

The background of the slide features a photograph of the International Space Station (ISS) in orbit above Earth's cloud-covered surface. The station's complex structure, including multiple solar panel arrays and modules, is clearly visible. The image is partially framed by large, overlapping geometric shapes in yellow, grey, blue, and white.

# **IoT project**

***IoT: Bernardo Sata, Gonalo Fontes Neves***

***Data Manage: Alberto Gonzalez, Seungah Lee***

***AI: Brian Franklin, Mohamed Eltablawy, Adrien Mencik***

***GUI: Gabriella Catalan, Aizar Berlanga***

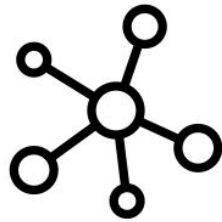
# Introduction

**Project name :** Factory of the future

**Project goals :** Deploy a system to monitor and control a finite set of factories remotely.

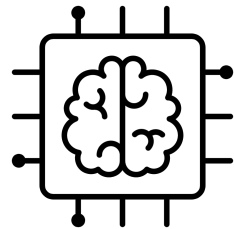
**Description:** This project will consider two different factories. Factory 'Le Monde' and 'Chocolatine'. Both factories will be monitored thanks to a redundant system of three environmental sensors. After merging the data of the sensors using a clustering algorithm, it is sent to a server which is in charge of storing the information and send it back to a remote display and to a prediction block. The server also sends data back to the factories regarding the state of two actuators: a fan and a LED.

