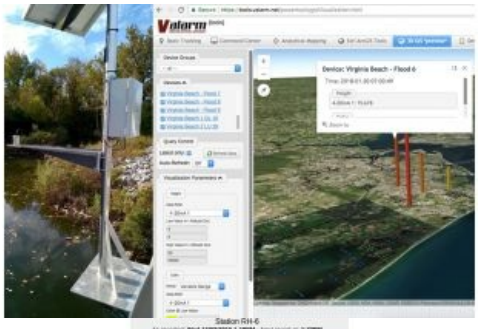
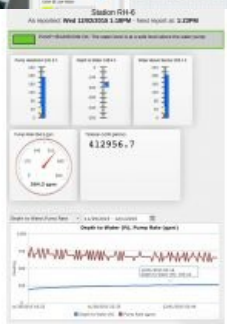
MITIGATION DOUBLES SYSTEMS EFFICIENCY

How Modern Water Monitoring Systems Improve Flooding and Water Risks





Our climate is changing; in many parts of the world water levels are changing. Storms knock out power and cause more floods than ever, whether or not you live on a coastline or near a river. More effective water level monitoring and flood warning systems will mean less insurance claims and a reduced need for relief funding, saving everyone time and money. New technological developments make water monitoring systems cost a fraction (less than 50%) of what they did just a few years ago. Geospatial data is an important pillar.

The ubiquity and proliferation of cost-effective Industrial IoT sensor hardware makes it easier to rapidly deploy affordable remote water monitoring systems. The affordability makes this a more obvious choice than ever for conserving and protecting our environment. Furthermore, sizes of sensors and hardware have been reduced in recent years making it easier to install monitoring systems. Also gaining importance is the notion that field data can be combined with satellite and UAV data for extra situational awareness, ground truthing, modelling, prediction, and geospatial analysis.

Smart Cities

All of these technological developments mean that more and more smart cities and regions can invest in better preparations for flooding. For example, the city of Newport News, Virginia, USA, invested in flood warning systems that monitor water levels in real-time due to storm surges, rising tides and rising water levels. Water monitoring systems use sensors to measure water levels and output alerts and early warnings when needed. Newport News selected devices that use radar pulses to measure water levels. The measurements are sent as 4-20mA signal readings to sensor adapters inside of the flood monitoring systems. Inside these systems are GSM sensor hubs that upload the sensor information via mobile cell networks. The information can be uploaded as often as needed, in this case to http://Tools.Valarm.net. Along with a flood and water monitoring system with additional IoT sensor, Virginia Beach uses ultrasonic depth sensors to measure water levels. These sensors send out noise pulses, and based on the reflected signal, water levels are known in near real-time.

It is critical that cities choose an open, flexible platform, so they are future proof in combining different sensors. Common level sensor technologies include ultrasonic, guided wave radar, and pressure transducers. There are pros and cons to each type, depending on the geography where to measure. For example, pressure transducers are typically less expensive than radar level sensors. However, pressure transducers need to be submerged and touching the water or fluids you're monitoring, while radar and ultrasonic level transmitters are non-contact and deployed above what's been monitored. Radar level sensors can penetrate things that might be on top of a fluid, like foam, which may make radar appropriate for certain scenarios.

Remote Well Management

Many areas in our world have precious water resources, and need to effectively monitor and manage groundwater volume as well as groundwater availability. It's expensive to know what's going on at remote water wells if staff need to collect the data manually. Water monitoring systems for wells have two key sensors that are monitored in real-time. Flow metres typically output a pulse every X number of

gallons, measured by a sensor adapter. Water level sensors are pressure transducers that output 4-20 mA signals, which are translated into depths of water in the wells. Sensor hubs are the central brain units / CPUs that receive data from the sensor adapters and upload sensor measurements at regular time intervals. On a water well web dashboard (say that 10 times fast) you'll see critical information about each of the monitored wells, by clicking on a name, map icon or location.

GIS Analytics

The output information of the sensors is always location-based; each monitoring system includes GPS/GNSS sensors. A GIS will readily accept real-time sensor readings to create geo-statistics, alerts, geo-fences, 2D & 3D maps, geospatial analytics, visualisations, record keeping, management, decision making, communications, collaborations, situational awareness and so on. Data from UAVs can provide an additional spatial data source that is both flexible and powerful. They can be used cost-effectively for additional groundtruthing and investigating specific areas of interest that sensor monitoring systems have suggested may need further research and analysis. Even satellite data is becoming more high resolution and is, certainly in disaster situations, available in a high frequency.

Connectivity and Power

Even in remote areas, affordability of power supplies like solar panels present fewer difficulties in providing electricity to power monitoring systems. At the same time, ubiquitous availability of internet networks make it simpler for water monitoring systems to upload real-time measurements to the cloud. Not each scenario/monitoring system needs the same internet connectivity and electric power source. And power for Industrial IoT sensor monitoring systems will likely be a combination of various options, depending on factors like size, costs, maintenance, weather, availability, staff, and time. Internet connectivity and electric power source are two topics that are interrelated, especially in the case of Power over Ethernet (PoE). PoE means an easy 2-in-1 solution for 'electrical juice' and internet connectivity. While this is a viable option for many Industrial IoT device deployments, like stationary tank level and volume monitoring, sometimes it is more logical to go wireless or use renewable energy sources like solar panel power. With standard solar charge controllers and backup batteries like sealed lead acid, remote monitoring systems will be good to go and stay alive almost indefinitely.

Wireless internet connectivity comes in many flavors – with pros and cons for each option. Sensor measurements can be uploaded to cloud databases and IoT portals via standard Wi-Fi like IEEE 802.11, M2M and fancy IoT machine networks like Ingenu, Sigfox and LoRa. If mobile cell networks like GSM, 3G/4G, LTE etc. are readily available in the target areas, then that can be a quick and easy way to deploy Industrial IoT sensor monitoring systems.

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