

Android App for Wireless Sensor Networks

Revathi Gujjarlapudi¹, Mohan Siddhartha.R², Kalyan Mohan Goli³

¹²³ Dept of ECM, KLCE, A.P, INDIA

Email: gujjarlapudi.revathi@gmail.com¹ sidduravuri@gmail.com² kmgoli@gmail.com³

Abstract: Wireless sensor networks which are employed in varied applications like Tsunami detection, seismic or temperature detection report to the base station. There is a requirement of human at the base station to observe these values time to time. To avoid this norm and facilitate the user with a convenience of observing the values in his Android phone an App is developed, which can be accessed from any part of the world provided the mobile and base station which is a computer are connected in a Network.

General Terms: Mobile Application; Net beans; simulation; issues

Keywords: Wireless Sensor Networks; Android; Apache Derby; Plug in; SDK; ADT

1. Introduction

Individual sensors which are deployed in applications where they communicate with base station of the network are growing. Temperature detection is one such scenario which we have considered to develop the mobile application. In a very cold and remote area let us assume that wireless sensors are employed for temperature detection and whenever this temperature crosses the human livable value, the person at the base station who will be observing these values will send alerts indicating that people can occupy the area to live. There is a requirement of human at the base station which can be avoided if the person can see these temperature values detected by the sensor in his own mobile. Of all the available mobile operating systems developing an Android application is more general and hard ware independent [1]

Developing android application is discoursed though out this paper. In the following section related work done in this field is covered. Section 3 describes about the software's required to develop an Android app. Methodology and implementation details are covered in section 4 and 5 respectively.

2. Related work

Out of the research we have done we presume that no application of this type is implemented. However there is a proposed architecture for developing a Mobile application [2] which we have considered in our application development.

3. Software Requirement

To develop an Android application for mobiles, we first check it on an emulator. For this purpose there is a requirement of Eclipse IDE, any of the available three alternatives indigos, Helios or galileos will suffice. Eclipse classic is the preferred version however. [3]. ADT plug-in and android SDK are the major requisites.

Each of these can be downloaded and installed without any difficulty. Because we cannot directly take input temperature values from wireless sensors, as they result in several other issues like scalability, dynamics, energy and reliability challenges [4] we are going for simulation. For simulating the scenario of temperature detection conducted by sensors we are going for an application which uses a built in random function to generate random values which can be treated as temperatures detected by the sensors, for this simulation we require Net beans IDE and Apache Derby (Java DB) database for storing the temperature values.

4. Implementation

Once if all the ground work is done developing an application requires potential in Java, as simulation of sensors scenario is done in Java and Mobile application in native android platform requires java understandability.

4.1. Simulating Wireless Sensor Temperature Reporting Scenario

In different applications like Tsunami/ seismic/ temperature detection the same scenario can be applied for simulating the environment of sensors. A page with options to select a sensor from all the deployed sensors that are working on site is developed. Whenever user chooses a sensor a random function which is inbuilt is called which gives a value. Whenever user chooses to add this value, it is saved in the database which is java DB which is automatically installed when you install Net beans IDE. Figure 1 shows the application with a drop down box to choose the sensor and this value which is randomly generated can be added to the database as soon as user clicks on ADD.

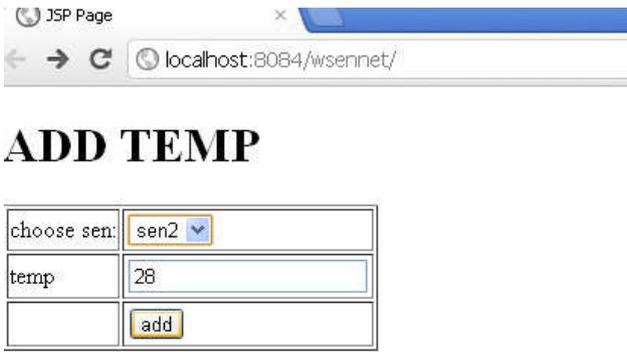


Figure1. Page Developed in Net beans for Simulating the Temperature reporting scenario at the Base station

4.2. Mobile Application Development in Android

We have planned on the whole 3 screens for this application. One of which is the starting screen which is a login form. All the users doesn't need access to this application as this is an exclusive app for WSN and even the sensor reported values to the base station should be secure and not revealed to everyone. Hence a login form has its role to play. Figure2 below shows the login screen on an Android emulator.



Figure 2 Login screen which is displayed on opening the app

Second screen is a subscription form to which the user is navigated, whenever he clicks on subscribe. This second screen allows the user to enter his own User ID and password for identification purpose in addition

Mobile number column is also specified for future enhancements of this application.