# Introduction



## IoT

**Bernardo Sata**  
**Gonçalo Fontes Neves**



## AI

**Brian Franklin**  
**Mohamed Eltablawy**  
**Adrien Mencik**



## Data Management

**Alberto Gonzalez**  
**Seungah Lee**



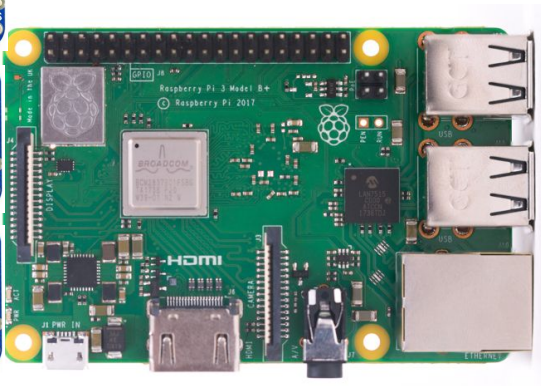
## GUI

**Gabriella Catalan**  
**Aizar Berlanga**

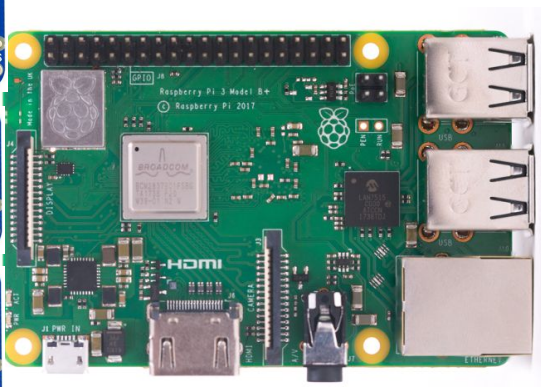
# System Configuration



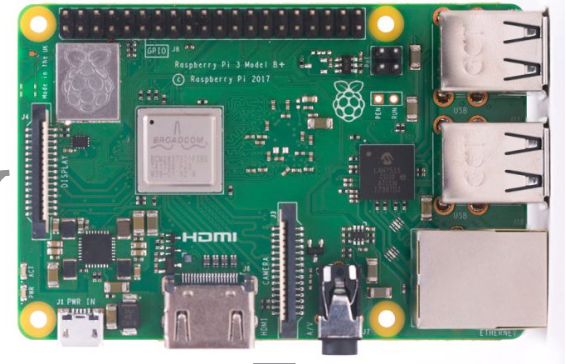
Factory Le Monde



Factory Chocolatine

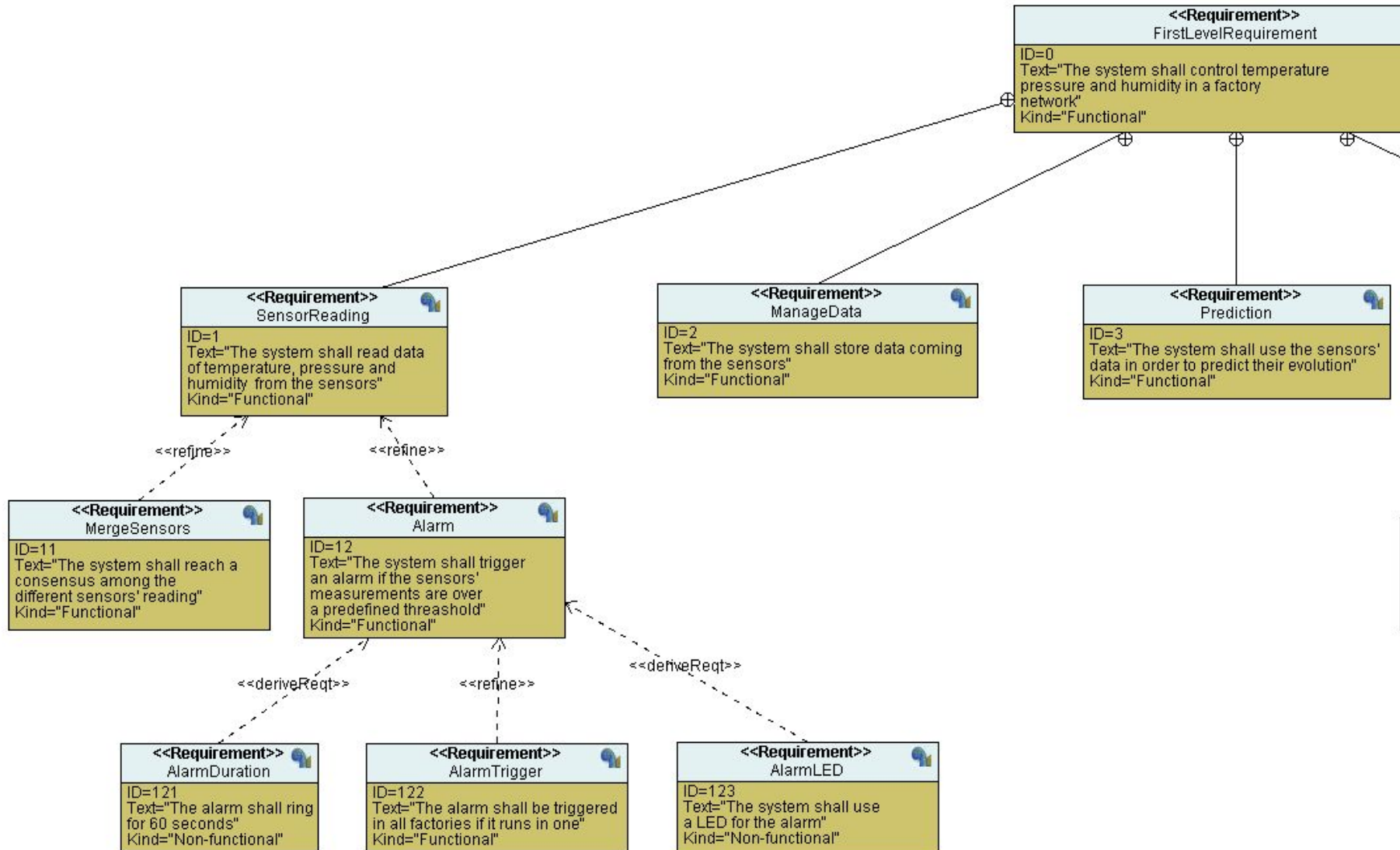


Server

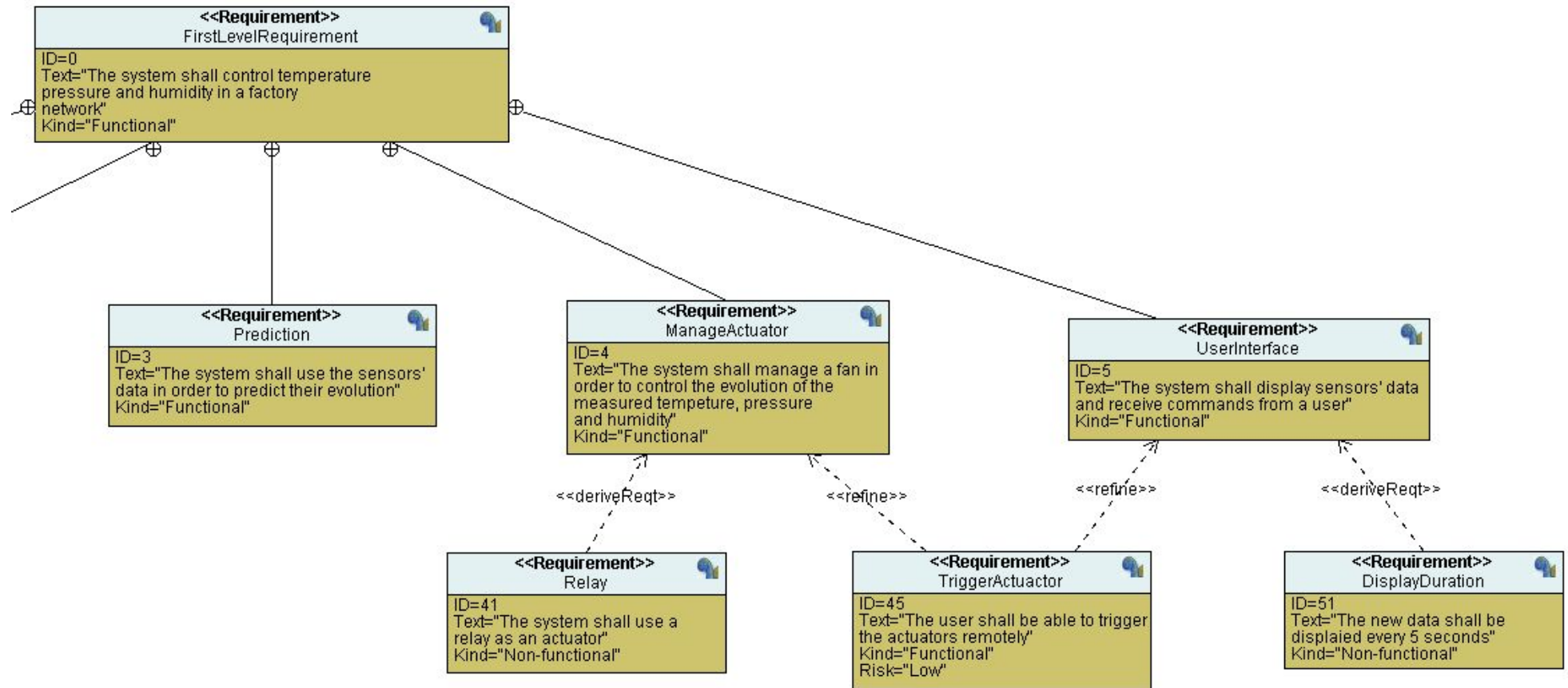




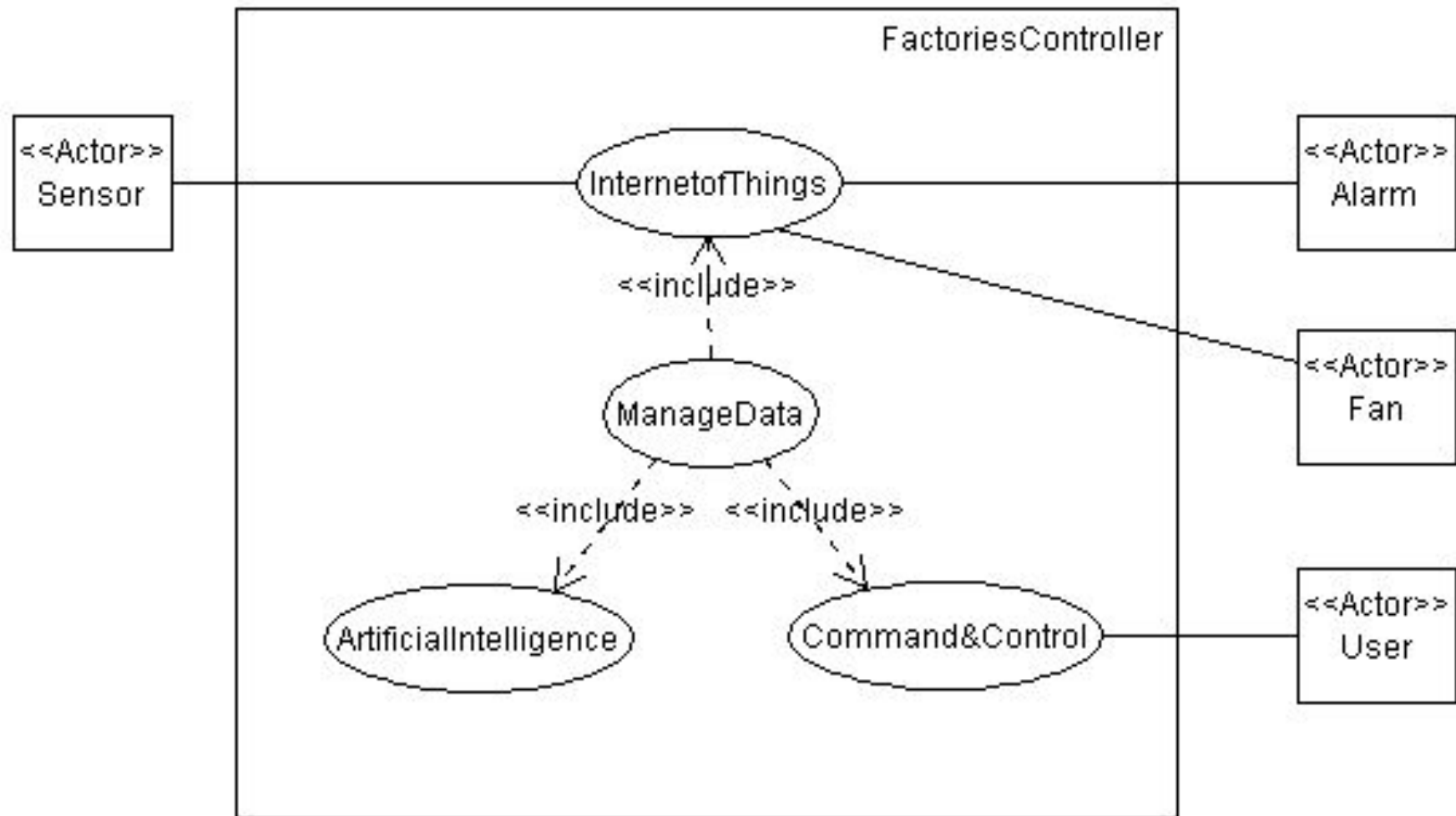
# Conceptual Analysis: Requirement Diagram



