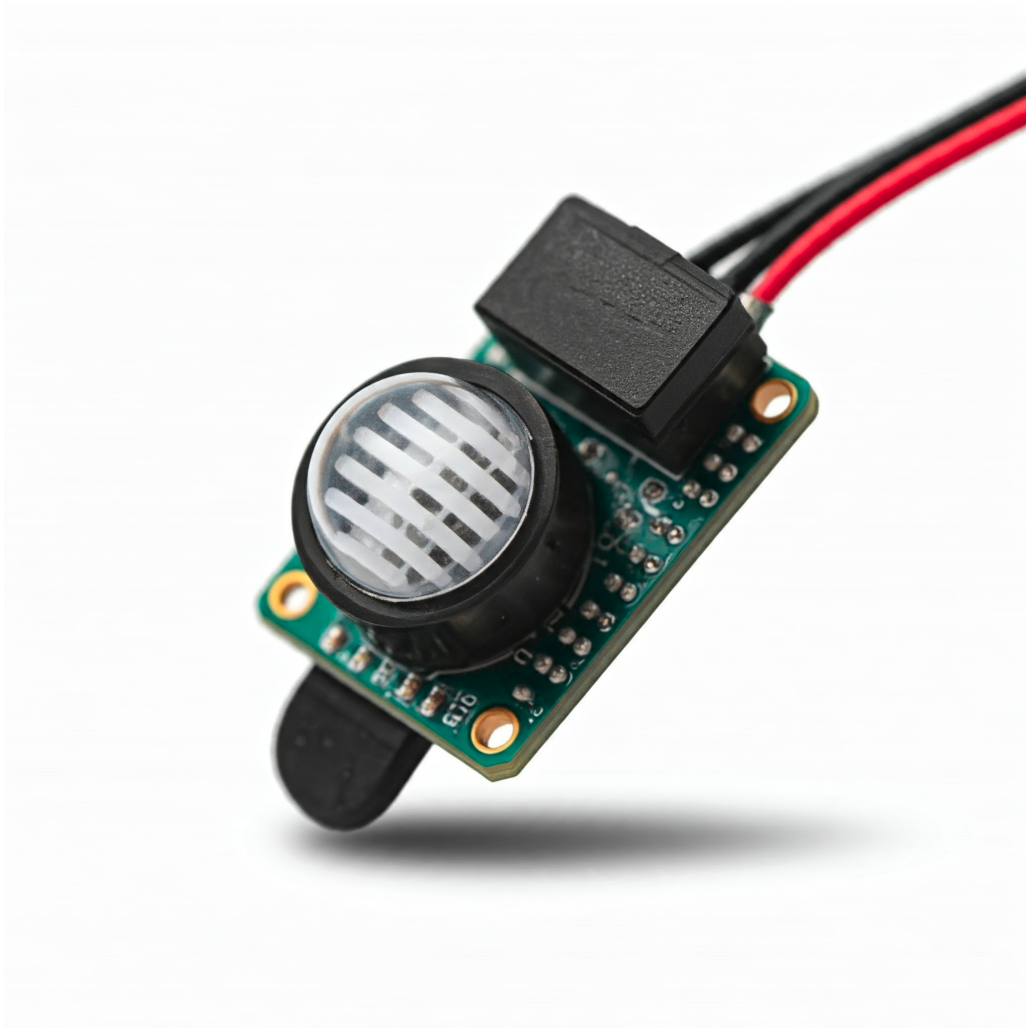


MovingSensor

System Description



Abstract

This document provides the system description (SysD) for the **MovingSensor System**.

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1 Overview

This document describes the MovingSensor system, which provides the functionality to detect movement in a room and send this information somewhere.

The rest of this document is organized as follows. In Section 1.1, we reference major prior art capabilities of the system. In Section 1.2, we describe the intended usage of the system. In Section 1.3, we describe fundamental properties provided by the system. In Section 1.4, we describe delimitations of capabilities of the system. In Section 2, we describe the abstract service functions consumed or produced by the system. In Section 3, we describe the security capabilities of the system.

