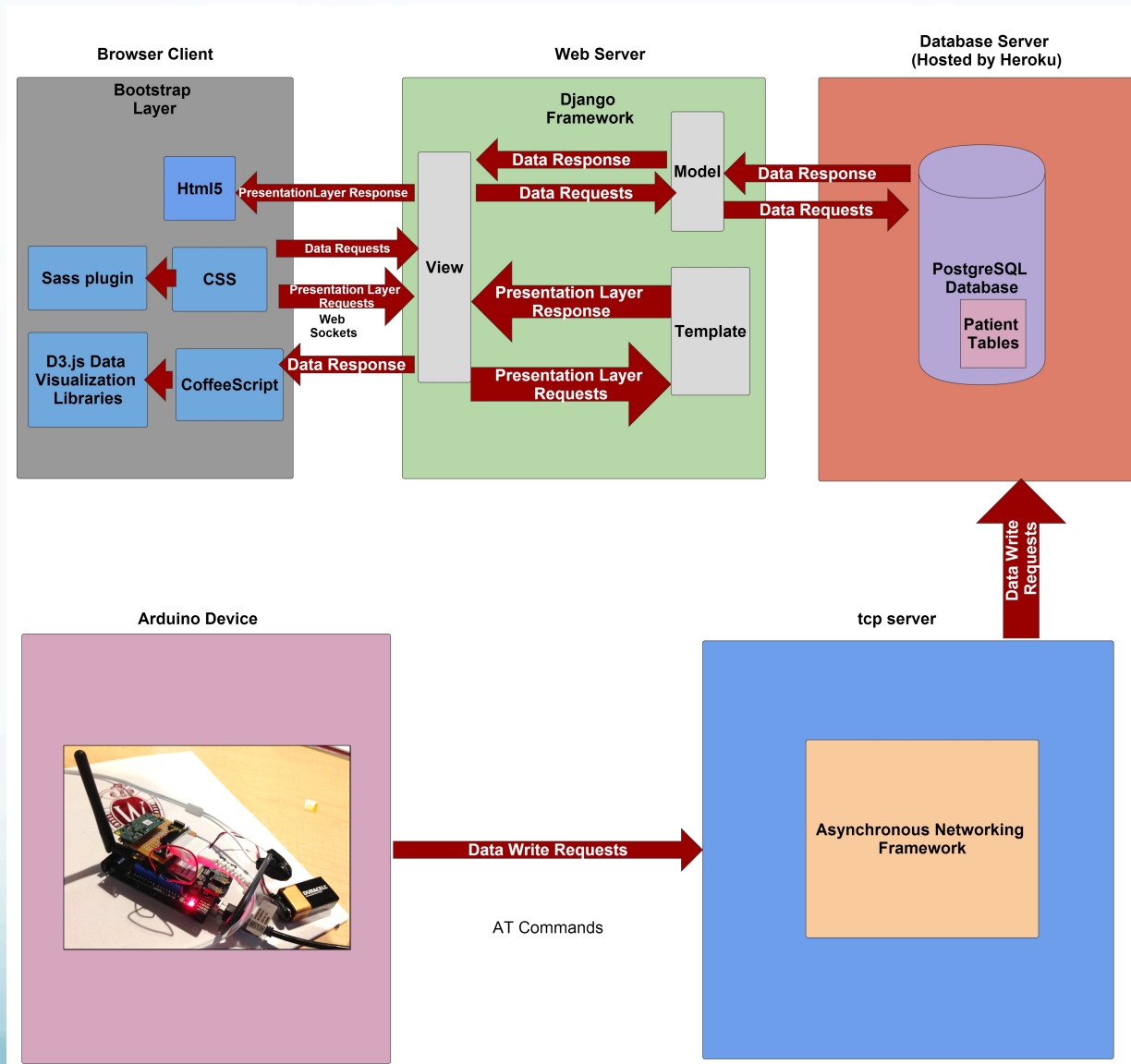
Product Design Specs

- Design a computer program that:
  - Receives and stores patient data from *Pogo*
  - Displays a waveform sample, pulse rate, SQI
  - Provides real-time alerts to aide in decisions
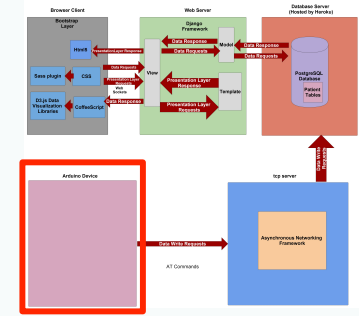 - Is extendable to monitor several patients simultaneously