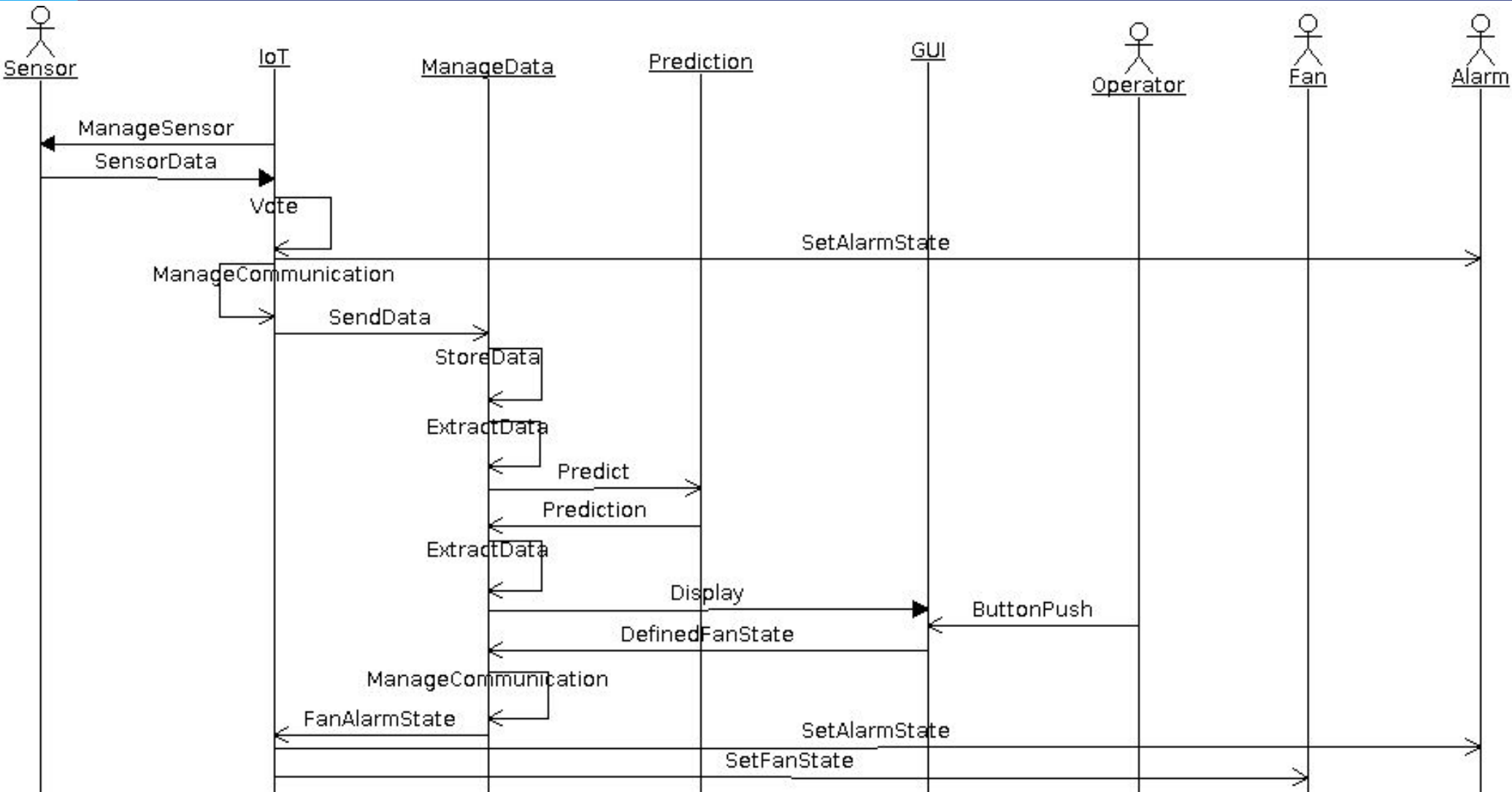
# Conceptual Analysis: Requirement Diagram