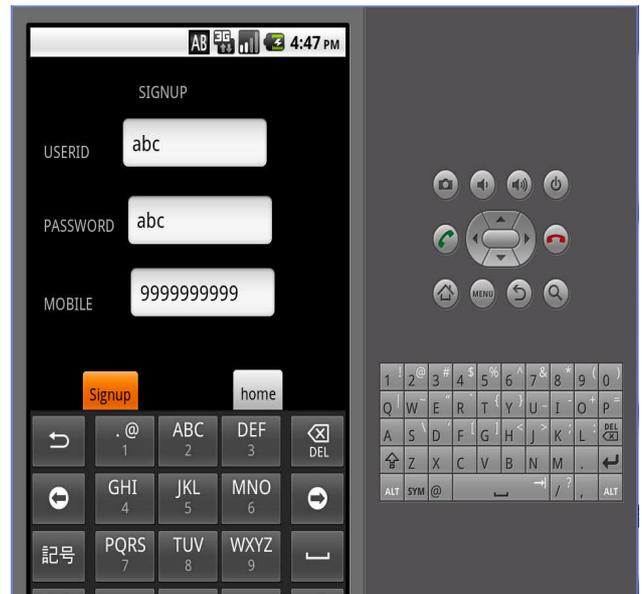


Figure 3 Screen which allows user to subscribe by entering unique user Id and password

Most important screen in the whole scenario is this third screen which has four buttons, three buttons for three sensors and the other one for Logout option. In the figure below you can see that the sensor 2 to which temperature 28 is generated in the base station(i.e., Simulated Application) is displayed in the mobile App.



Figure4. Screen that displays temperature values.

This Android App is installed into any Android mobile phone by copying the APK file of this program into the Mobile SD card. The same screens can be viewed on the mobile provided both System which is acting as base station and Mobile phone are connected in a network and

the base station can be uniquely identified by the IP address. In this case we have to provide IP address of the Base station in the Android Application. Thus we can completely eliminate the requirement of human at the base station by implementing a Mobile app like this. Below are different screen shots of Application taken after installing the Android App into the mobile. Figure 5 shows the Menu Icon for Wsen app. Followed by figure 6 and 7 each of which shows the screens sign up and subscribe respectively.

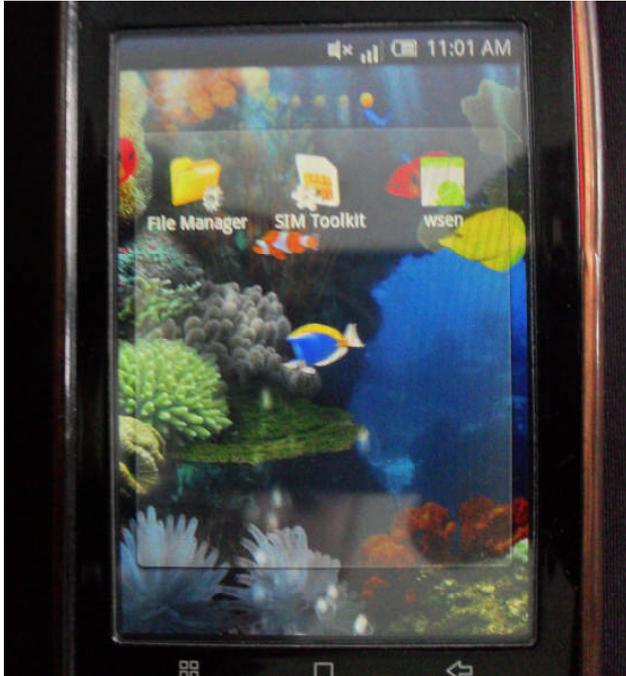


Figure 5. Wsen App installed in Sony Walkman Series phone with Android Operating System.

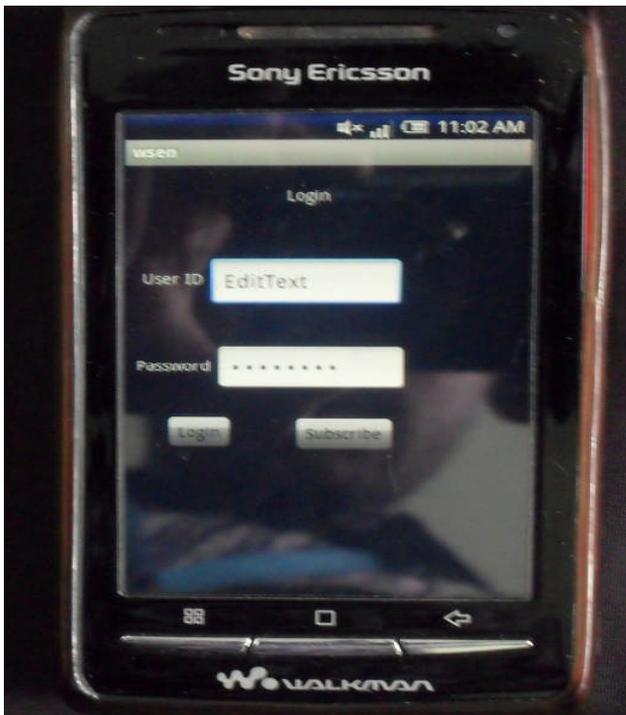


Figure 6. Login screen after installing the app into the mobile(Sony Ericsson with Android Operating system)

