

# **HUEBERT Design Document**

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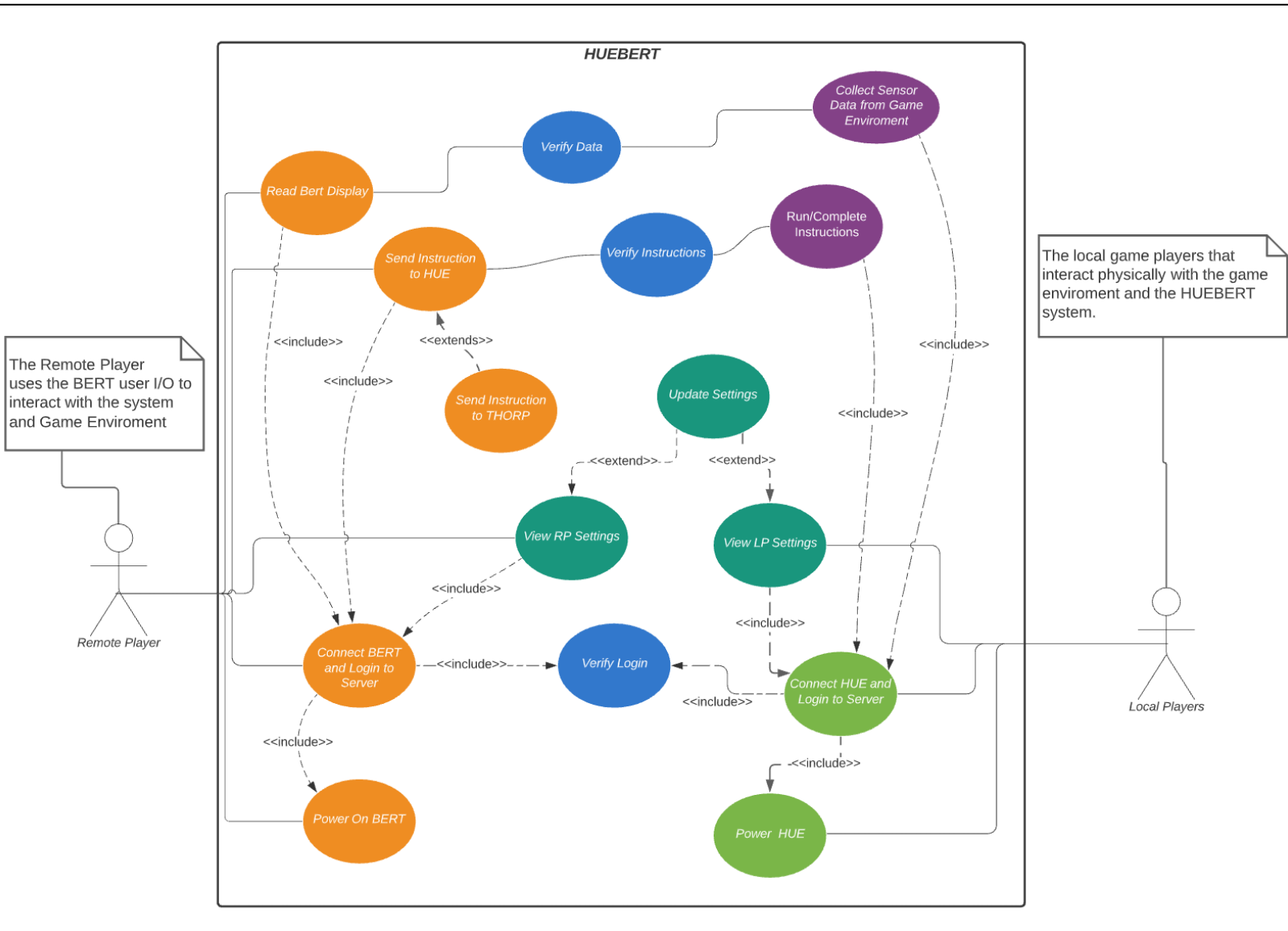
ECE 356, UVic

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# Introduction

The following document contains the graphs, tables, and specification regarding the design requirements of the HUEBERT system