# Functional Analysis: Use Case Diagram

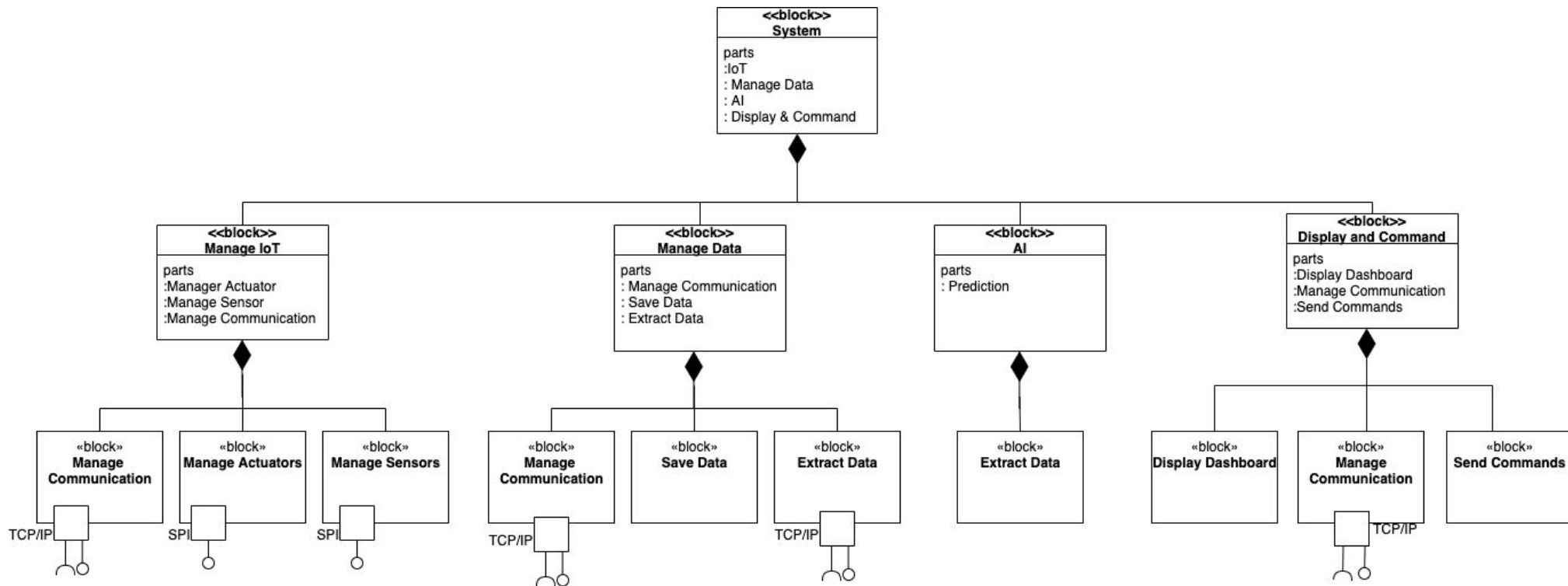


# Functional Analysis: Sequence Diagram

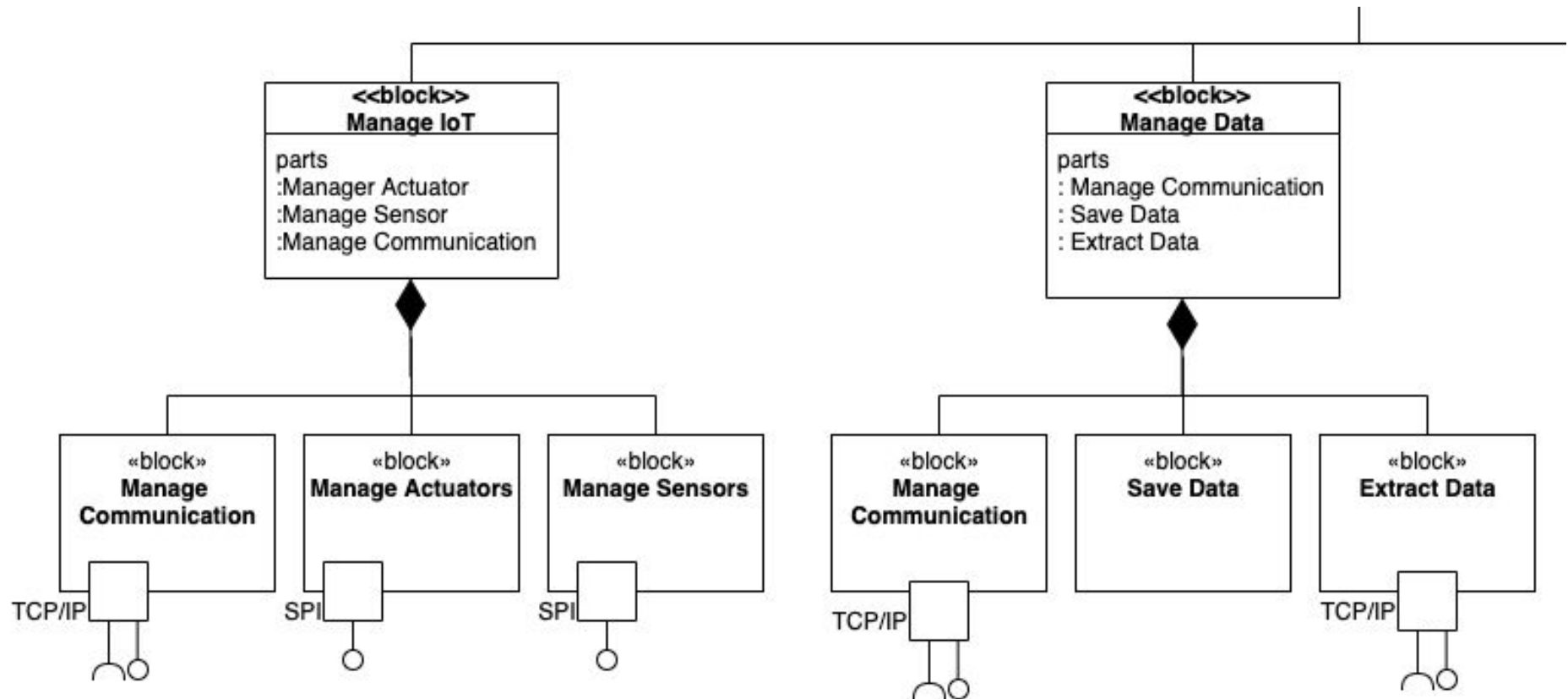




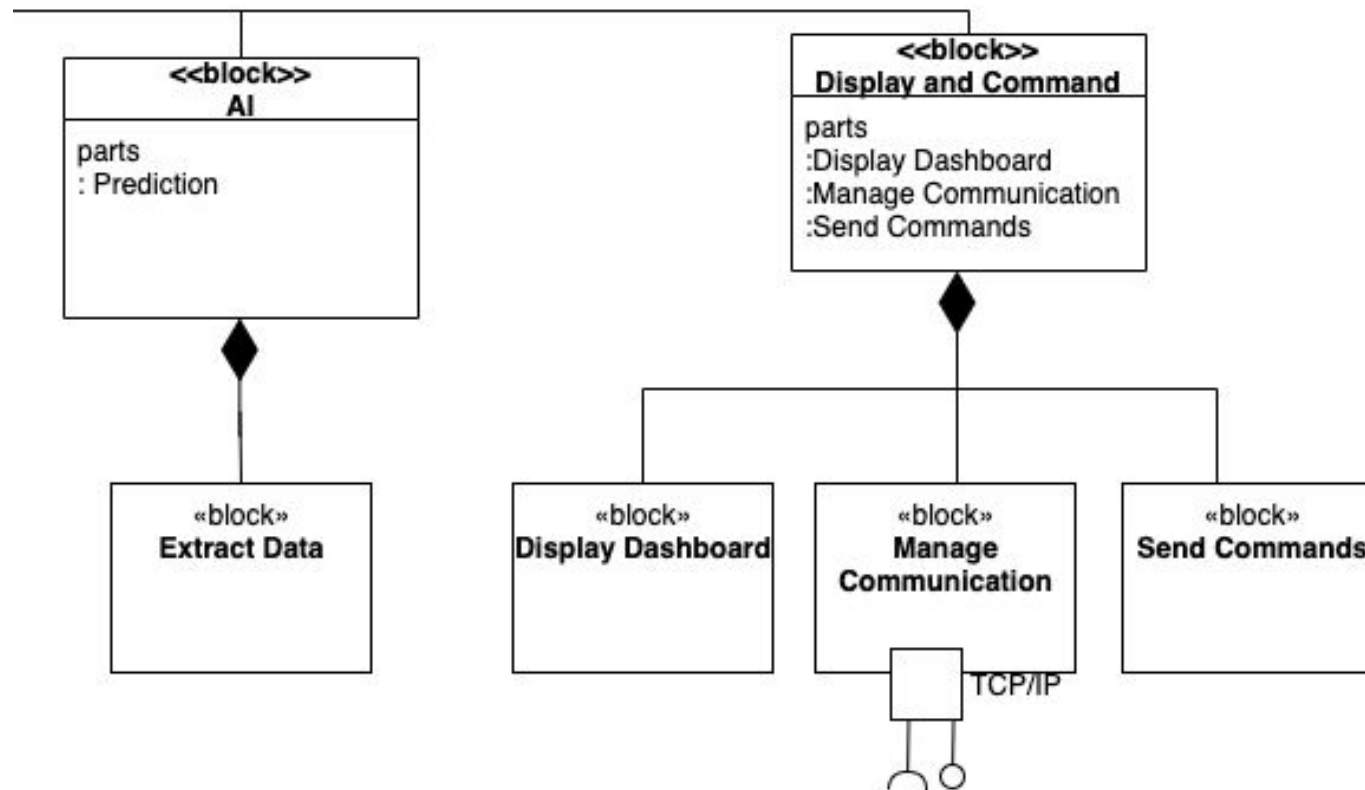
# Functional Analysis: Block Diagram



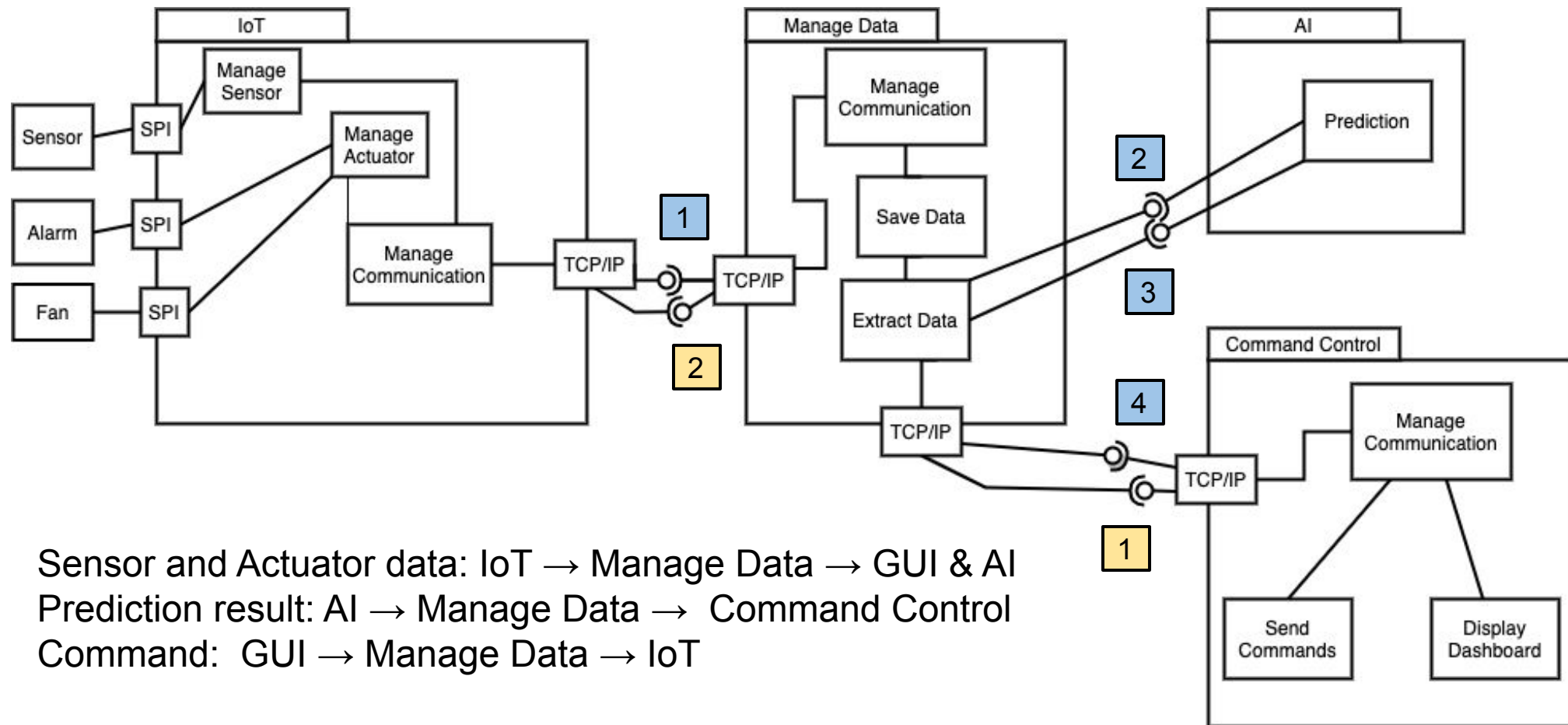
# Functional Analysis: Block Diagram



# Functional Analysis: