

# Light Detection System

## System Description

## Contents

<b>1 Overview</b>	<b>3</b>
1.1 How This SoS Is Meant to Be Used	4
1.2 SoS functionalities and properties	5
1.3 Important Delimitations	5
<b>2 Services</b>	<b>6</b>
2.1 Produced service	6
2.2 Consumed services	6

## 1 Overview

This document describes the Smart Home Light Detection System of Systems (SoS), which provides intelligent detection of the need for lighting in a home equipped with battery-powered, homogeneous IoT devices.

This SoS is constituted of the following microsystems :

- *Sensor System* : One per room, detect motion and light level
- *Light Controller System* : Turns lights on and off based on sensor data
- *Manual Switch System* : Allows the user to override the light control
- *Arrowhead Core Systems* : Service Registry, Service Orchestration, Authentication, Consumption Authorization

All systems are deployed within the same local cloud.

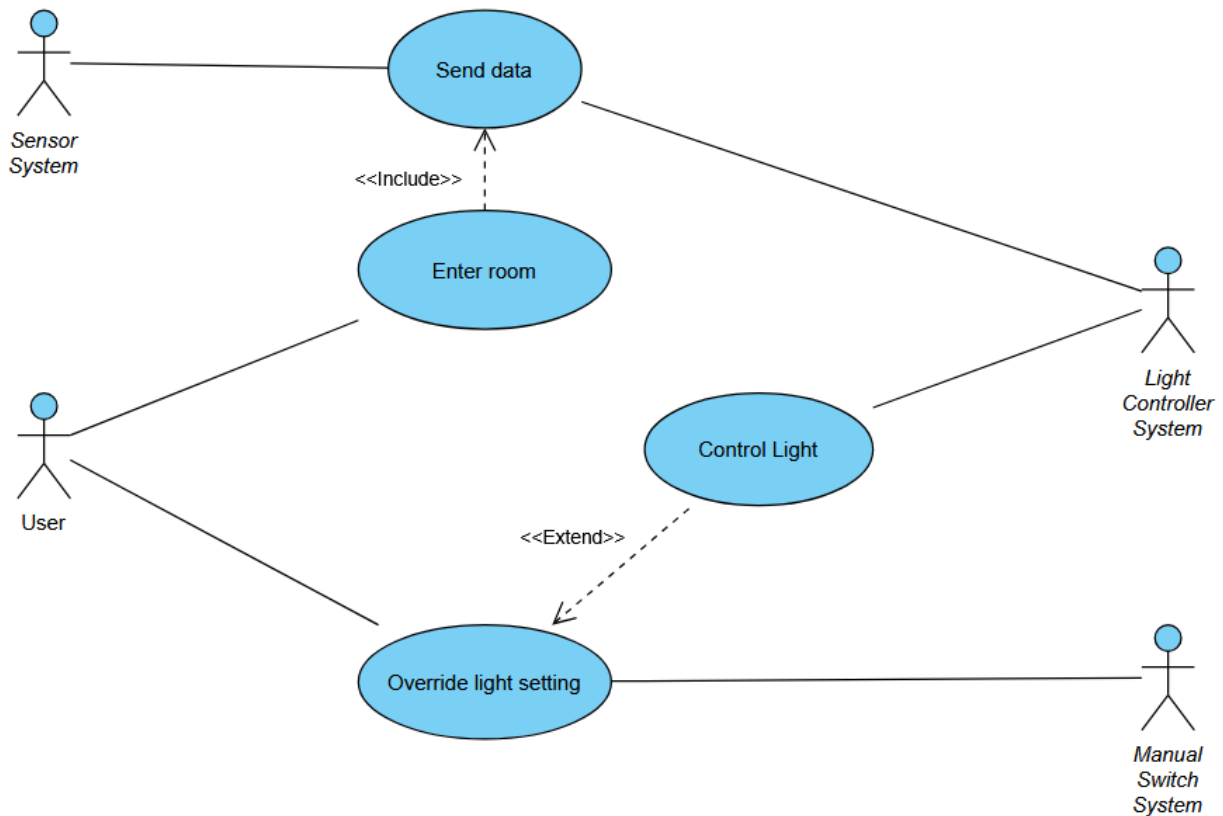


Figure 1 - Use Case Diagram of the Light Detection System

The rest of this document is organized as follows. In Section 1.1, we reference major prior art capabilities of the SoS. In Section 1.2, we the intended usage of the SoS. In Section 1.3, we describe fundamental properties provided by the SoS. In Section 1.4, we describe de-limitations of capabilities ofn the SoS. In Section 2, we describe the microsystem (abstract level with references to their SysDs) which constitutes the SoS. In Section 3, we describe the security capabilities of the SoS.

## 1.1 How This SoS Is Meant to Be Used

This SoS is designed to automate light control, based on the presence of someone in the room and the ambient light levels.

