

Database System Development for Wireless Sensor Network

1. Background

Every old building is unique, consisting of construction and building material where a modern building-technician may not fully have knowledge about. The requirement of maintaining with old buildings and monuments is great. It requires a lot of knowledge from the building administrator. However, the knowledge on the field is often too poor for a person to take care of the buildings in a correct way. This leads to the fact that the risk on damaging the building increases. A wireless data-collecting system can be used to collect varies data from different sensors with minimum operation on the building, avoiding damage of historical values. The collected data can be used for monitoring and controlling functions in the building such as heating and ventilation. Furthermore, the collected data can be used for developing knowledge about the environment behaviour of the specific building. With such knowledge, a smart control-system can be built for the specific building based on the building properties and functions, e.g., controlling the interplay between the heating and the ventilation in a building with high humidity to avoid the moulds. The goal with a wireless sensor network is to bring an optimal solution for each individual building. The network can also be included with functions like smoke alarms and alarm systems against intruders. The sensor data is stored locally at each building of interest and the data should also be uploaded to a central control/monitor server for an overview of all wireless sensor network existing.

2. Objectives

An infrastructure for data storage and access is needed for the project wireless sensor network for culture buildings. The work can be divided into two parts. The first part will be focusing at creating a database structure for storage of data collected from the wireless sensor network and creating a generic interface for accessing the database. The second part will be focusing at creating an interface for displaying the data for different users. For the system, one local server will be needed at each building for storage of the local sensed data. The local server will thereafter remotely connect to a main server for uploading of data and synchronize the information. The main server is connected to the Internet for easy access by local servers and the users who are interested at the information. Login functions to the system will be required for limiting the access of the information and authority. The local users at each building should be able to access the local server at each building without an Internet connection. More details about the system will be given when the thesis workers start their work.

3. Tasks

Since this is one system divided into two parts, two thesis workers will be need for the projects. The thesis workers must be able to work and discuss with each other together with the supervisors. A basic work tasks are listed below. A more detailed task list and system specification will be given for agreement of what are needed to be done when the thesis workers starts.

Part One

- Define the generic interface between network coordinator and local database for data manipulation. (including the interface specification with parameter)
- Database schema design for both the main and local database.

- Design the application framework for the user interface program, including the display pattern design.
- Automatic synchronic the local databases with the main server.
- Simple software should be developed for easy access of the database without requiring Internet connection.

Part Two

- Develop an user Interface (with the format of homepage) for the project wireless sensor network for culture buildings.
- Implementation of the login mechanism with different authority.
- Implementation of the various data-displaying formats based on the data in the main server database.
- The application should gather extra specific data and store them into the database.

4. Basic education required

- C/C++ programing.
- Object oriented design experience and UML knowledge will be a strong plus.
- Basic homepage development knowledge, i.e, Java Script, Flash and HTML Language.
- Basic database knowledge.

5. Criteria of success

The thesis workers will need to work closely together although specific tasks are defined for each of them. Good communication between them is needed to get the whole system working.

Part One

- Database structure for the main and local server is created.
- A set of generic interface for accessing the databases.
- Automatic and manual data synchronization between the main and local database.
- Documentation of the databases.
- Presentation of the homepage for members who are involved in the wireless sensor network for culture buildings project.
- Written report in English.

Part Two

- A homepage with login function working with different level of authorities.
- Data displaying in different formats.
- Extract data from other homepage and store the information in a database.
- Documentation of the homepage.
- Presentation of the homepage for members who are involved in the wireless sensor network for culture buildings project.
- Written report in English.

6. Financing

ITN provides the software essential for the development of the homepage and a PC for the project. No personal compensation.

7. Supervisors

Allan Huynh and Jingcheng Zhang.

8. Examiner

Qin-Zhong Ye

9. Period

A six month project.

10. Others

The project will be in English.