Block Diagram



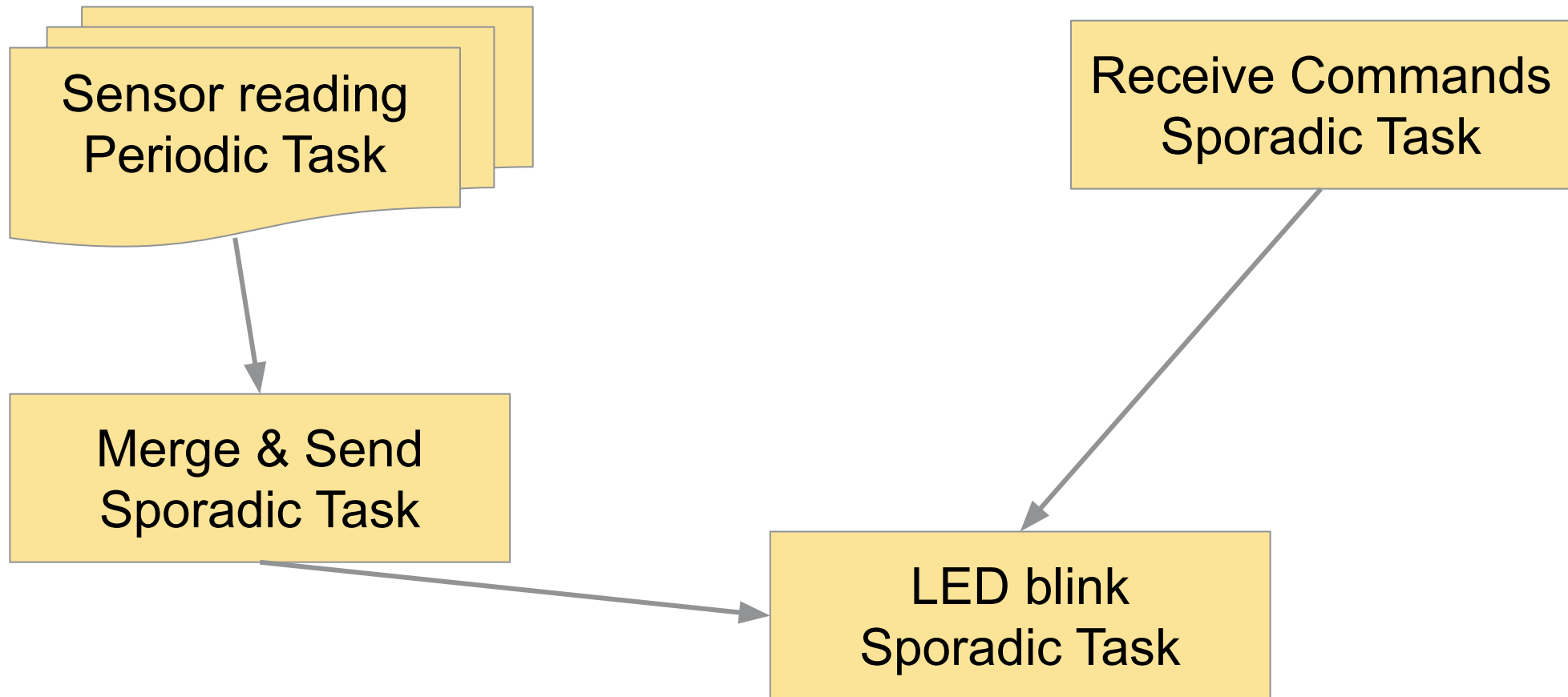
# Functional Analysis: Internal Block Diagram



Sensor and Actuator data: IoT → Manage Data → GUI & AI  
Prediction result: AI → Manage Data → Command Control  
Command: GUI → Manage Data → IoT

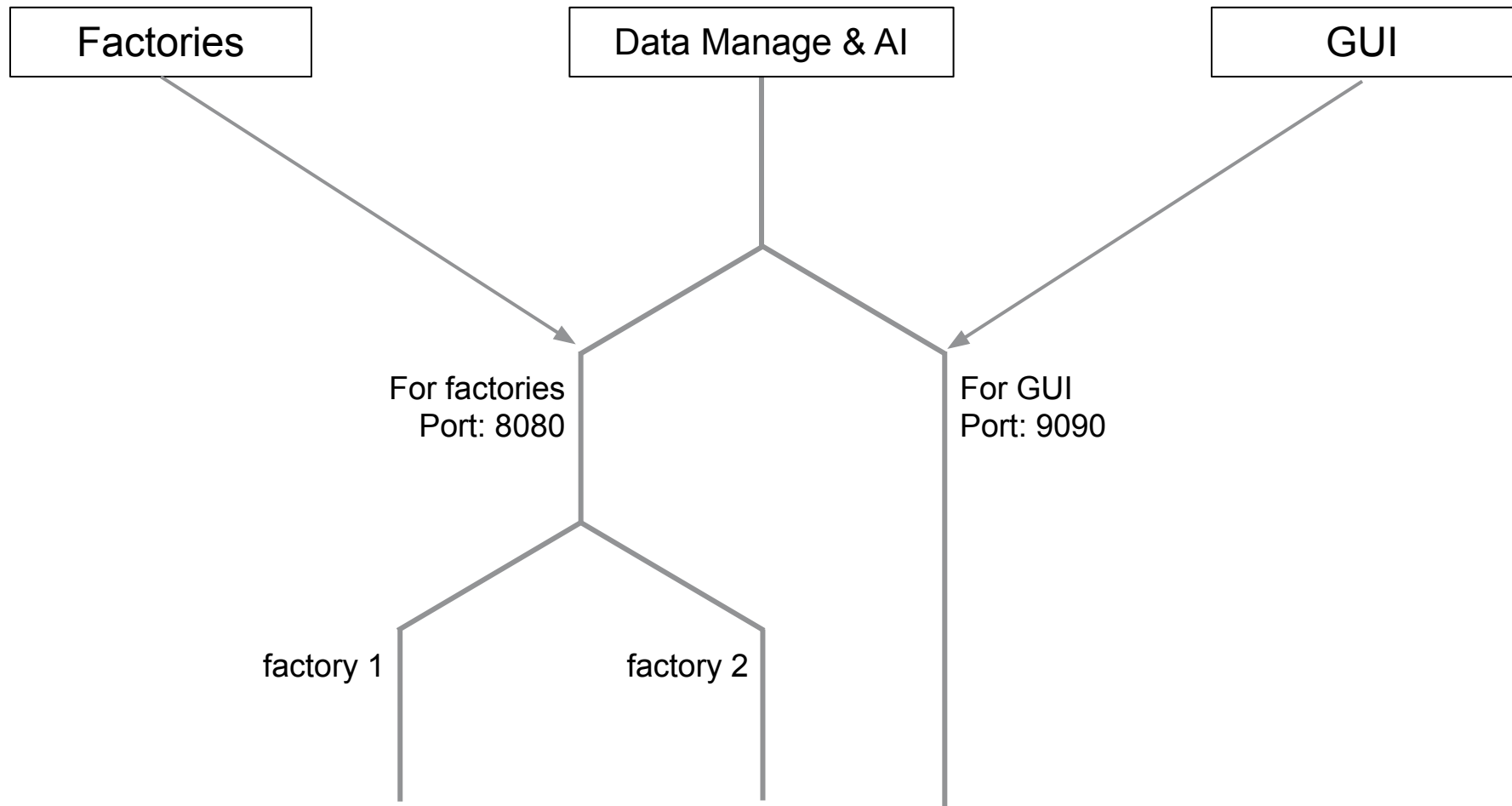
Blue box : sensor, actuator, prediction  
Yellow box: commands