Design Alternatives

Alternatives & Criteria	Weight	Desktop Application		Mobile Application		Website Application	
Cost	10	5	10	5	10	3	6
Safety	10	2	4	4	8	5	10
Ease of Use	20	2	8	3	12	5	20
Continuous Deployment	15	3	9	4	12	5	15
Reliability	20	4	16	3	12	5	20
Portability (cross-platform)	15	1	3	1	3	4	12
Ease of Development	10	2	4	2	4	4	8
Total	100		54		61		91

Web Application Workflow

Browser Client

Web Server

Database Server (Hosted by Heroku)

Bootstrap Layer

Django Framework

Html5

Model

Data Response

Data Response

Data Requests

Data Requests

PresentationLayer Response

Sass plugin

CSS

Data Requests

View

Presentation Layer Requests

Presentation Layer Response

Web Sockets

PostgreSQL Database

Patient Tables

D3.js Data Visualization Libraries

CoffeeScript

Data Response

Template

Presentation Layer Requests

Data Write Requests

Arduino Device

tcp server

Data Write Requests

Asynchronous Networking Framework

AT Commands
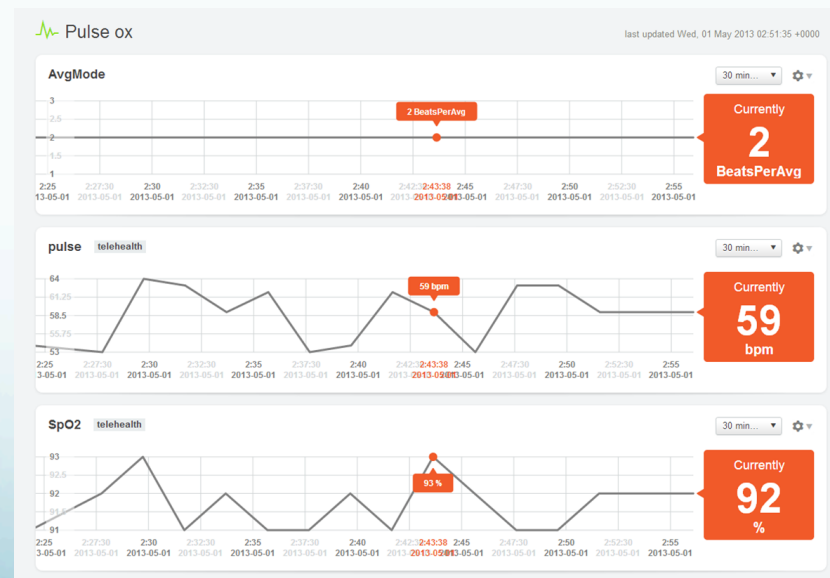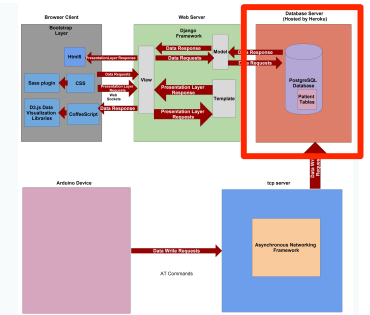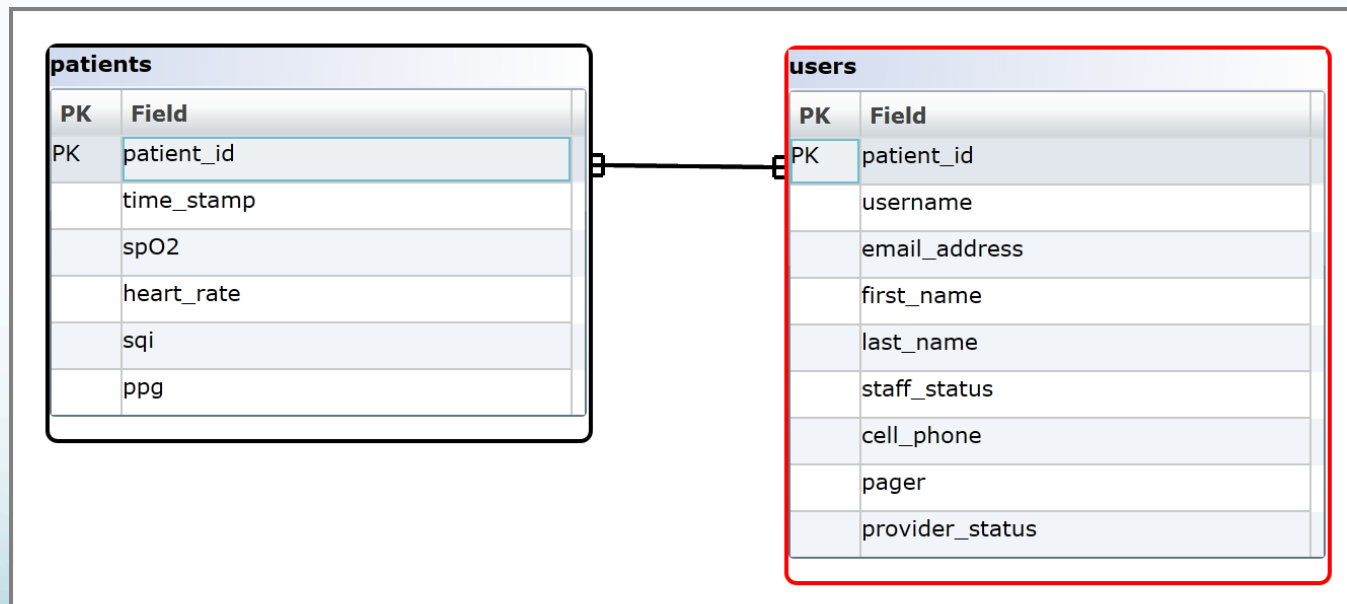
Pogo

- Saves patient oximetry data

- Periodically transmits data packets to Xively
  - Utilizes secure API key to initiate websocket
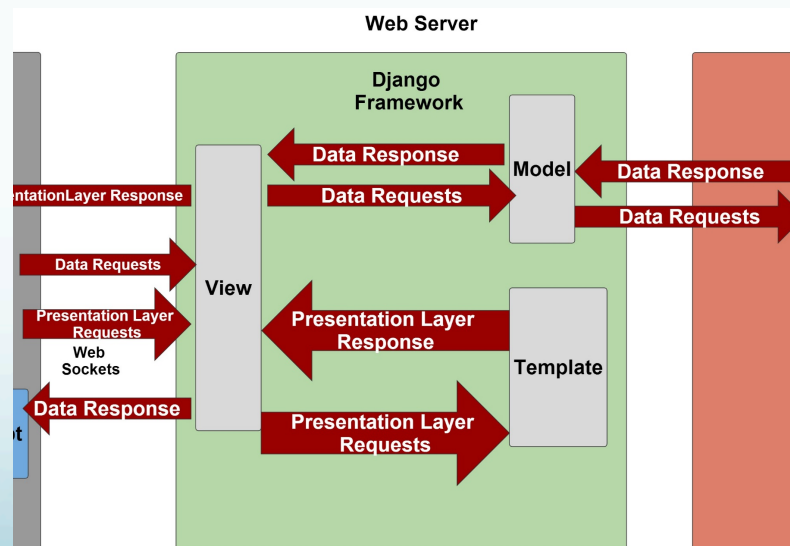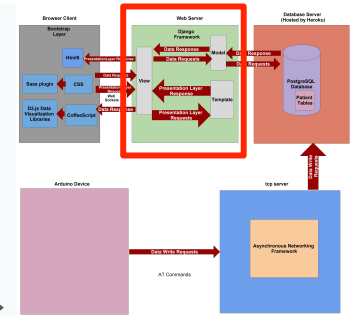 - Data contains no identifiable patient info