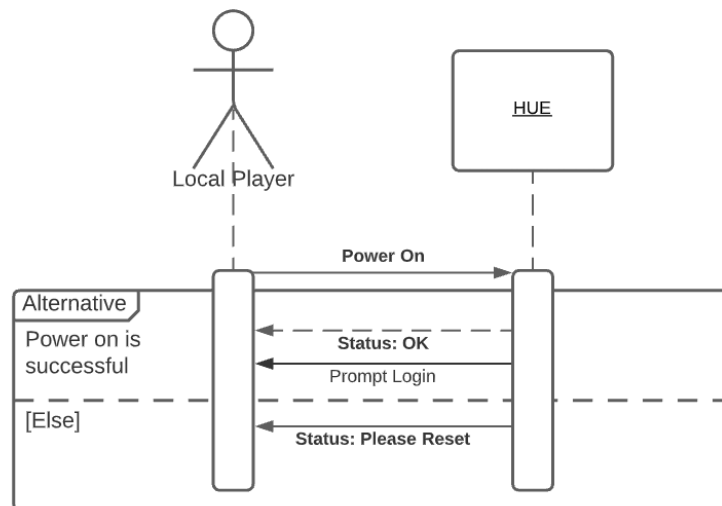
## 1. UML Use Case Diagram



## 2. Specifications and Sequence Diagram

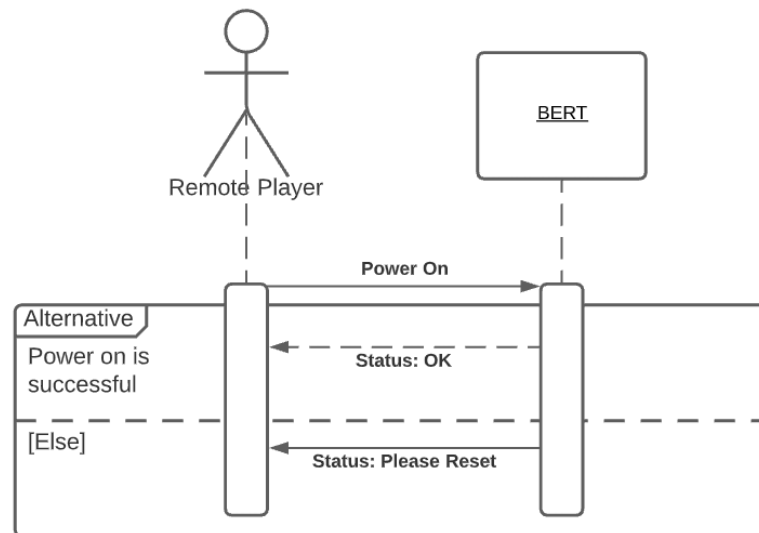
### 2.1.1 Power On HUE

ID	UC-01
Description	The LP powers on the HUE system so it can be utilized.
Actors	Local Player
Secondary Use Cases	N/A
Preconditions	N/A
Main Flow	<ol style="list-style-type: none"><li>1. The Local Player turns the HUE system on.</li><li>2. If the HUE system powers up correctly.<ol style="list-style-type: none"><li>a. The LP is prompted to connect HUE to the server and login</li></ol></li></ol>
Postconditions	The LP can connect HUE to the Server and Login
Alternative Flow(s)	<ol style="list-style-type: none"><li>2.b If the HUE system does not power up correctly:<ol style="list-style-type: none"><li>a) The error message is displayed.</li><li>b) The LP is asked to retry powering up HUE (Continue from 1).</li></ol></li></ol>



### 2.1.2 Power On BERT

ID	UC-02
Description	The RP powers on the BERT system so it can be utilized.
Actors	Remote Player
Secondary Use Cases	N/A
Preconditions	N/A
Main Flow	<ol style="list-style-type: none"><li>1. The Remote Player turns the BERT system on.</li><li>2. If the BERT system powers up correctly.<ol style="list-style-type: none"><li>a. The LP is prompted to connect BERT to the server and login</li></ol></li></ol>
Postconditions	The RP can connect BERT to the Server and Login
Alternative Flow(s)	<ol style="list-style-type: none"><li>2.b If the BERT system does not power up correctly:<ol style="list-style-type: none"><li>a) The error message is displayed.</li></ol></li></ol> <p>The LP is asked to retry powering up BERT (Continue from 1).</p>



