



# Internet of Things – Smart Cities – Household Application

Proactive Disease Avoidance



# Problem



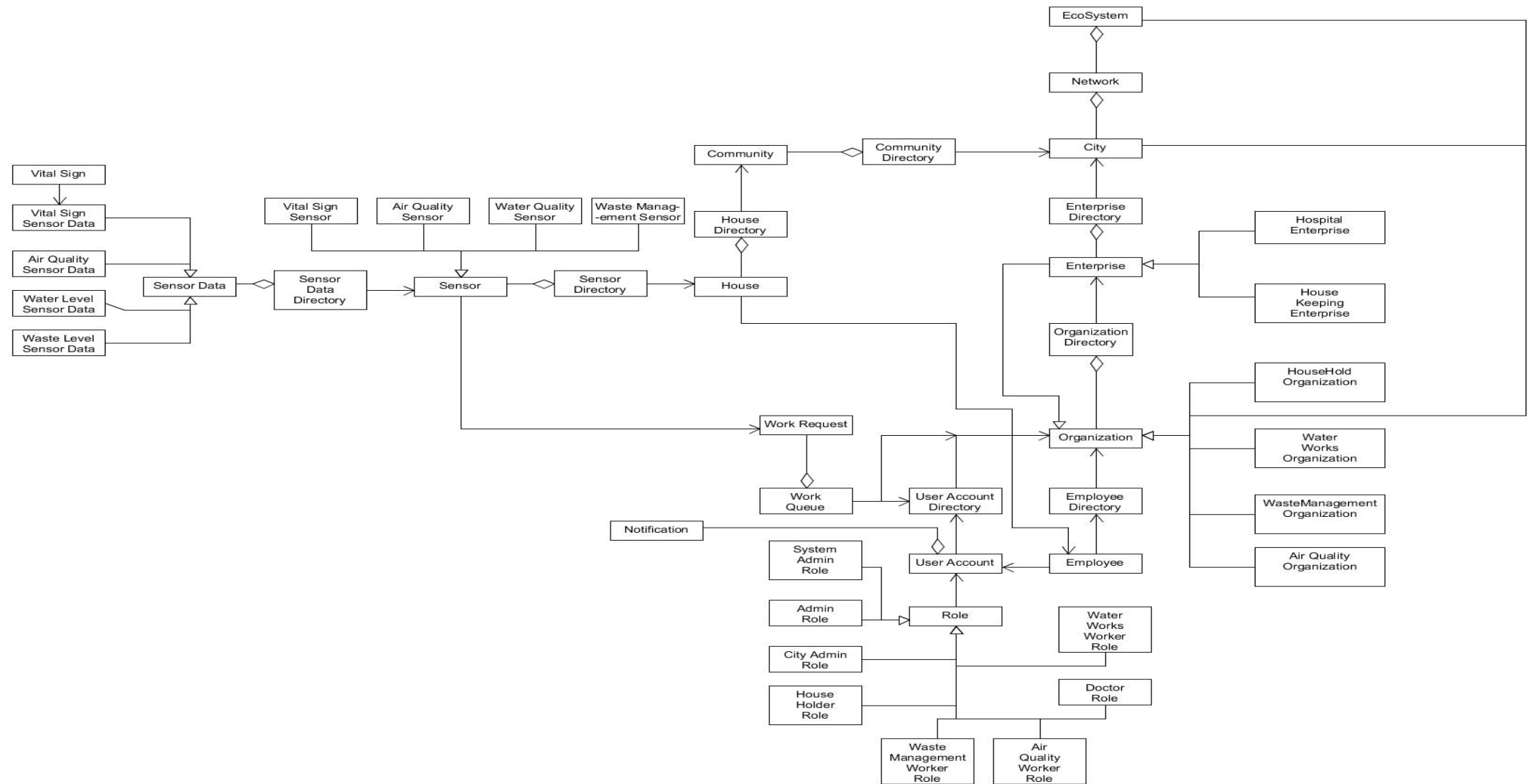
- In a city, people in few communities often fall sick.
- People at home are more prone to diseases if the following things are not properly managed:
  - Water Quality
  - Air Quality
  - Timely Waste Disposal
- Doctors are challenged by the frequency of disease occurrence.



