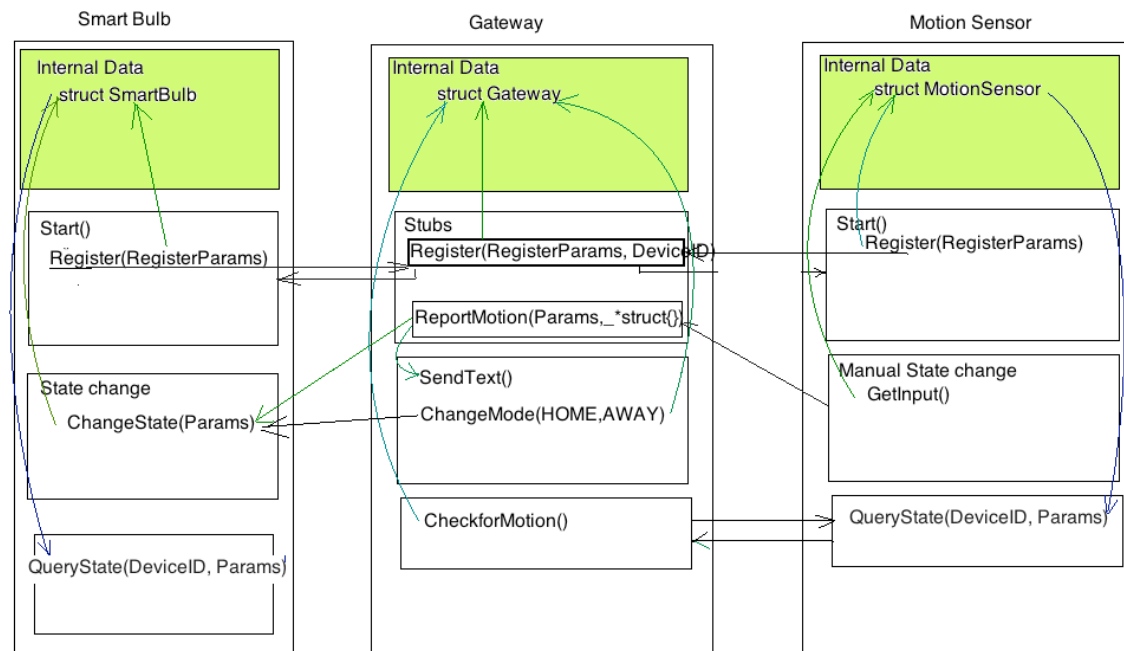
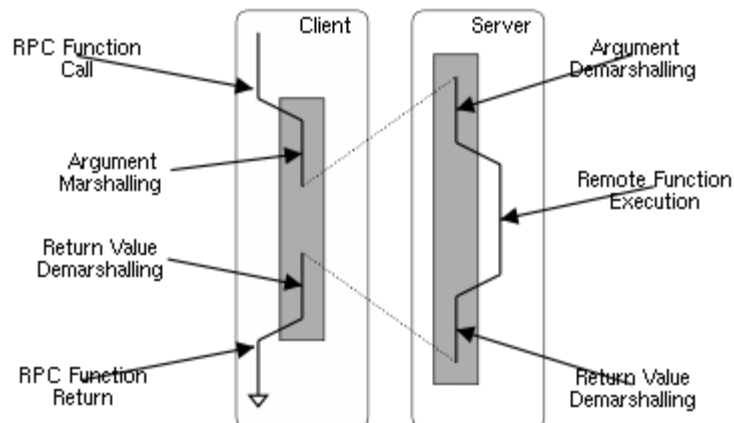
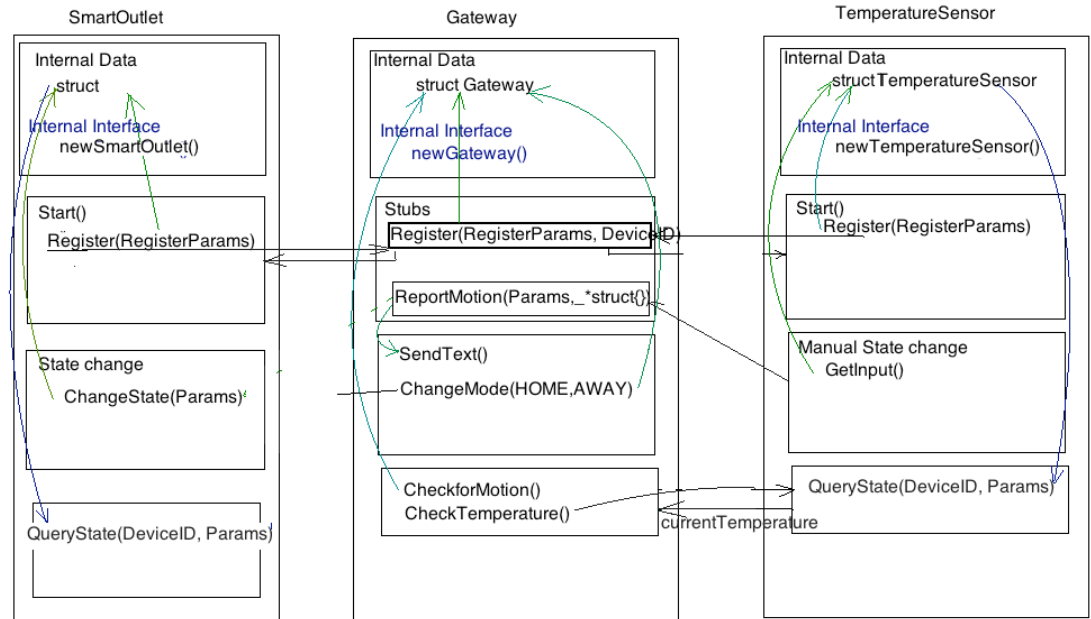


