IOT BASED DAM MONITORING AND CONTROLLING USING RASPBERRY PI

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ABSTRACT:

In many areas today, decision making is both difficult and complex. Environmental management and food security, for example, require the integration of many different kinds of specialist knowledge (i.e. ecology, clirnate and weather, medicine, agricultural science, economics and sociology), as well as factoring in uncertainty, and balancing competing priorities (e.g. economic vs. environmental values). To cope with such complex problems, decision makers are increasingly turning to probabilistic graphical models (such as Bayesian networks), whose advantages include a mathematically sound treatment of uncertainty (via probability theory) and preferences (via utility theory), an explicit representation and visualization of causa I relationships, and the ability to incorporate new information as it becomes available over time, to reason both predictively and diagnostically. Bayesian networks are now a mature technology, with robust efficient software, being widely used for complex decision making under uncertainty. As BNs are being used to model ever more complex domains, the size of the resultant networks makes visualisation difficult, and harder even for the experts building it to understand, let alone stakeholders. This problem is exacerbated when incorporating explicitly temporal and spatial dynamics within a system. As with all complex modelling, one solution is to divide the problem into sub models, and later 'piece' them together; this was commonly done in an ad hoc way in early BN modelling. The complexity of ecological systems is such that representing even a moderate degree of ecological realism tends to lead to large networks. The resulting visual 'clutter' of large networks makes working on sub models cumbersome and detracts from the value of BNs as a tool for communicating with stakeholders.

This problem of network size is compounded when temporal and spatial dynamics are explicitly integrated. As with all complex modelling, one solution is to break the problem into sub models, and then 'piece' them together. In the early BN modelling this was commonly done, in an ad hoc way. However a variant of BNs, called Object-oriented Bayesian networks (OOBNs) (based on object oriented ideas taken from software engineering) were proposed to support de compositional modelling in a more structured and rigorous way. OOBNs support the management of complexity via abstraction and encapsulation and provide 'classes' to define sub models with internal coherence, that can be combined and re-use, via a formalised interface. Although not yet widely used, OOBN have been applied in water management as weil as broaderenvironmental modelling including recent work combining OOBNs with dynamic BNs to model both temporal and GIS-spatial dynamics. In this paper, we present a novel method for combining OOBNs and DBNs, based on the flow connections between dams within a water catchment.

With the great development of Chinese economy and the population explosions, more and more people have moved to the developed cities in coastal areas, which have caused great pressure to coastal environments. As a unique coastal ecosystem surrounded by the sea, island coastal zones perform important ecological functions and make it critical habitats , and also suffer great pressure from the human exploitations. It is urgent to monitor island coastal changes caused by human activities such as the reclamation, coastline exploitation and island tourism. With the development of remote sensing technology, especially high resolution imaging, it is a complementary to ground survey for coast zone monitoring and other marine applications. In this paper, we carry out a dynamic monitoring for one island sand dam based on time-series Landsat images analysis, and trend of the changing dam was detected.

LITERATURE REVIEW

SAND DAM DYNAMIC MONITORING IN COASTAL AREAS BASED ON TIME-SERIES REMOTE SENSING IMAGES

As the development of marine economy and population explosion, coastal areas is suffering great pressure - because of the immigration from inland to the developed cities along east China. Island coastal zones, which is a specific ecosystem surrounded by the sea, is more sensitive to human activities, e.g. reclamations. It is essential to monitor the dynamic changes of the island coastal areas to retrieve the siltation pattern of the surrounding open-sea and their impacts to island coastlines using remote sensing technique. In this paper,a time-series monitoring using Landsat images is performed to monitor the changes of a sand dam in the island coast zone, aiming at analyzing the effects of human exploitation. The results show great potential of using remote sensing images for coast zone dynamic monitoring.

Heshan Lin, JinyanXu

Dynamic OOBNs Applied to Water Management in Dams

Bayesian networks (BNs) are a mature technology now widely used for modelling complex domains requiring decision making under certainty, such as environmental modelling. Object-oriented BNs (OOBNs) have been proposed to help manage the modelling complexity through structured decomposition, abstraction and encapsulation. OOBNs have been applied previously to water catchment management, but without explicit spatial modelling. In this paper, we present a novel schema that captures the spatial relationships between connected dams, as weil as the temporal dynamics of the catchment over successive seasons. This is validated on an abstracted 5 dam example, with results presented for two representative cases.

M. Julia Flores

A study on river water level monitoring method in a debris barrier

In this paper, the river water level monitoring method in a debris barrier is presented. There are four steps in this proposed solution: Frame difference, Thresholding& Noise refinement, Candidate point detection, and Classification. The proposed method is able to calculate water flow occupancy value and monitor the change in water flow in a dam. This technique is very efficient to give warning in case of there is any abrupt change in water flow in the river.

Hyo Sub Choi

3. PROPOSED WORK

3.1 BLOCK DIAGRAM:

DAM AREA:

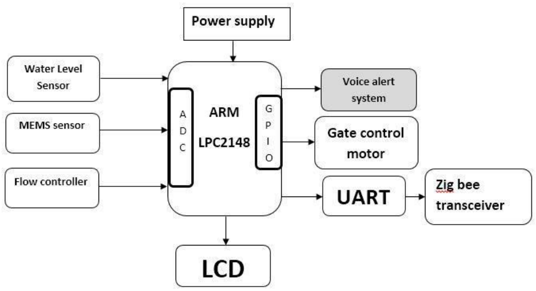

Figure 3.1 Dam area block diagram.

MONITORING AREA:

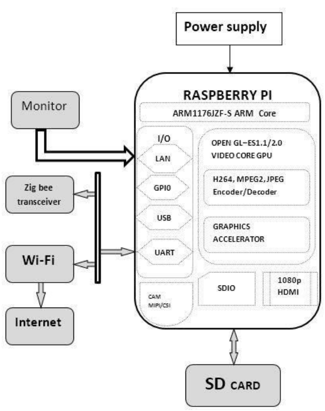

Figure 3.2 Monitoring area block diagram.

MONITORING AND CONTROLLING UNIT:

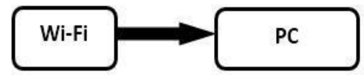

Figure 3.3 Monitoring and controlling unit block diagram.

5. CONCLUSION

The purpose of the instrumentation program and underlying geotechnical and structural problems that create the need for instrumentation must be clearly defined. The instrumentation program must be so comprehensive and carefully planned to include measurements of all the quantities which are essential in the problem to be studied. The data collected must be reduced to a convenient form and the results must be available to the concerning authorities without unnecessary delay. There should be close co-operation between the designers, instrumentation specialist, expert analysis and site authorities to achive the goal of instrumentation. We can obtain real significance of various parameters used in a design and thereby modify procedure and criteria leading to increase the economy and safety. We can obtain constant watch over the performance of the structure and timely warnings we can save life of many peoples, farms and various structures in city.

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