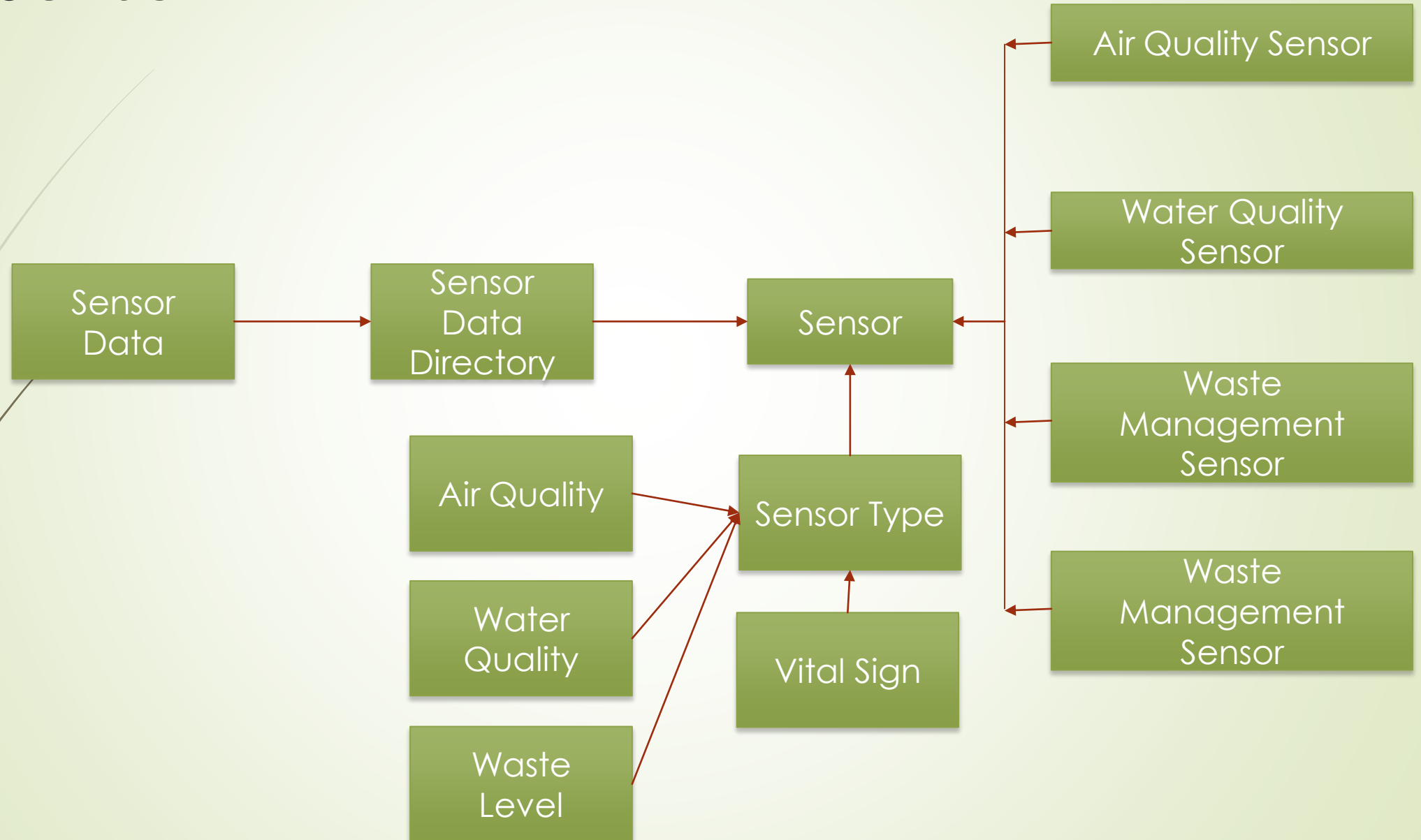
# Proposed Solution

- Design and deliver an application to house holder in integration with Doctors, Waterworks, Air Quality and Waste Management Departments.
- Sensors are deployed in each household, sensors will be integrated with the application.
- The objective of this application is to make people life better and lead the life healthily in at most smarter way.
- Four different types of sensors deliver data to the application.
- Application will warn respective departments, if any sensor measurement hits threshold.
- Also, Application enables house holder to keep the city clean.
- Timely addressing the abnormalities of basic amenities will reduce probability of people becoming sick in a community.