- Objective** To design and develop a ready to deploy system comprising of smart devices and sensors controlled by gateway. The design has 2 sensors, 2 devices and 1 gateway
- Design Goals**
- Implement a push based motion sensor device that sends the state to gateway, which further controls the state of the Bulb.
 - Control the state of a smart outlet based on the temperature sensed by the temperature sensor, which is a pull based device.
 - Detect any motion in the house if the status of the house is AWAY and send a notification to the owner
 - Simulate temperature changes and human motion changes

System Decomposition





Design Decisions:

The entire system has 6 main parts: Gateway, Motion Sensor, Temperature Sensor, Bulb, Smart Outlet, User

- Each block of the system has its own internal structure, which keeps track of its own IP, port where it listens for incoming requests, the port and IP of gateway to issue the RPC calls.
- All the RPC calls are using TCP. TCP was chosen over HTTP for 2 main reasons. Firstly, speed and secondly, since there is no access over web pages, we preferred tcp over http.
- Apart from control from gateway and toggling of states based on the requirement given in the problem statement, simulation of environmental conditions to demonstrate changes in temperature and motion changes to indicate presence and absence of humans is also taken care of.
- The api.go file describes all the api's used across the system.
- The synchronization aspect is taken care by use of Locks and RWMutex.
- When manually temperature is incremented or decremented the change is fixed step of 1 degree Celsius.

Gateway:

- Gateway is the central decision making entity.
- As soon as each device/sensor joins the system, it registers with the gateway and is assigned a unique DeviceID.
- The Gateway has stubs for push based motion sensor. The Motion sensor calls these stubs every time a change in motion is observed.
- For pull based devices such as temperature sensor the gateway issues rpc to the temperature sensor to check the temperature and based on the values returned by QueryState(), it changes the state of the corresponding devices. All the system intelligence is in the Gateway.

- When a motion sensor detects no motion in the room a timer is started in the gateway that tracks the time elapsed since the last absence of motion state. If it crosses 5 mins then the bulb state is set to Off.
- Along with this the user can set the state of the home to AWAY or HOME and each event triggers a specific set of actions as mentioned in the problem

Temperature Sensor and Motion Sensor are both stateful. They store the current temperature and the state of motion respectively. They register RPC stubs for querying the state and to simulate user input and environmental changes in temperature.

The Bulb and Smart Outlet devices are controlled manually as well as by gateway.