Heroku

- Cloud platform as a service (paas)

- PostgreSQL database management system
  - Utilizes partitioned, relational data tables:

patients

PK	Field
PK	patient_id
	time_stamp
	spO2
	heart_rate
	sqi
	ppg

users

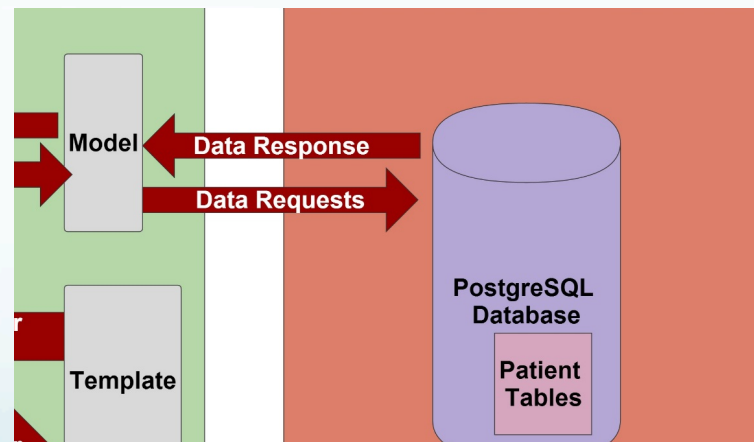| PK	Field
PK	patient_id
	username
	email_address
	first_name
	last_name
	staff_status
	cell_phone
	pager
	provider_status

Django

- Django is a python web framework for rapid development of database-driven applications
  - Open-source
  - Platform agnostic
  - Widely supported
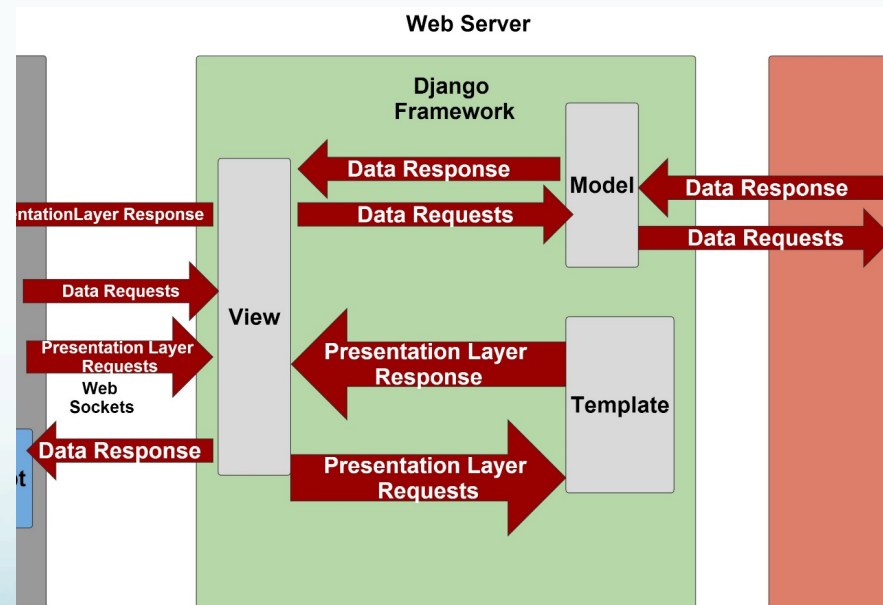 - Highly Modular – MVT architecture