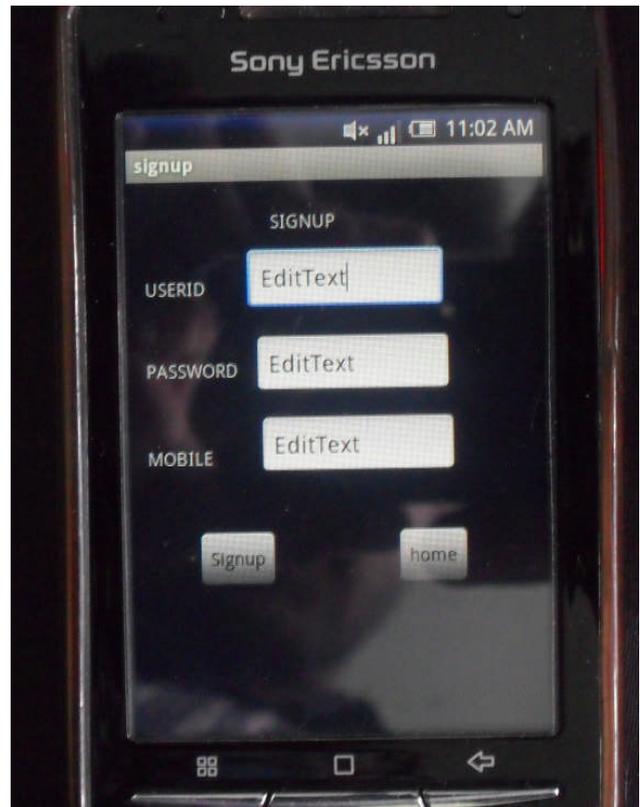


Figure 7. Subscription screen in the App after installing into Mobile.

5. Conclusion

Lot of Applications can be attributed to WSN these days. We developed an Android App which makes these applications more efficient and eliminates human presence. When implemented in real time this approach may be surrounded by some issues like Scalability, Dynamics, Energy and Reliability. In near future Mobile applications to monitor WSN can be developed for any type of operating system [6-10].

6. Acknowledgement

We thank our H.O.D Dr. Balaji and Principal K. Rajasekhar Rao for giving us the eminent facilities to perform our research. We are obliged to whole Electronics and Computers department, KLCE for their timely help and support.

References

- [1] Allan Hammershøj, Antonio Sapuppo, Reza Tadayoni, "Challenges for Mobile Application Development" Intelligence in Next Generation Networks (ICIN), 2010 14th International Conference 11-14 Oct. 2010, 1 – 8
- [2] Nuno Moreira, Marco Venda, Catarina Silva, Luis Marcelino, António Pereira, "Mobile Application to Monitor a WSN" Information Systems and Technologies (CISTI), 2011 6th Iberian Conference
- [3] Allan Hammershøj, Antonio Sapuppo, Reza Tadayoni, "Challenges for Mobile Application Development" Intelligence in Next Generation Networks (ICIN), 2010 14th International Conference 11-14 Oct. 2010, 1 – 8
- [4] Installing the SDK|Android developers:preparing the developing Computer <http://developer.android.com/sdk/installing.html>
- [5] Hairong Qi, Member, IEEE, Yingyue Xu, and Xiaoling Wang, Student Member, IEEE, "Mobile-agent-based Collaborative Signal and

- Information Processing in Sensor Networks, roceedings of the IEEE
Aug. 2003 91(8) 1172 – 1183
- [6] Yudong Zhang, Lenan Wu, “Artificial Bee Colony for Two Dimensional Protein Folding”, Advances in Electrical Engineering Systems, 2012, 1(1), 19-23
- [7] Junjun Chen, Lianghai Lei, “Empirical Study on the Optimal Scale of China's Foreign Exchange Reserves”, Advances in Applied Economics and Finance, 2012, 1(1), 71-74
- [8] Yudong zhang, Lenan Wu, “Rigid Image Registration by PSOSQP Algorithm”, Advances in Digital Multimedia, 2012, 1(1): 4-8
- [9] Yulong Chen, Xing-ye Li, “Forecasting abrupt changes in the Chinese stock market via wavelet decomposition”, Advances in Applied Economics and Finance, 2012, 1(1), 61-65
- [10] Rahim Asadian, “Methods of financial supply in companies”, Advances in Applied Economics and Finance, 2012,1(1): 61-65