# IoT Factories

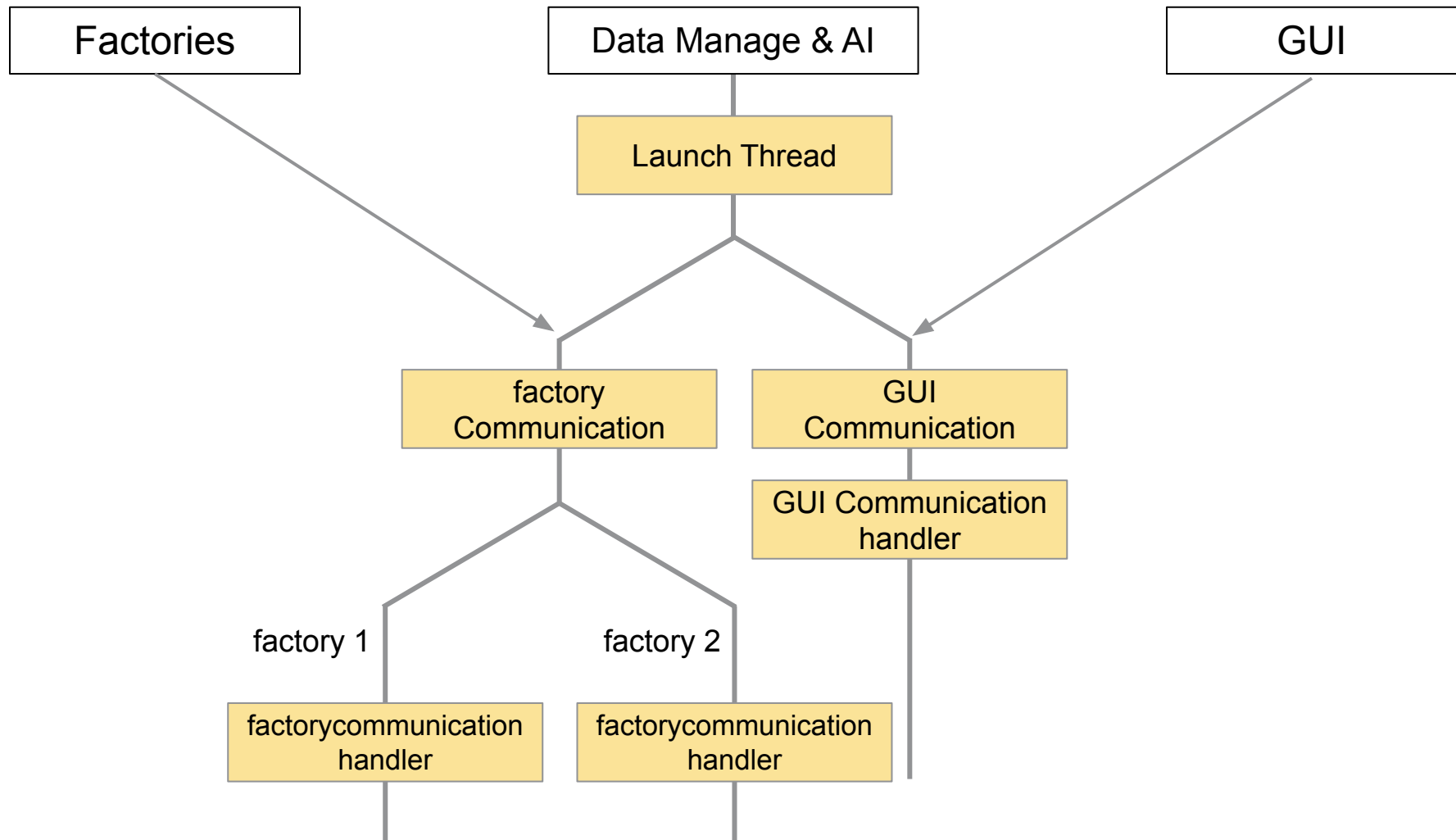




# Data Manage

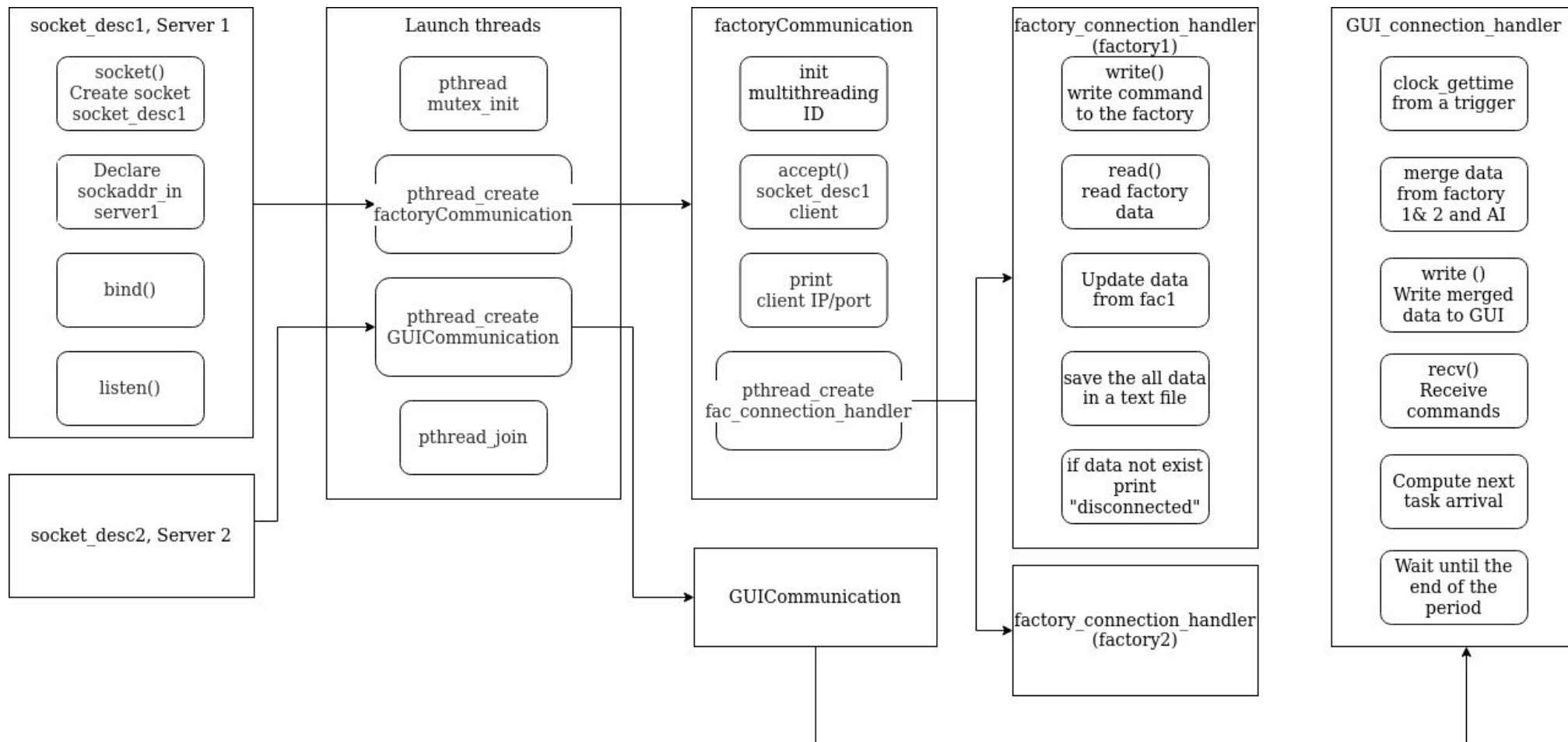


# Data Manage



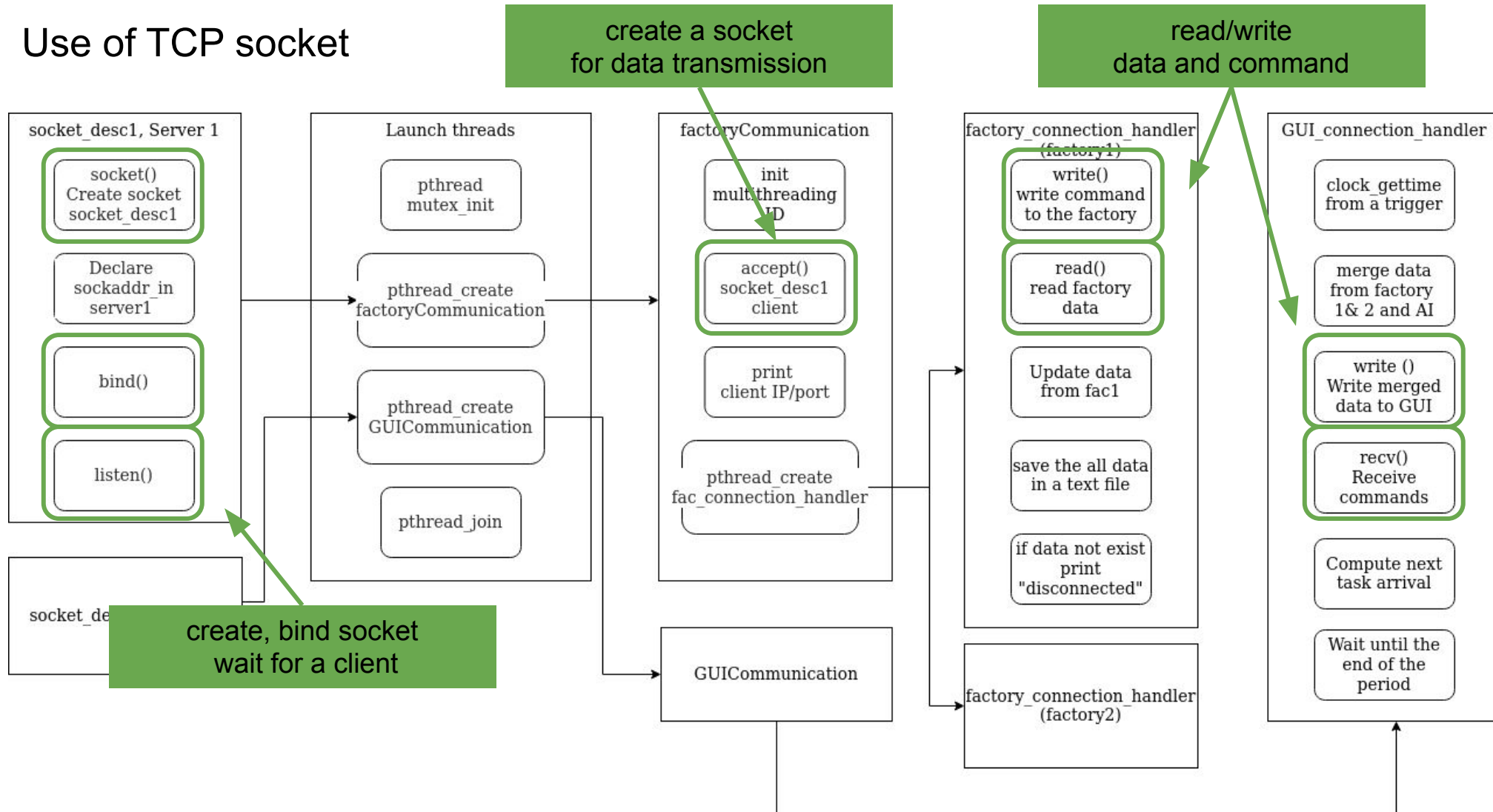
# Data Manage

## Flow chart



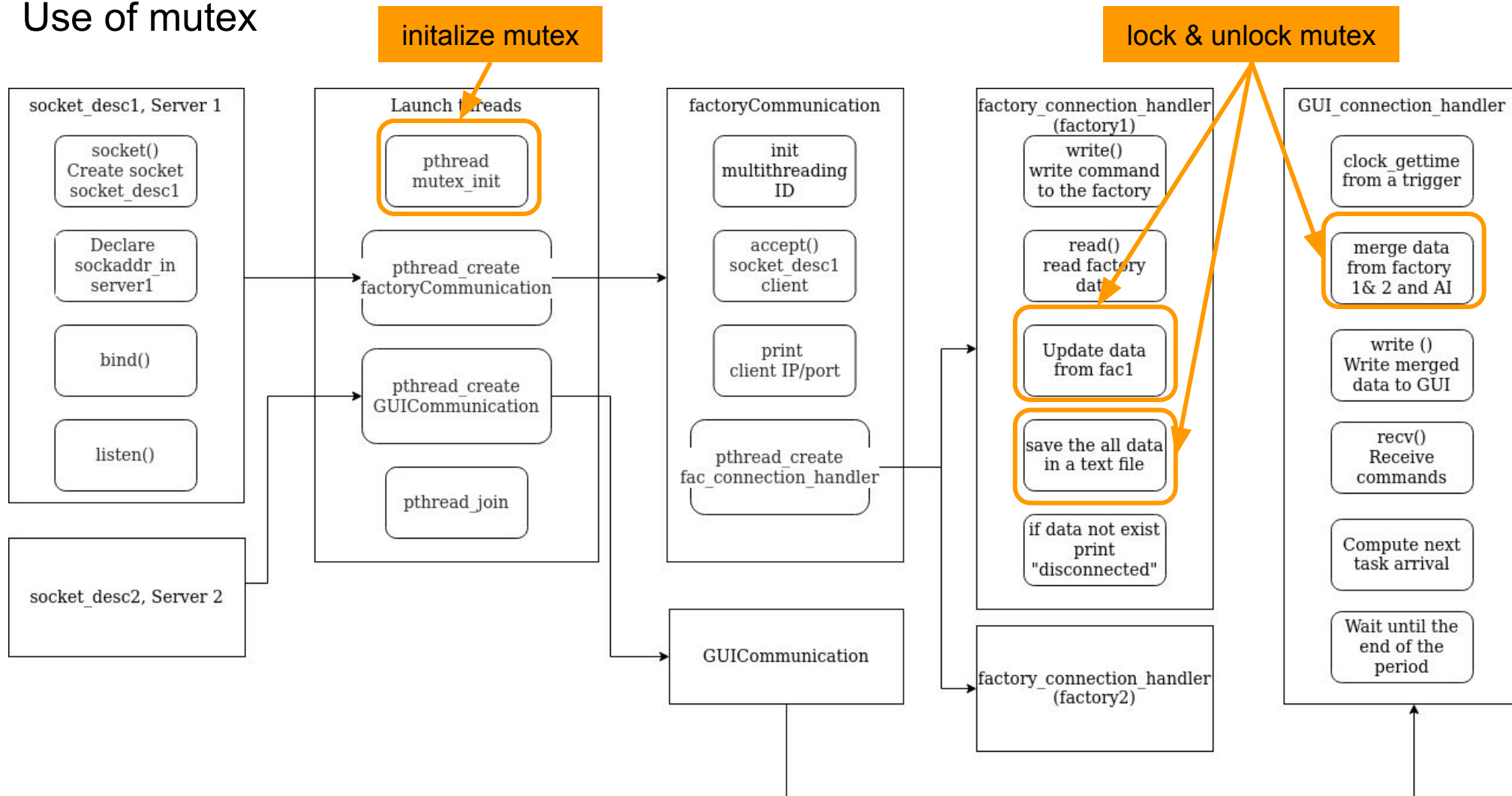
# Data Manage

## Use of TCP socket



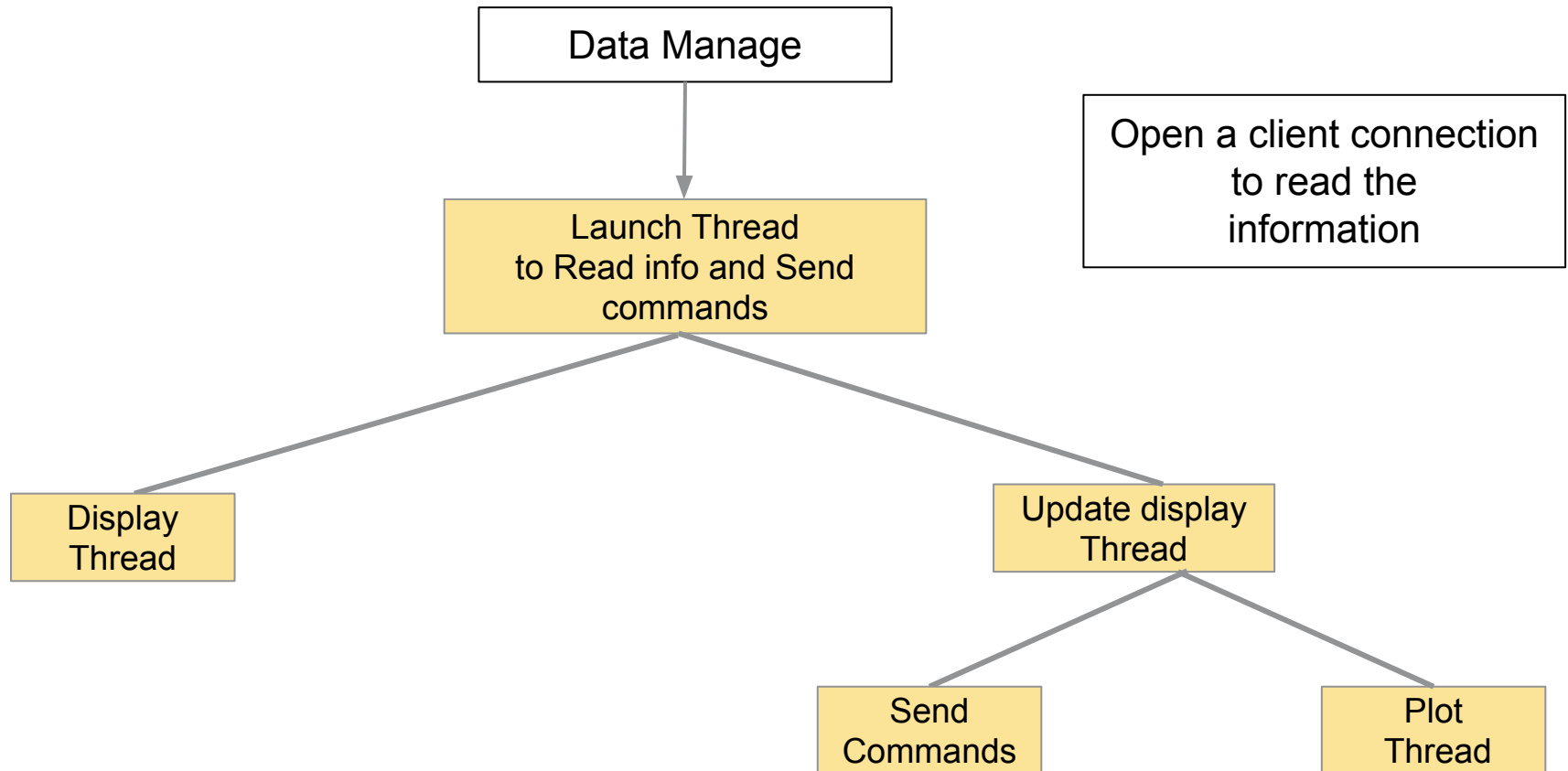
# Data Manage

## Use of mutex

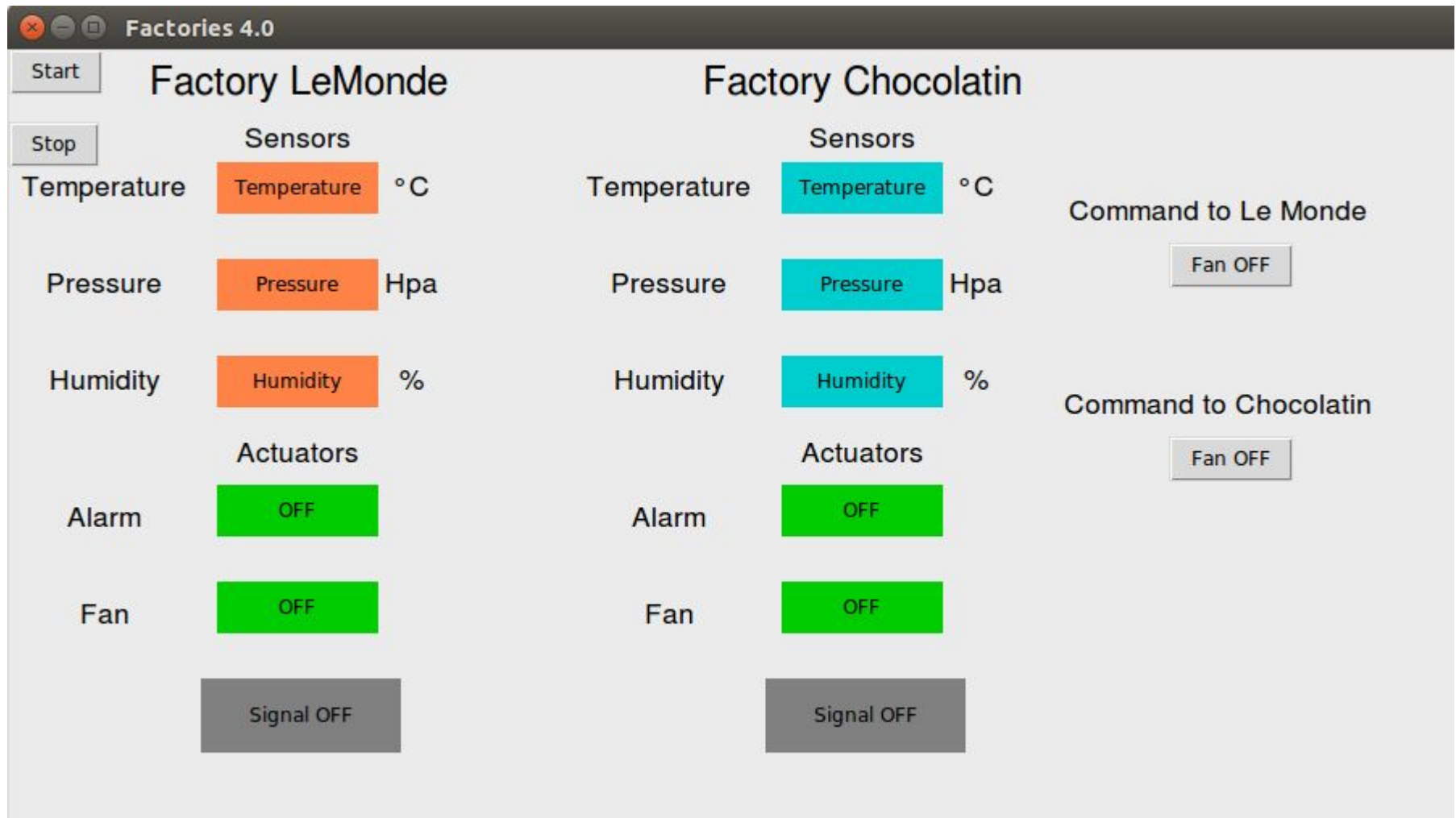




# Graphical Interface



# GUI



- AI's purpose: To predict values based on received data:
  - Time, pressure/humidity/temperature.
  - Data received as a structure.
  - Prediction made using a linear regression model. This model is computed using the GSL library.
  - Data received every 5 seconds.
  - Prediction done at every reception of data.



# AI : The code

Link with the data processing:

- the function `Pred()` is called after reception of data. The data comes as a structure.

- The structure is divided in values of time pressure, humidity and temperature. These values are swiped in the existing array and used in the function argument.

- `Pred()` takes into argument arrays of the time and the received value of data to be predicted.

# AI : The function Pred

The function Pred():

- uses the gsl function `gsl_fit_linear` to calculate the linear regression.
- returns the values of temperature, pressure or humidity predicted as double, later sent to GUI.





# THANK YOU