## 2.1.3 Server Login

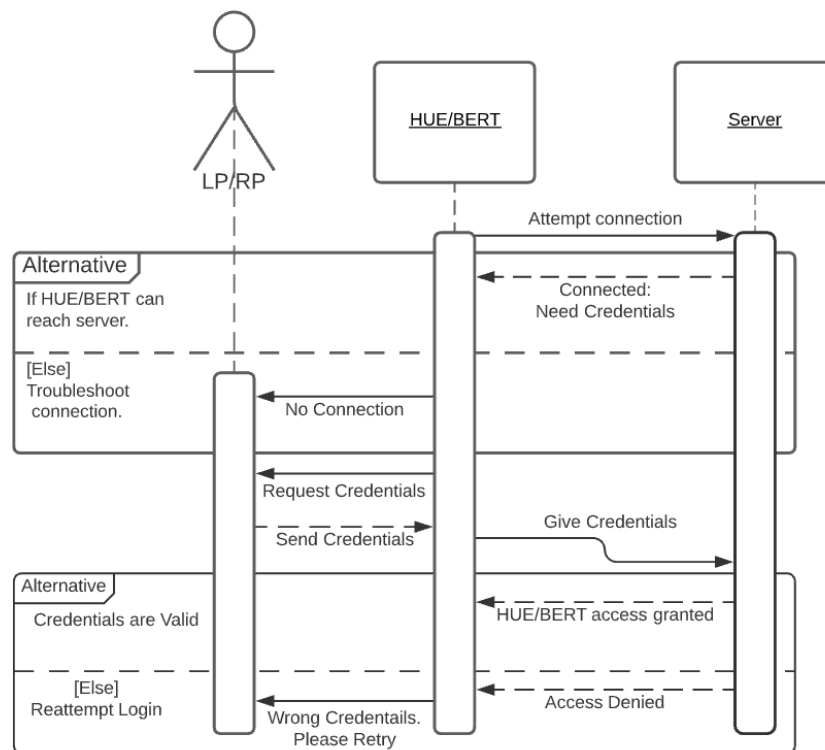
### 2.1.3.1 LP Login to Server

ID	UC-03
Description	The LP provides credentials to the server to authenticate themselves and allow HUE to start sending data to the server for BERT.
Actors	Local Player.
Secondary Use Cases	UC-01: Power on HUE
Preconditions	HUEBERT is powered on and connected to a network.
Main Flow	<ol style="list-style-type: none"> <li>1. HUE attempts to connect to the server</li> <li>2. The LP is prompted to enter their credentials.</li> <li>3. The LP enters their credentials.</li> <li>4. If the credentials are correct: <ol style="list-style-type: none"> <li>a. BERT can connect to HUE.</li> </ol> </li> </ol>
Postconditions	HUE can send data to the server for BERT.
Alternative Flow(s)	<ol style="list-style-type: none"> <li>1b. If HUE cannot find server <ol style="list-style-type: none"> <li>a) Display error message</li> </ol> </li> <li>3b. If the credentials are not valid: <ol style="list-style-type: none"> <li>a) The server notifies the LP of their incorrect login attempt</li> <li>b) The server prompts the LP to retry their credentials (Continue from 1)</li> </ol> </li> </ol>

### 2.1.3.2 RP Login to Server

ID	UC-04
Description	The RP provides credentials to the server to authenticate themselves and enable the BERT system to send control data to HUE.
Actors	Remote Player
Secondary Use Cases	UC-03: Power on BERT
Preconditions	HUEBERT is powered on, BERT is connected to the Server.
Main Flow	<ol style="list-style-type: none"> <li>1. BERT attempts to connect to the server</li> <li>2. The RP is prompted to enter their credentials.</li> </ol>