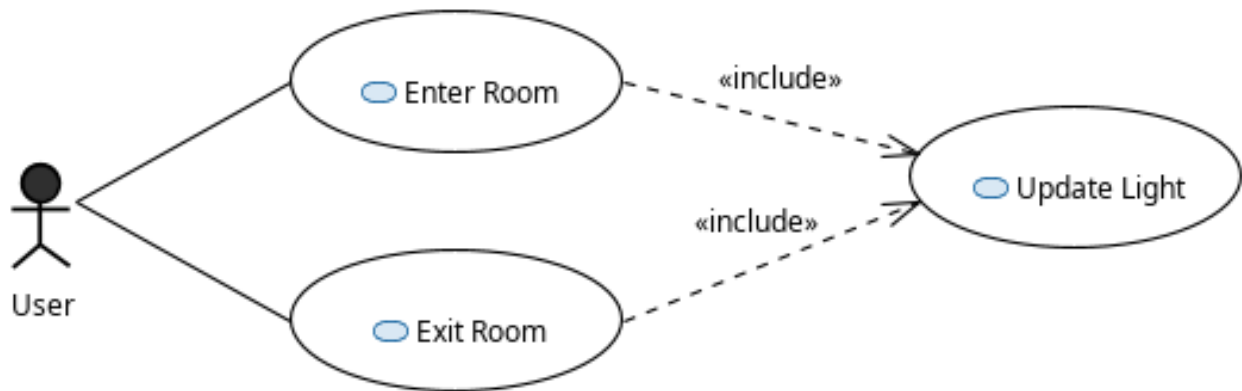


Figure 1: SysML use case diagram. A user can enter a room and the light will be turned on, depending on the movement of the person. A user can also leave a room and if no other person is in the room, the light will be turned off.

1.1 Significant Prior Art

A motion detector is a device that uses a sensor to identify movement in its surroundings. It's commonly used as a component in systems that automatically trigger actions or notify users about detected motion. Motion detection can be achieved through either mechanical or electronic means. The power source is a standard AA battery with a minimum voltage of 1.5V.

1.2 How This System Is Meant to Be Used

The movement sensor is a component of the smart home local cloud, serving the capability to detect movement within a room. It smoothly integrates with other smart home devices in the network, enabling users to create custom actions based on the trigger of their movement. For example, users can apply an AI model, which is custom trained for specific rooms, and then use a filtered data stream to execute actions upon this knowledge like activating a camera or the light in the room.