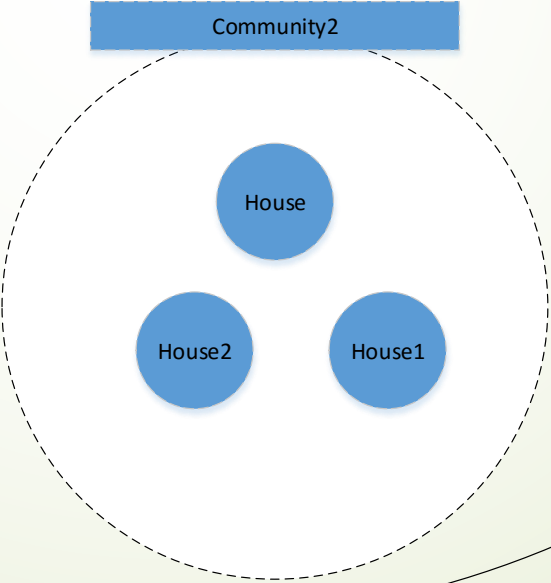
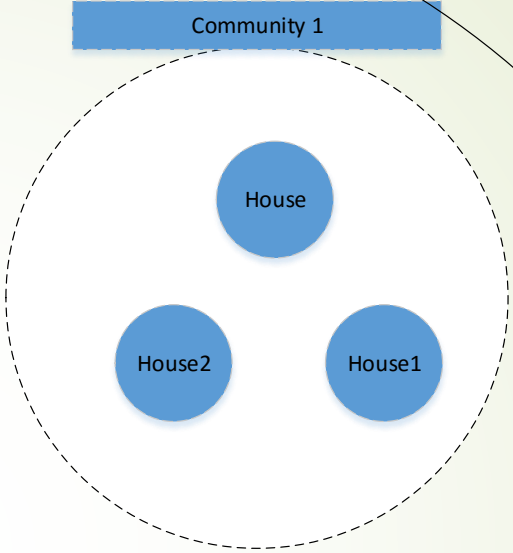
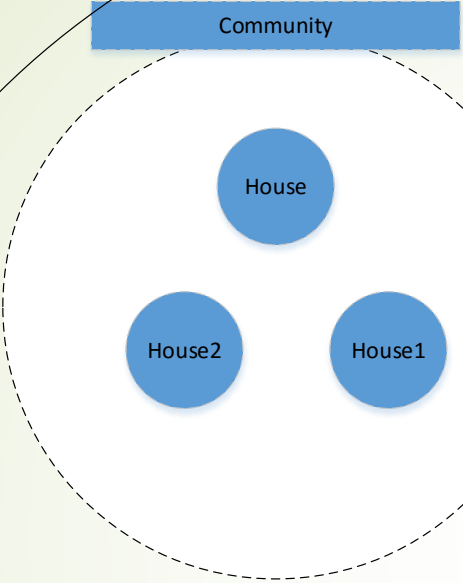
# Object Model of Application



# Sensor



City





# Key Roles

- House Holder Role
- Doctor Role
- City Admin Role
- Water Works Worker Role
- Air Quality Worker Role
- Waste Management Worker Role