### Usage Scenario :

- Someone enters a room
- The room *Sensor System* detects motion
- The data is sent to the *Light Controller System*
- The *Light Controller System* turns light on or off based on the data
- If the user uses the *Manual Switch System*, the decision is overridden (turns the light on if they were off or vice versa)

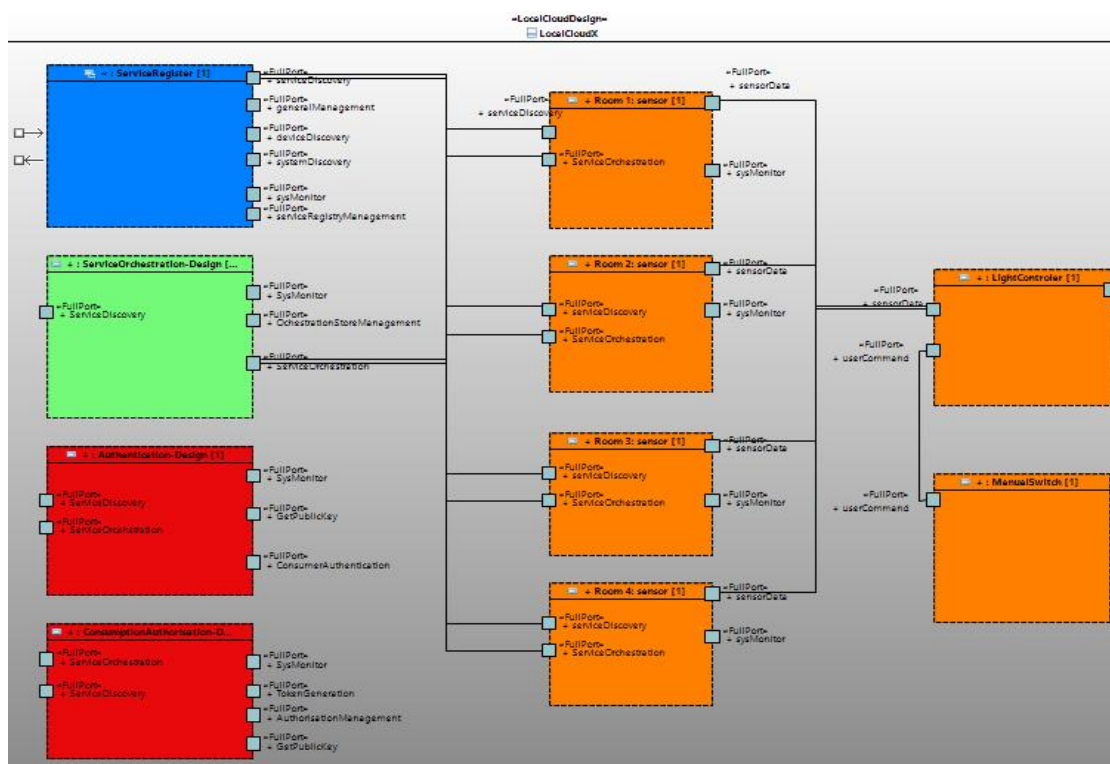


Figure 2 - IBD of the local cloud of the SoS (using Papyrus)

## 1.2 SoS functionalities and properties

### 1.2.1 Functional properties of the SoS

- Environmental Sensing
  - o The system shall measure the environment light level
  - o The system shall detect the environment motion level
- Communication
  - o The system shall allow the user to override the SoS
- Actuation
  - o The system shall be able to detect the need for light based on sensor data
  - o The system shall be able to enable and disable the lights in the house

### 1.2.2 Data stored by the individual microsystem

- *Sensor System* : Motion status, light level
- *Light Controller System* : Last sensor data, current light state

### 1.2.3 Non functional properties

- Security
  - o The system shall prevent unauthorized manipulation of actuators.
  - o The system shall protect sensible datas
- Resilience
  - o The system shall tolerate individual component failures without complete system failure.
- Efficiency
  - o The system shall minimize energy consumption
- Scalability
  - o The system shall scale in size (number of rooms or zones).

### 1.2.4 Stateful or stateless

The system shall be stateful : the *Light Controller System* keeps the current state of each room's light.

## 1.3 Important Delimitations

- The system does not handle multiple house scenario (or any need of inter-cloud operations)

## 2 Services

### 2.1 Produced service

- *sendSensorData* :
  - Sends light level and motion data
  - Produced by the *Sensor System*
- *userCommand* :
  - Sends user override signal
  - Produced by the *Manual Switch System*

### 2.2 Consumed services

- *sendSensorData* :
  - Receive light level and motion data
  - Consumed by the *Light Controller System*
- *userCommand* :
  - Receive user override signal
  - Consumed by the *Light Controller System*