Model – the data access layer

- Access the data from database

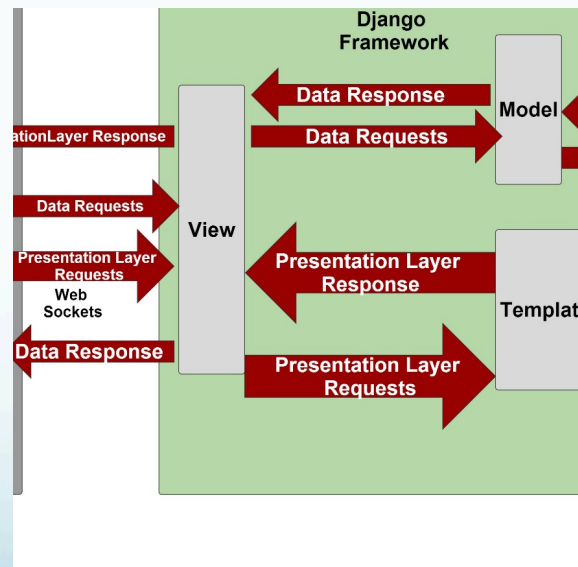- Configuration of data – behaviors and relationships between datasets

Template – the display logic layer

- "Presentation layer"
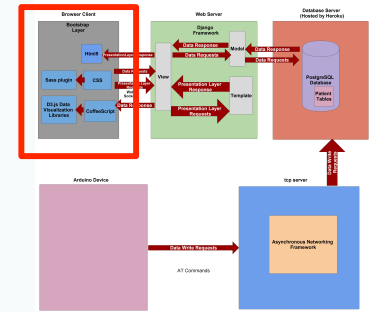
- Syntax similar to HTML
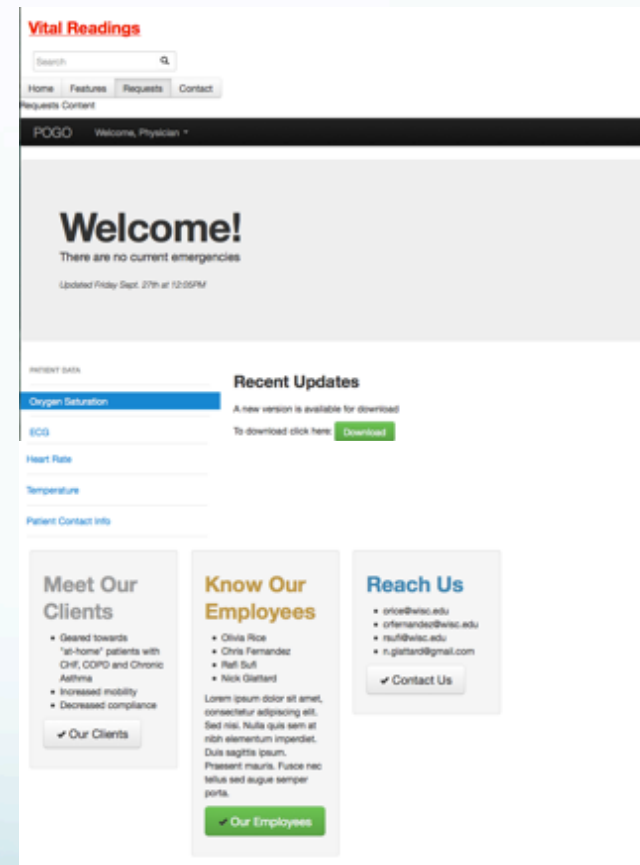
View – the business logic layer

- Logic for getting data in and out of database

- Takes web request and returns a response

Bootstrap

- Implementing interface with Twitter Bootstrap framework
- —Incorporates CSS, HTML5 and JavaScript
- Currently prototyping interface locally:

Future Work

- Gather Physician feedback on user interface
  - Incorporate D3 data visualization libraries
- Validate and test pulse oximetry data
- Configure Django framework with PostgreSQL database
  - Optimize database partitions
- Verify Django script that retrieves data from Xively API

Special Thank You

- Dr. Fred Robertson

- Dr. Amit Nimunkar

- Department of Anesthesiology

- Law & Entrepreneurship Clinic

Questions?