# City Admin Role



Create Houses

Create Communities

Add Houses to communities

Map houses to employees

City Dashboard



# House Holder Role

Manage Sensors

Add Water Quality Sensor

Add Waste Level Sensor

Add Vital Sign Sensor

Add Air Quality Sensor

Manage Requests

Raise Request to Waste and Water Works Organization

View Status of work request raised by Sensors to respective organizations

# Doctor Role

Manage Vital Sign Requests

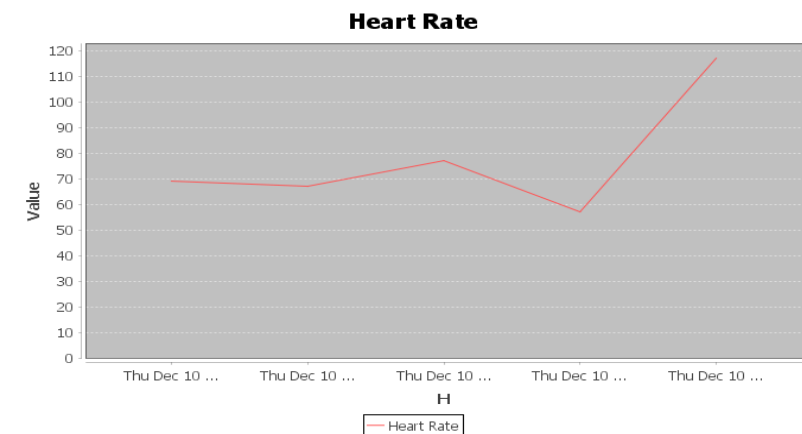
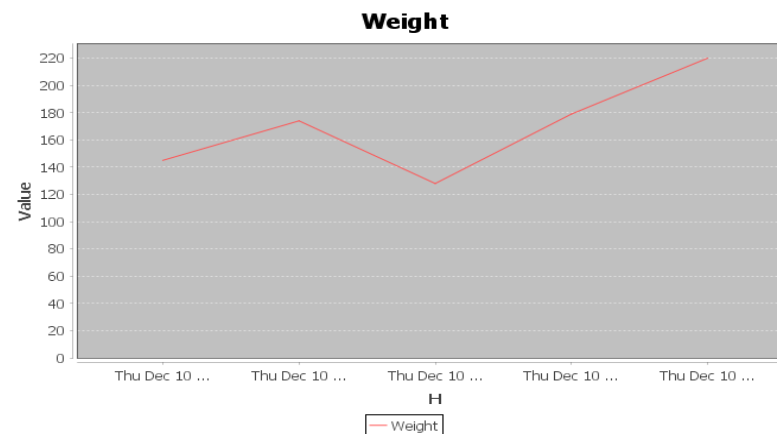
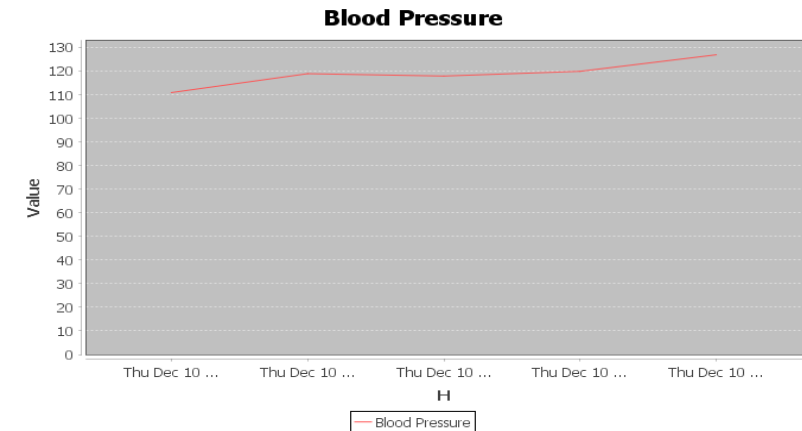
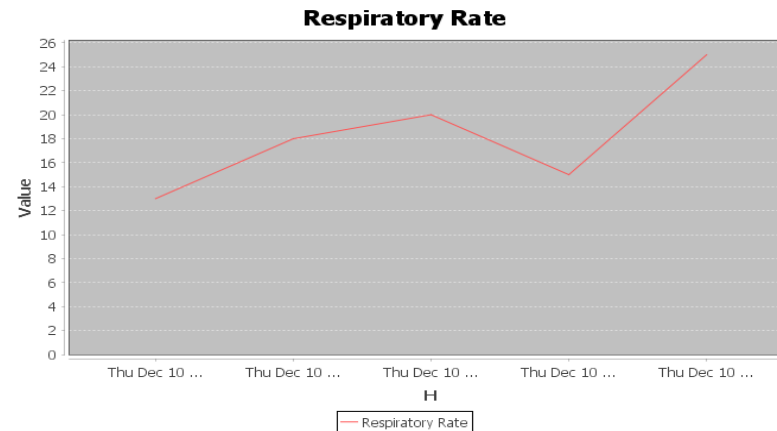
Pull report of Vital Sign History  
for analysis