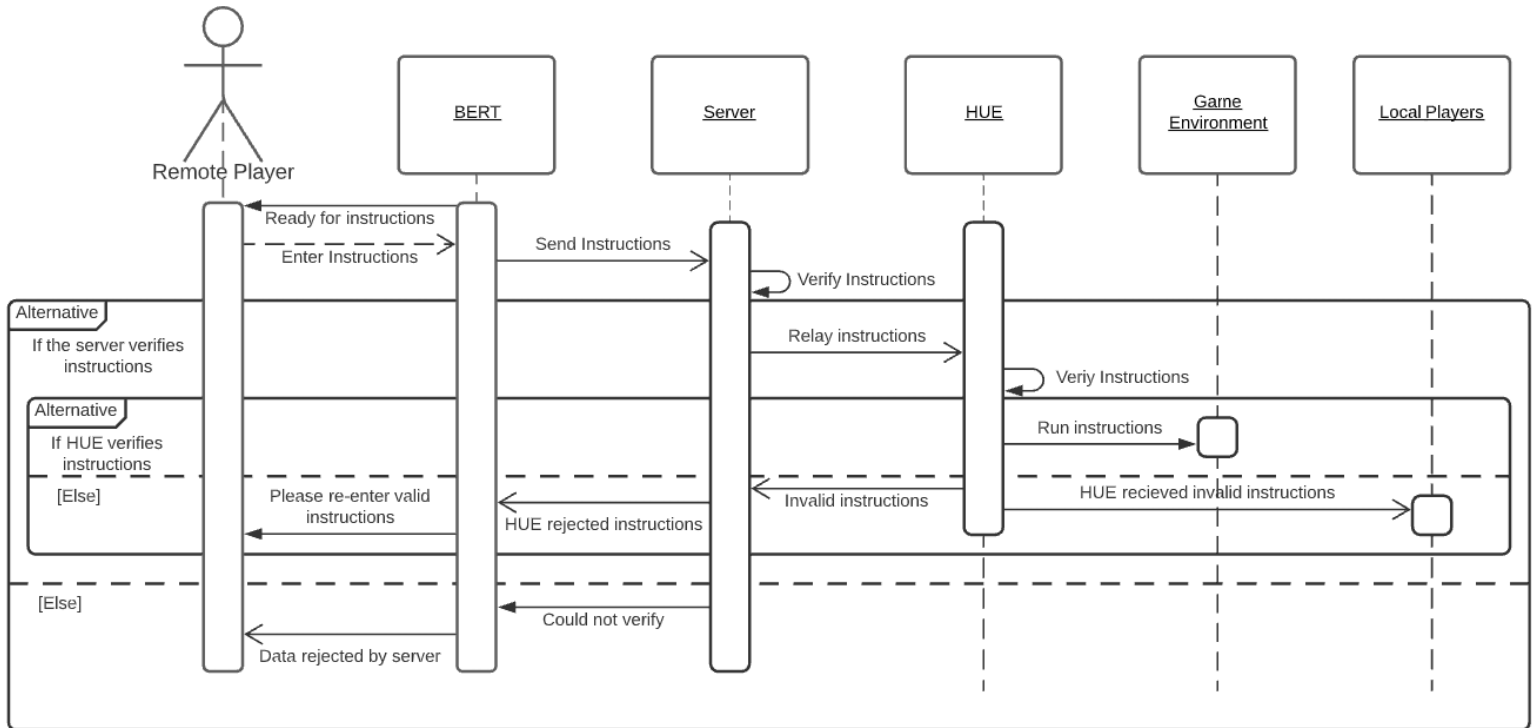
	3. The RP enters their credentials. 4. If the credentials are correct: <ul style="list-style-type: none"> <li>a) The RP can connect to the server.</li> </ul>
Postconditions	The RP can send control data from BERT to HUE and receive feedback.
Alternative Flow(s)	1b. If BERT cannot find server <ul style="list-style-type: none"> <li>a) Display error message</li> </ul> 3b. If the credentials are not valid: <ul style="list-style-type: none"> <li>a) The server notifies the RP of their incorrect login attempt</li> <li>b) The server prompts the RP to retry their credentials (Continue from 1)</li> </ul>



## 2.1.4 Send Instruction to HUE

ID	UC-05
Description	The RP sends instruction for HUE through BERT. These instructions allow HUE to interact with the Game Environment.
Actors	Remote Player
Secondary Use Cases	UC-04: RP Login
Preconditions	HUEBERT is powered on and connected, the RP and LP have logged in to the server.
Main Flow	1. The RP enters their instruction for HUE through BERT 2. BERT compiles and sends these instructions to the server 3. If the server can verify BERT's data <ul style="list-style-type: none"> <li>a. The server relays the data for BERT</li> </ul> 4. If the controls information is verified by HUE. <ul style="list-style-type: none"> <li>a. HUE runs the instructions</li> <li>b. HUE moves and the Game Environment changes in Accordance with these instructions.</li> </ul>
Postconditions	HUE completes the instructions sent to it from BERT.
Alternative Flow(s)	3b. If the server cannot verify the data:

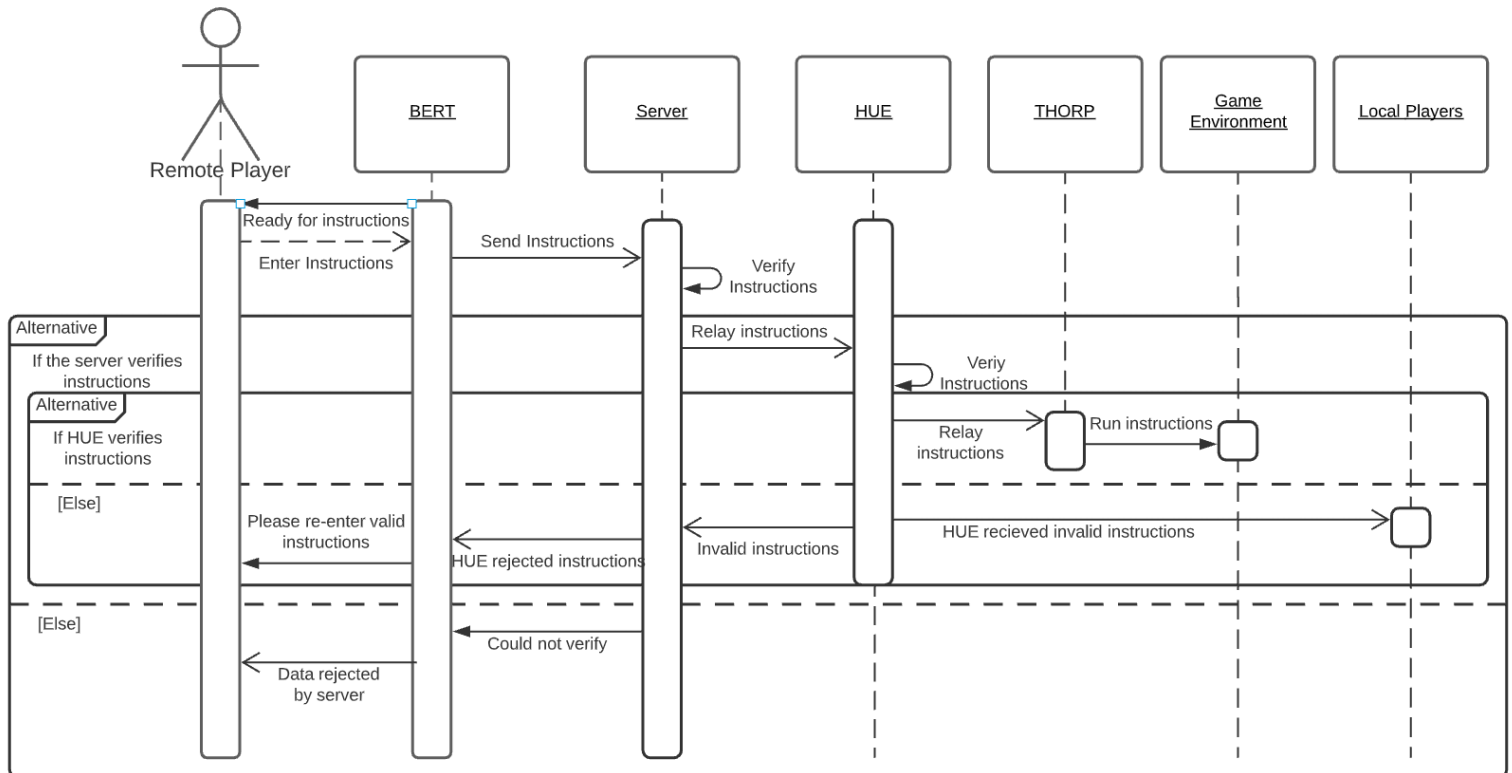
	a) The data is rejected, and no information is sent through to HUE b) The error message is displayed for the RP 4b. If the control information cannot be verified by HUE: a) HUEBERT notifies the RP and LP the controls were invalid. b) HUEBERT prompts the RP to re-enter valid controls (Continue from 1).
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### 2.1.5 Send Instruction to THORP

ID	UC-06
Description	The RP sends control data from BERT to THORP (through HUE) to interact with pieces in the local game environment.
Actors	Remote Player
Secondary Use Cases	UC-05: Send Instruction to HUE,
Preconditions	HUEBERT is powered on and connected, the RP and LP have logged in to the server, THORP is powered and active.
Main Flow	<ol style="list-style-type: none"> <li>1. The RP enters their instruction for THORP through the RP input controls.</li> <li>2. BERT compiles and relays these instructions to the server</li> <li>3. If the server can verify BERT's data <ol style="list-style-type: none"> <li>a. The server relays the data for BERT</li> </ol> </li> <li>4. If the control information is verified by HUE: <ol style="list-style-type: none"> <li>a. HUE relays the instructions to THORP</li> <li>b. THORP runs the instructions</li> <li>c. THORP moves and the Game Environment changes accordingly</li> </ol> </li> </ol>
Postconditions	THORP completes the instructions sent by the RP