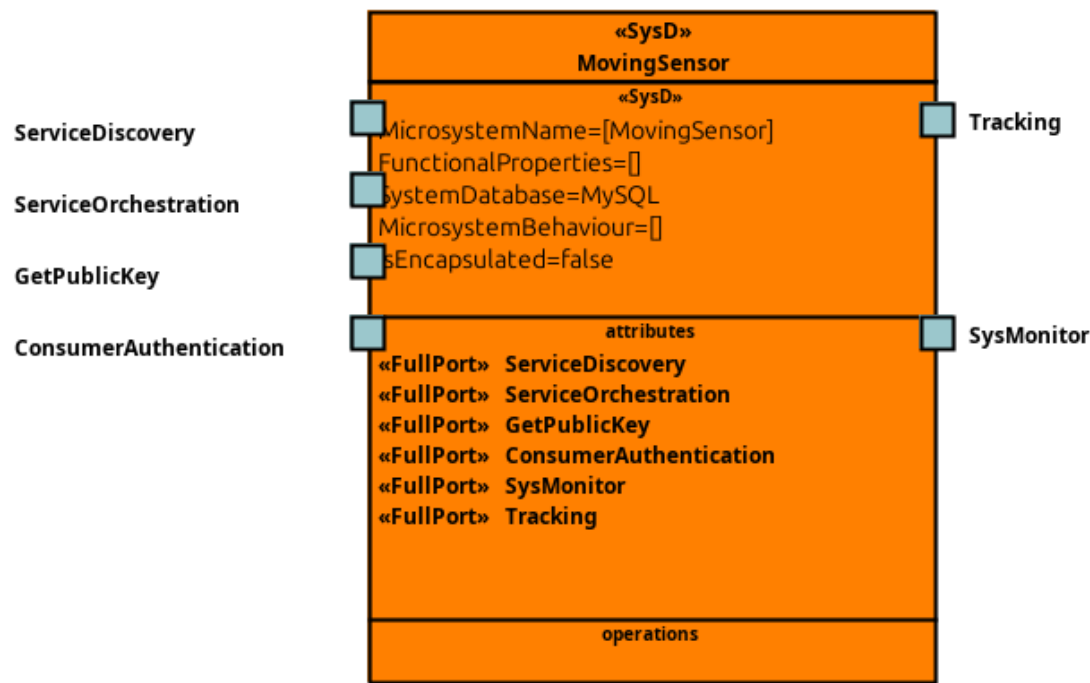


Figure 2: System Definition Block Diagram of the MovingSensor

1.3 System functionalities and properties

1.3.1 Functional properties of the system

The MovingSensor solves the following needs to fulfill the requirements of movement detection in a room:

- Enables a system operator to define actions based on a movement trigger.
- Enables others to apply a custom filter model to only react on special movement patterns.

1.3.2 Configuration of system properties

One can make use of all tracked movement in a room, or can apply a custom filter model to only use filtered movement data. This filter model can be changed.

1.3.3 Data stored by the system

In order to achieve the mentioned functionalities, the MovingSensor is capable to store a filter model to manipulate the data stream.

1.3.4 Non functional properties

The sensor is built with a small AA battery, which minimizes the risk of an electric shock, but can still lead to the emission of sparks in the worst case. The latency of the detection must be less than 100ms. Anybody can be detected if he moves in the range of the sensor, which is data that must be protected.

1.4 Important Delimitations

A movement detector is a device that uses a sensor to identify movement in its surroundings. It's commonly used as a component in systems that automatically trigger actions or notify users about detected motion.

However, the movement sensor has limitations. It cannot distinguish between different types of motion, such as a human, an animal, or an object. It can only detect motion within its range and cannot determine the exact location of the moving object. Additionally, it cannot identify the specific cause of the motion, like a door opening or a person walking. Finally, the sensor cannot provide continuous tracking of an object, but only detects motion at specific intervals.

2 Services

2.1 Produced service

2.1.1 service Tracking

The purpose of this service is to query movement data of the sensor for a room. The service is offered for the application system. See Light SD document for more details.

2.1.2 service SysMonitor

The purpose of this service is to generate monitoring data for a consumer with the current status of the MovingSensor. The service is offered for the application system. See MicrosystemMonitor SD document for more details.

2.2 Consumed services

2.2.1 service ServiceDiscovery

The purpose of this service is to be discoverable by the system. It is part of the Arrowhead core system. See ServiceDiscovery SD for more details.

2.2.2 service ServiceOrchestration

The purpose of this service is to be orchestrated by the system. It is part of the Arrowhead core system. See ServiceOrchestration SD for more details.

2.2.3 service GetPublicKey

The purpose of this service is to provide authorization capabilities. It is part of the Arrowhead core system. See GetPublicKey SD for more details.

2.2.4 service ConsumerAuthentication

The purpose of this service is to provide authentication capabilities. It is part of the Arrowhead core system. See ConsumerAuthentication SD for more details.

3 Security

The security of Eclipse Arrowhead — and therefore the security of the MovingSensor — is relying on X.509 certificate trust chains. The Arrowhead trust chain consists of three levels:

- Master certificate: `arrowhead.eu`
- Cloud certificate: `my-smarthome.smarthome.arrowhead.eu`
- Client certificate: `my-movingsensor.my-smarthome.smarthome.arrowhead.eu`

For Arrowhead certificate profile, see: <https://github.com/eclipse-arrowhead/documentation>
The system does not contain configuration for Arrowhead unsecure/ secure mode.



ARROWHEAD

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4 Revision History

4.1 Amendments

No.	Date	Version	Subject of Amendments	Author
1	2024-10-12	4.6.2		Max Lütkemeyer

4.2 Quality Assurance

No.	Date	Version	Approved by
1	2024-10-12	4.6.2	