View House Sensors generated  
data

Give medication to patient  
based on analysis of Vital Signs  
and House Sensor Data

# Features

- Doctor can pictorially analyze householder's or patient's vital sign history as well as he can have look at house sensor's generated data.



# Features

- House Holder can raise request to Waste Management Organization and Water works Organization if he finds any Water Leakage or Waste in city. House Holder must attach the picture of Waste or Water leakage.

***New Request***

Organization:

Image: 


Description:

Longitude:

Latitude:

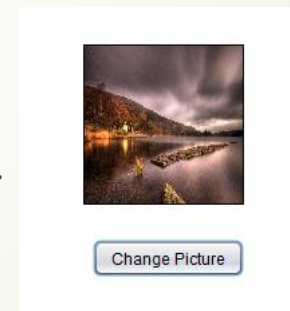
# Extra Features

- Unique User Name
  - Application will show availability of desired username.



A screenshot of a web form for user registration. The form contains four input fields: 'Enterprise:' with a dropdown menu showing 'HOSPITAL', 'Username:' with a text box containing 'BOSTON', 'Password:' with an empty text box, and 'Name:' with an empty text box. To the right of the 'Username:' field, the text 'User Name not Available' is displayed in red. At the bottom of the form, there are two buttons: '<< Back' and 'Submit'.

- Profile Picture for each user login
  - User can change profile picture of his liking.
  - Added a filter to allow only JPEG and PNG formats.






# Cause and Effect Relationship

- House holder will be less prone to diseases.
  - Waste at home if not properly removed on time will have ramifications on person's health. Bacteria will spread and it will totally start effecting the whole community.
- Waste Management organization's employee can manage his accordingly based on the requests received.
  - The house keeping organization will have business advantage such as Waste Management employee don't have to do to go and check all the waste bins in the city.
- No one will be able to identify a room in house has impure air until they suffer with suffocation
  - IOT Application will help identify air quality issues at right time and help avoid issues in right time.
- Drinking water of less quality will cause a lot of health issues to people.
  - As an effect of perfect water quality control system, health issues will be avoided.

# User Screens – Doctor Role



User Name  
DOC  
Password  
\*\*\*  
Login  
Logout

### My Work Area - Doctor Role

Filter: Open Requests ▼


Patient Name	Age	Vital Signs Stat...	Respiratory Rate	Heart Rate	Blood Pressure	Weight	Receiver	Status
H	22	Abnormal	25	60	117	178		Sent
H	22	Abnormal	23	117	90	175		Sent
H	22	Abnormal	37	73	94	17		Sent
H	22	Abnormal	14	135	88	31		Sent
H	22	Abnormal	28	79	86	173		Sent
H	22	Abnormal	40	122	118	195		Sent
H	22	Abnormal	26	92	105	198		Sent
H	22	Abnormal	18	91	83	72		Sent
H	22	Abnormal	26	68	94	34		Sent
H	22	Abnormal	13	126	125	165		Sent
H	22	Abnormal	28	68	75	127		Sent
H	22	Abnormal	17	76	111	141		Sent
H	22	Abnormal	47	81	116	184		Sent

View Patient's House Conditions

Assign to me

View Patient Vital Sign Record


Process Request



Change Picture



# User Screens(cont.) – House Holder Role



User Name

H

Password

\*

Login

Logout

Requests raised by sensors:

Request Date	Resolve Date	Status	Level of Concern	Type	Message
Thu Dec 10 09:00:26 EST ...		Sent	Abnormal	VitalSigns	
Thu Dec 10 09:00:33 EST ...		Sent	Abnormal	VitalSigns	
Thu Dec 10 09:00:33 EST ...		Sent	Abnormal	VitalSigns	
Thu Dec 10 09:00:34 EST ...		Sent	Abnormal	VitalSigns	
Thu Dec 10 09:00:34 EST ...		Sent	Abnormal	VitalSigns	
Thu Dec 10 09:00:34 EST ...		Sent	Abnormal	VitalSigns	
Thu Dec 10 09:01:00 EST ...		Sent	Abnormal	VitalSigns	
Thu Dec 10 09:01:01 EST ...		Sent	Abnormal	VitalSigns	
Thu Dec 10 09:01:01 EST ...		Sent	Abnormal	VitalSigns	
Thu Dec 10 09:01:02 EST ...		Sent	Abnormal	VitalSigns	
Thu Dec 10 09:01:02 EST ...		Sent	Abnormal	VitalSigns	
Thu Dec 10 09:07:35 EST ...		Sent	Poor	Water	
Thu Dec 10 09:07:35 EST ...		Sent	Poor	Water	
Thu Dec 10 09:07:35 EST ...		Sent	Marginal	Water	
Thu Dec 10 09:07:36 EST ...		Sent	Marginal	Water	
Thu Dec 10 09:07:44 EST ...		Sent	Poor	Water	
Thu Dec 10 09:07:45 EST ...		Sent	Poor	Water	

Request raised by you:


Request Date	Resolve Date	Status	Organization	Message
Thu Dec 10 09:08:49 EST 2015	Thu Dec 10 09:35:46 EST 2015	Completed	WasteManagement	DONE
Thu Dec 10 09:08:59 EST 2015		Sent	WasteManagement	
Thu Dec 10 09:31:52 EST 2015		Sent	WasteManagement	

<<Back

Raise New Request



## User Screens(cont.) – Waste Management Worker Role



User Name

WASTE

Password

\*\*\*\*\*

Login

Logout

### ***My Work Area - Waste Management Worker Role***


Filter: All ▼

Request Type	Waste Level	Level of Concern	Status	Receiver	Request Date
Sensor	84	Unhealthy	Sent		Thu Dec 10 09:07:5...
Sensor	98	Hazardos	Sent		Thu Dec 10 09:07:5...
Sensor	88	Unhealthy	Sent		Thu Dec 10 09:08:0...
Sensor	99	Hazardos	Sent		Thu Dec 10 09:08:0...
HouseHolder			Sent		Thu Dec 10 09:08:5...
Sensor	87	Unhealthy	Sent		Thu Dec 10 09:31:0...
HouseHolder			Sent		Thu Dec 10 09:31:5...

Assign to me


View Details

Process Request



Change Picture

## User Screens(cont.) – Sensor Work Area



User Name


Password

### ***Water Quality Sensor Work Area***

WQI	TimeStamp	Levels of Concern
44	Thu Dec 10 09:07:35 E...	Poor
1	Thu Dec 10 09:07:35 E...	Poor
53	Thu Dec 10 09:07:35 E...	Marginal
79	Thu Dec 10 09:07:36 E...	Fair
64	Thu Dec 10 09:07:36 E...	Marginal
94	Thu Dec 10 09:07:36 E...	Good
97	Thu Dec 10 09:07:36 E...	Excellent

Last Generated Water Quality Index:

## User Screens(cont.) – Sensor Work Area



User Name

Password

Login

Logout

### *City DashBoard*

List of Communities and Number of Abnormalities Reported:

Community Name	Type of Sensor	Number of Abnormalities Reported
KJ	Air	4
KJ	Waste	5
KJ	Water	10
KJ	VitalSigns	37
BSB	Air	0
BSB	Waste	0
BSB	Water	0
BSB	VitalSigns	5

Number of Organization Work Requests based on status in an Enterprise:

Enterprise Name:

Organization Name	Type	Completed	Sent	Pending	Processing
Doctor Organization		1	41	0	0

<<Back



# Future Extensions to application

- Integrating the works request with maps. Waste Management worker will be presented with map markers using latitude and longitude data from all active work requests. Maps will also present the shortest possible routes from worker's starting point through all other work request locations.
- If a user's vital sign's are seriously abnormal, emergency alarm goes off and raises alerts for ambulance.