

Smart Sensor Network

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IEEE Standard P21451-1

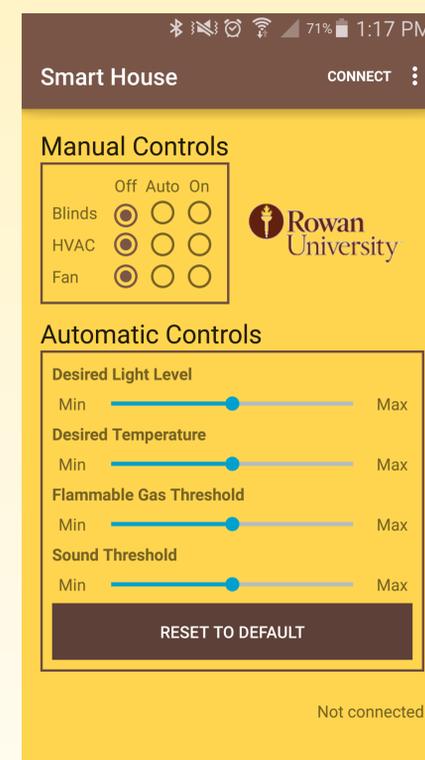
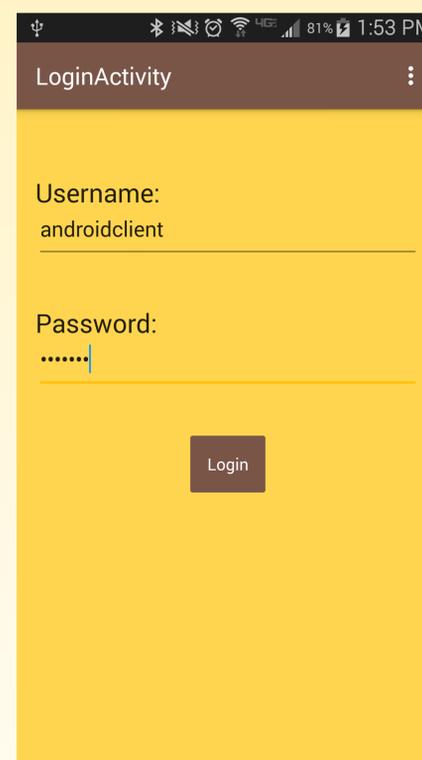
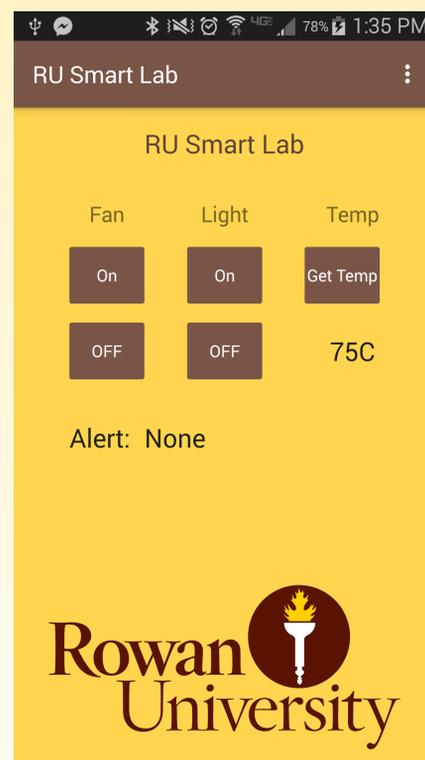
Abstract

The purpose of this project was to develop a smart sensor network model for a proposed update to IEEE standard P21451-1. The basis of the standard implies the communication between clients, servers, and transducer interface modules (TIMs). The variant of the standard implemented was P21451-1.0, which indicates serial communication between the nodes. Raspberry Pi's were used to emulate the server and TIMs using the Raspian operating system and the internal Idle python compiler. An android application written in Java to be used as the client side of the smart sensor network model and communicated between the client and server with XMPP commands to request transducer information or control

Android GUI

XMPP Server

The Android XMPPconnection library, Smack, was used throughout the application to connect to the server and send and receive messages. The library allows you to specify the XMPP server, the port we are communicating on, and gives presence of who else is connected to the server



Bluetooth Server

The Bluetooth server is a BlueSMiRF Silver. It is programmed with a name and password and can be paired with any Bluetooth compatible device. Once paired, the user must initialize a connection from the menu screen. This is done using Androids Bluetooth library. The Bluetooth server connects to the TIM via a Serial UART connection

XMPP Control

The Android GUI allows the user to issue commands via XMPP to the NCAP server. The commands, which are in the standardized message structure, are sent to the XMPP server. The NCAP server is listening to the message log on the XMPP server and parses each command, and sends the proper

Login

The Login screen authenticates the login information, checks that the android device is connected to the internet, checks that the XMPP server is online, and then establishes a connection to the XMPP server. It issues an error if any of those checks fail.

Bluetooth Control

After a Bluetooth connection is established, the buttons and sliders directly communicate to the server to send P21451-1 messages. The messages themselves use the standardized message structure which is decoded by the Bluetooth server, parsed, and issued to the TIM.

