

Controller

System Description

Abstract

This is the System Description (SysD document) for the "AI Tool" System according to the Eclipse Arrowhead documentation structure.

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1 Overview

This document describes the Controller system which is responsible for taking the data from two sensor networks and analysing it using two criteria, the luminosity and if the weather conditions are extreme. It is analysed in order to update the database of the lamps stored in the controller, containing the lamp ID and its status.

The rest of this document is organized as follows. In Section 1.1, we describe the intended usage of the system. In Section 1.2, we describe fundamental properties provided by the system. In Section 1.3, 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.

1.1 How This System Is Meant to Be Used

This system is used to periodically get the status of lamps that changed from the actual configuration in the Street Lighting system. It requests the data of sensors to the Weather Sensors and Light Sensors systems, it decides of the new status of all lamps and stores it in an array. This array also stores the information if the configuration of lamps in the Street Lighting system should be the same or is different from the controller array.

1.2 System functionalities and properties

1.2.1 Functional properties of the system

- The system can detect if it is dark outside using a threshold for luminosity.
- The system can detect if the weather conditions are considered extreme and then they reduce visibility.
- The system decides whether to turn on or off a lamp considering its current status, if the luminosity is not strong enough and if the luminosity is not strong enough considering the weather conditions.

1.2.2 Configuration of system properties

1.2.3 Data stored by the system

Data coming from the sensors is stored in a local variable and overwritten with every answer from the Weather and Light Sensors systems. The lamps' status is stored in the controller memory (InMemoryLampDB) as a map database.

1.2.4 Stateful or stateless

Stateful: the data about the status of the lamps (on or off) is kept in memory by the in-memory database (InMemoryLampDB). The system keeps a persistent state while it is running.

1.3 Important Delimitations

- The system relies on accurate and timely data from external Weather and Light Sensor systems. If these systems fail or provide incorrect data, the decision-making process might be compromised.
- The number of lamps the system can handle is limited by the memory and processing power available to the controller.
- The system assumes all lamps and sensors operate correctly and does not include fault-tolerant mechanisms for individual lamp or sensor failures.
- The system is designed for periodic updates and might not perform optimally under real-time or high-frequency demands.

1.4 Publishing of Contract Events

The system is subscribed to receive the announcements of the destruction of the Light and Weather Systems. If it was destroyed, the system will start reorchestration or shut down.

2 Services

2.1 Produced service

- "UpdateLamps": The service sends the information and states of only the lamps that should change state to the Street Lighting system in order to turn on or off these lamps.
- "getAllLamps": The service sends the information and states of all lamps to the Street Lighting system in order to compare if the controller has an incoherence with the actual status of the lamps.

2.2 Consumed services

- "getWeatherSensors": The service receives the data from the Weather Sensors system as List<WeatherSensorResponse>.
- "getLightSensors": The service receives the data from the Light Sensors system as List<LightSensorResponseDTO>.
- "ServiceDiscovery": Essential for communication with the registry.
- "ServiceOrchestration": Coordinates the system.

3 Security

- The Controller system utilizes secure protocols such as:
 - HTTP/HTTPS: For web-based communication, with HTTPS ensuring secure communication via encryption.
- The system performs strict authorization checks before providing services, based on:
 - Arrowhead Authorisation System: This checks the legitimacy of service requests within the Arrowhead ecosystem, ensuring that services are only consumed by authorized actors.

For Arrowhead certificate profile see github.com/eclipse-arrowhead/documentation

4 References

5 Revision History

5.1 Amendments

Revision history and Quality assurance as per examples below

No.	Date	Version	Subject of Amendments	Author
1	2020-12-05	X.Y.Z		Tanyi Szvetlin
2	2021-07-14	X.Y.Z	Minor updates	Jerker Delsing
3	2022-01-12	X.Y.Z	Minor updates	Jerker Delsing

5.2 Quality Assurance

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1	2022-01-10	X.Y.Z	