Project Proposal

Fajran Iman Rusadi - 5781574
ZhengZhangzheng - 5901995

1 Background

Most state of the art sensor networks existing now are designed for a single application. However, it is expected that many users will need to make different use of the sensor infrastructure. For instance, a user could be interested in temperature data on specific intervals, while another user might want to correlate audio streams coming from microphone arrays. As a consequence, a sensor network should support multiple applications. An issue that complicates the matter is, the type of applications that will run on a sensor network of such scale and time cannot be known beforehand. In our project, we present our solutions to run different applications on the same sensor network without one application interfering with other applications, and the new application can be propagated to all the nodes in the sensor network easily by means of radio communication.

2 Implementation Idea

2.1 Software Architecture

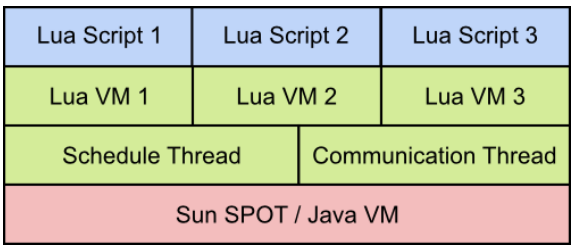

Figure 1: Component Stack

The Figure 1 above reflects the software architecture of our implementation. In our implementation, the sensor network will run a virtual machine to run applications that contains the detailed application logic to fulfill a certain task in the sensor network.

We will use Lua virtual machine and therefore the application is written in Lua scripting language. Every time a new Lua script is run, a new Lua virtual machine is created and the script will be run on top of it. A scheduler will be written to schedule execution of applications that are being run to guarantee the isolation from application to application. This scheduler will be run on its own thread, "Schedule Thread".

To make the applications, that are run on the virtual machine, can access libraries on the sensor network, some functions in the libraries will be exported to the virtual machine. In this way, the applications can make functionalities that are offered by the sensor network.

To ensure the applications can be scheduled and run in our way, a so called application framework, or "how the application should be written", will be used by the applications. All applications that want to be run in this sensor network have to follow the rules.

Beside scheduling the Lua applications, the main program in the sensor network will also acts as an application manager and communication handler. It receives new applications from the network, runs them in the virtual machine, stops the execution, and also deletes the application. It will also handle the communication with other sensor networks including the routing function. This part of the program will be run on a different thread, "Communication Thread".

2.2 Data Propagation

We assume there is a base station in the collection of sensor networks that will acts as the main node. This is the node that will initially send new applications to the network to be installed and run on every nodes of sensor networks. This is also the node that will be the final destination of all result data sent by the other sensor networks.

To propagate a data to all sensor network, each node will have a forwarding and routing function. These functions are implemented to make sure a data packet that is sent from the base station can reach all other nodes and all packets that contain data result from all nodes can be sent back to the base station.