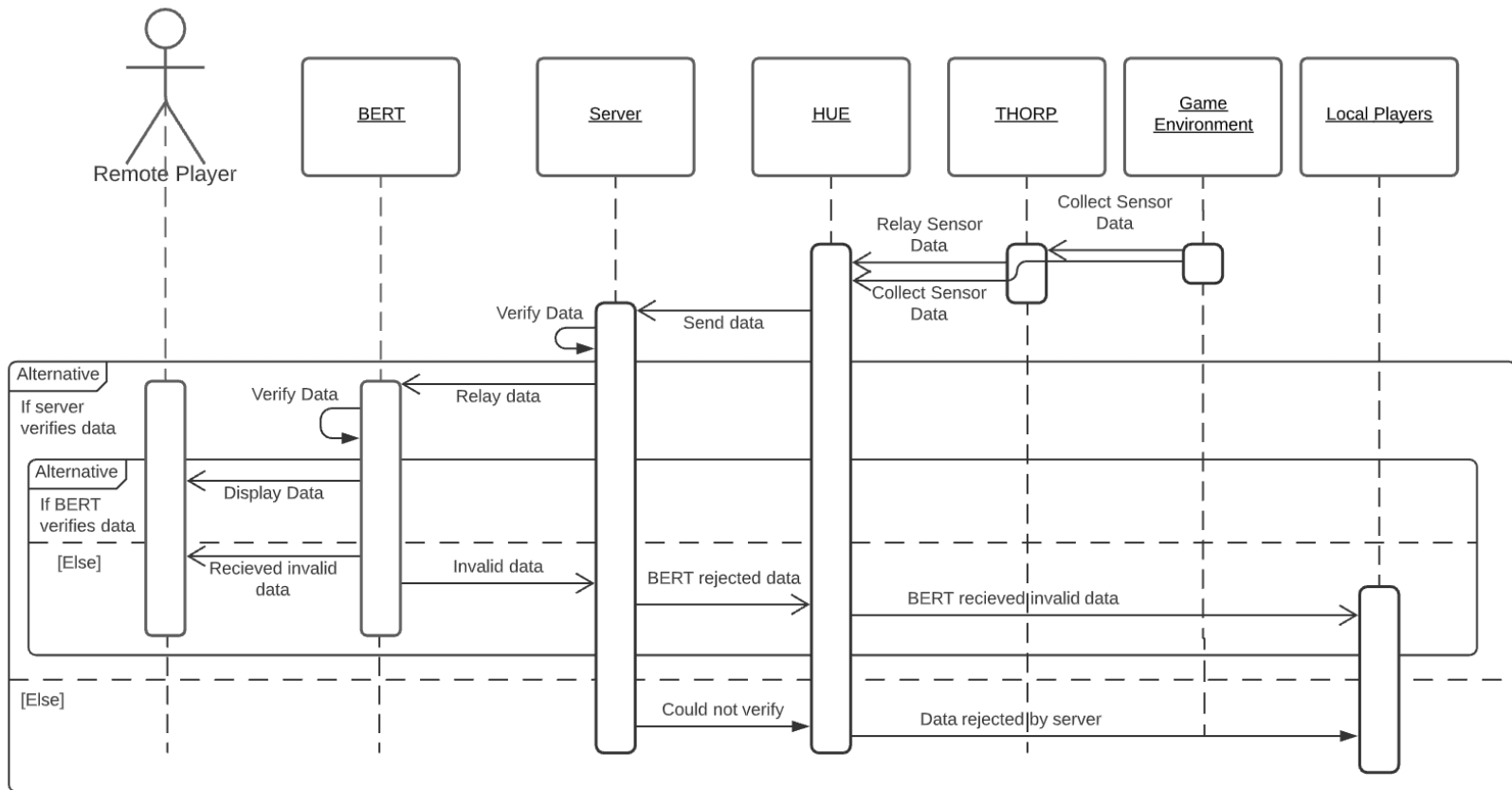
Alternative Flow(s)	<p>3b. If the server cannot verify the data:</p> <ul style="list-style-type: none"> <li>a) The data is rejected, and no information is sent through to HUE</li> <li>b) The error message is displayed for the RP</li> </ul> <p>4.b If the controls cannot be verified:</p> <ul style="list-style-type: none"> <li>a) HUEBERT notifies the RP that the controls were invalid</li> <li>b) HUEBERT prompts the RP to re-enter valid controls (Continue from 3)</li> </ul>
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## 2.1.6 Read BERT Display

ID	UC-07
Description	BERT reads data (sent by HUE) from the server and displays this data for the RP so that the RP can 'see' the game environment.
Actors	Remote Player
Secondary Use Cases	UC-04: RP Login
Preconditions	HUEBERT is powered on and connected, the RP and LP have logged in to the server.
Main Flow	<ol style="list-style-type: none"> <li>HUE and THORP's sensors collect information about the Game Environment</li> <li>HUE sends this data to the server for BERT</li> <li>If the server can verify HUE's data <ol style="list-style-type: none"> <li>The Server relays the data for BERT</li> </ol> </li> <li>BERT verifies the data being sent by the server. <ol style="list-style-type: none"> <li>BERT compiles the data and displays it on the RP Output</li> <li>The RP views BERT's output display.</li> </ol> </li> </ol>
Postconditions	The RP can view the local game environment in real time.
Alternative Flow(s)	<p>3b. If the server cannot verify the data:</p> <ul style="list-style-type: none"> <li>c) The data is rejected, and no information is sent through to BERT.</li> </ul>

	d) The error message is displayed for the RP and LP 4.b If BERT fails to verify the data e) The error message is displayed for the RP and LP f) The RP is asked to please reconnect BERT to the server.



