

Project Scenario 4: Water Monitoring & Alert System

Note: This scenario will provide the material needed to create the artifacts as specified on the Project page. Though you will not develop the actual system, it may be a good idea to familiarize yourself with the required technology in order to produce more accurate plans.

Problem Statement

Over the years the Island of American Samoa has seen economic and environmental devastation. Most recently, the island was hit by a Tsunami that destroyed property over a mile inland. A not-for-profit foundation, funded in great part by several NFL players of Samoan descent, has created a grant to implement a general-purpose Water Monitoring and Alert System (WMAS). Their primary goal is to be able to deploy, configure and monitor remote-sensing buoys around the island waters that will operate in conjunction with a diagnostic and alert station. Among other things, this system will facilitate the monitoring of wave patterns, the forecast of dangerous water conditions and the emergency broadcast of alerts to the island inhabitants. Clients will be able to manage and configure the initial central station and monitor the island waters via control software. They will be able to enable and disable buoys onboard computers and their sensors via remote connection. Operators should also be able to retrieve previously stored data from the system and examine and map the information pertaining to any of the buoy's sensors. The systems should also allow for expanding the number of locations and buoys monitored and diagnosing their status remotely. The users will start with your general solution and be able to configure the product to meet their specific needs.

As part of the alert system, your software must be able to also run autonomously and analyze data based on pre-established thresholds. Exceeding these thresholds will trigger the alert system which is run by a third party.

The requirements for this system are given in the list below as desired features for the overall system. The list is neither exhaustive nor definitive. It is up to your team to develop a list of features that best fit the defined scope of your application.

Potential Features

1. Buoy Sensors

- The buoy sensors are typically deployed by retrofitting industrial buoys with corresponding devices. These devices capture water temperature, GPS location, degree of activity (gyroscope) as well as digital images and sound.
- New types of sensors are being developed to be able to capture other types of data and your system must account for enhancements like these in the future.
- The sensors capture data and store it at configurable intervals. They transmit the data based on a programmed schedule by communicating to Sensor Station(s).

2. Sensor stations

- Sensor stations are deployed in the proximity of the beach area being monitored. Powerful antennas and the corresponding hardware are deployed by a third party and hooked to a computer network connected to the central station where your software solution will run.

3. Central Station

- Central station is the focal point for all data storage and data mining. The physical structure is already being expanded from a building previously constructed for the island's weather forecasting and radio broadcasting station. Facilities have been allocated to host your hardware and provide a comfortable environment for the operators. Powerful antennas and the corresponding hardware are deployed by a third party and hooked to a computer network connected to the central station where your software solution may run.
- Power and networking infrastructure is already in place but your system must be able to account for bringing the system online as soon as possible if a power outage occurs and allow for remote access to the system.

4. Administration

- Can add and configure new stations and buoys to the WMAS
- Be able to filter data coming from specific location(s)
- Control access of specific users to specific locations
- Report on critical events. (i.e. sensor stops transmitting; buoy appears not to be moving, etc.)

5. Monitoring

- Given appropriate access, users can monitor the status/mapping of sensor data in your solutions GUI.
- Users can retrieve historical data and create reports and produce weather maps.

Remember, these are suggestions. Feel free to add to or modify these requirements based on the design of your system, research, and your domain analysis. Your instructor may assist you and clarify if need be.