## 2.1.7 View Settings

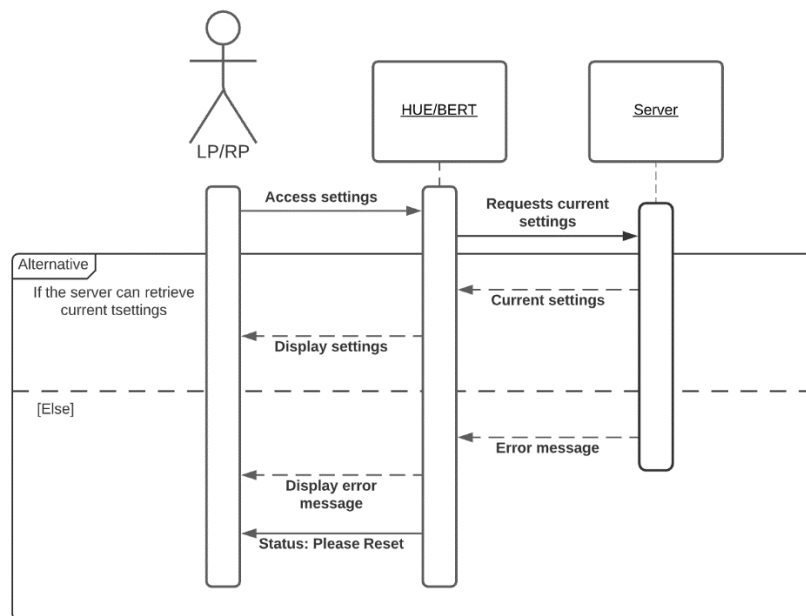
### 2.1.7.1 View RP Settings

ID	UC-08
Description	The RP views the current HUEBERT settings related to their interactions.
Actors	Remote Player
Secondary Use Cases	UC-04: RP Login
Preconditions	The RP has logged in and connect BERT to the Server.
Main Flow	1. The RP attempts to access the settings through BERT's interface. <ol style="list-style-type: none"> <li>The server sends BERT the current settings.</li> <li>The RP sees the current settings</li> </ol>
Postconditions	The RP can see and edit the settings available to them.
Alternative Flow(s)	1.b If the RP fails to access the settings: <ol style="list-style-type: none"> <li>The error message is displayed.</li> <li>The RP is asked to reset the system.</li> </ol>



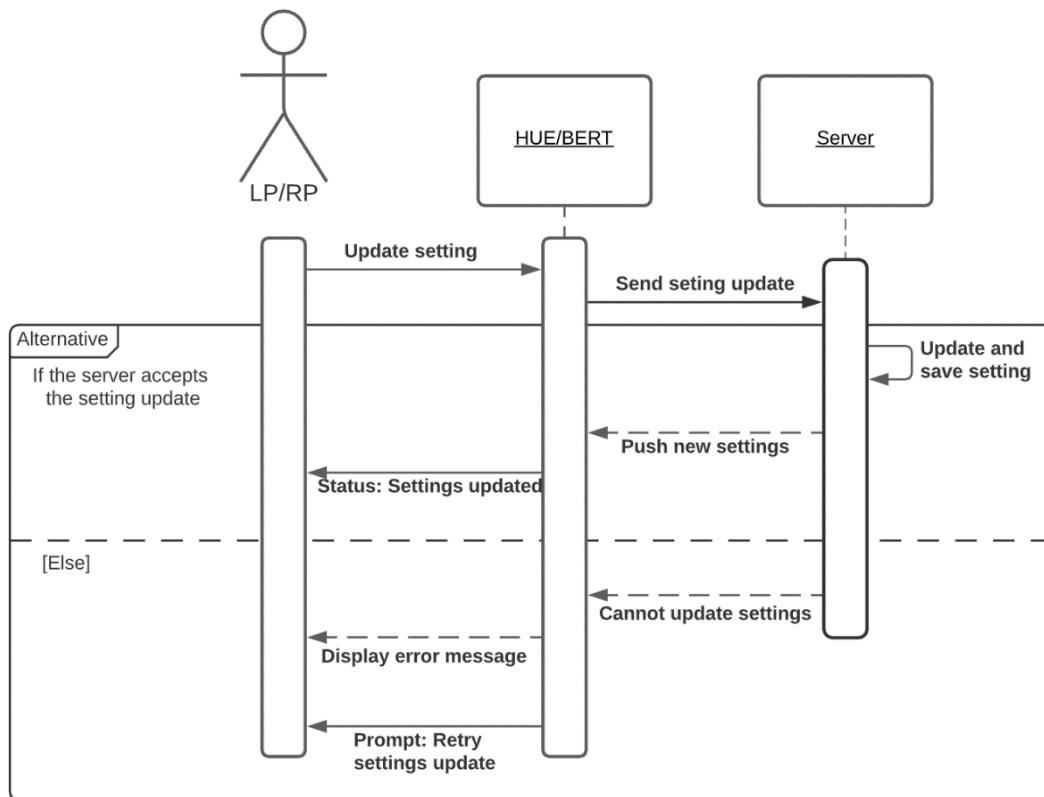
### 2.1.7.2 View LP Settings

ID	UC-09
Description	The RP views the current HUEBERT settings related to their interactions.
Actors	Local Player
Secondary Use Cases	UC-03: LP Login
Preconditions	The LP has logged in and connect HUE to the Server.
Main Flow	<ol style="list-style-type: none"> <li>The RP attempts to access the settings through HUE's interface. <ol style="list-style-type: none"> <li>The server sends HUE the current settings.</li> <li>The LP sees the current settings</li> </ol> </li> </ol>
Postconditions	The RP can see and edit the settings available to them.
Alternative Flow(s)	<ol style="list-style-type: none"> <li>If the LP fails to access the settings: <ol style="list-style-type: none"> <li>The error message is displayed.</li> <li>The LP is asked to reset the system.</li> </ol> </li> </ol>



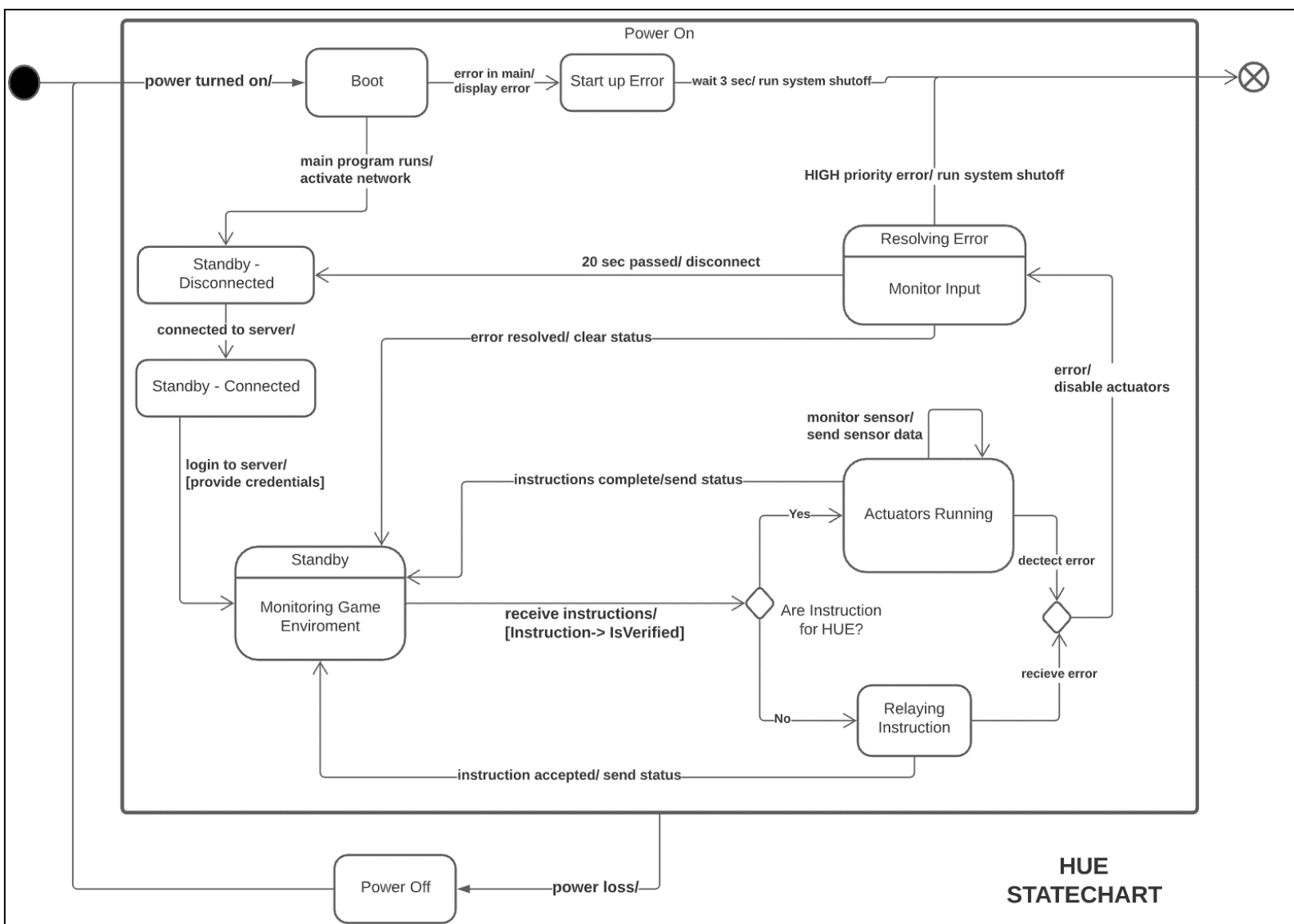
### 2.1.7.3 Update Settings

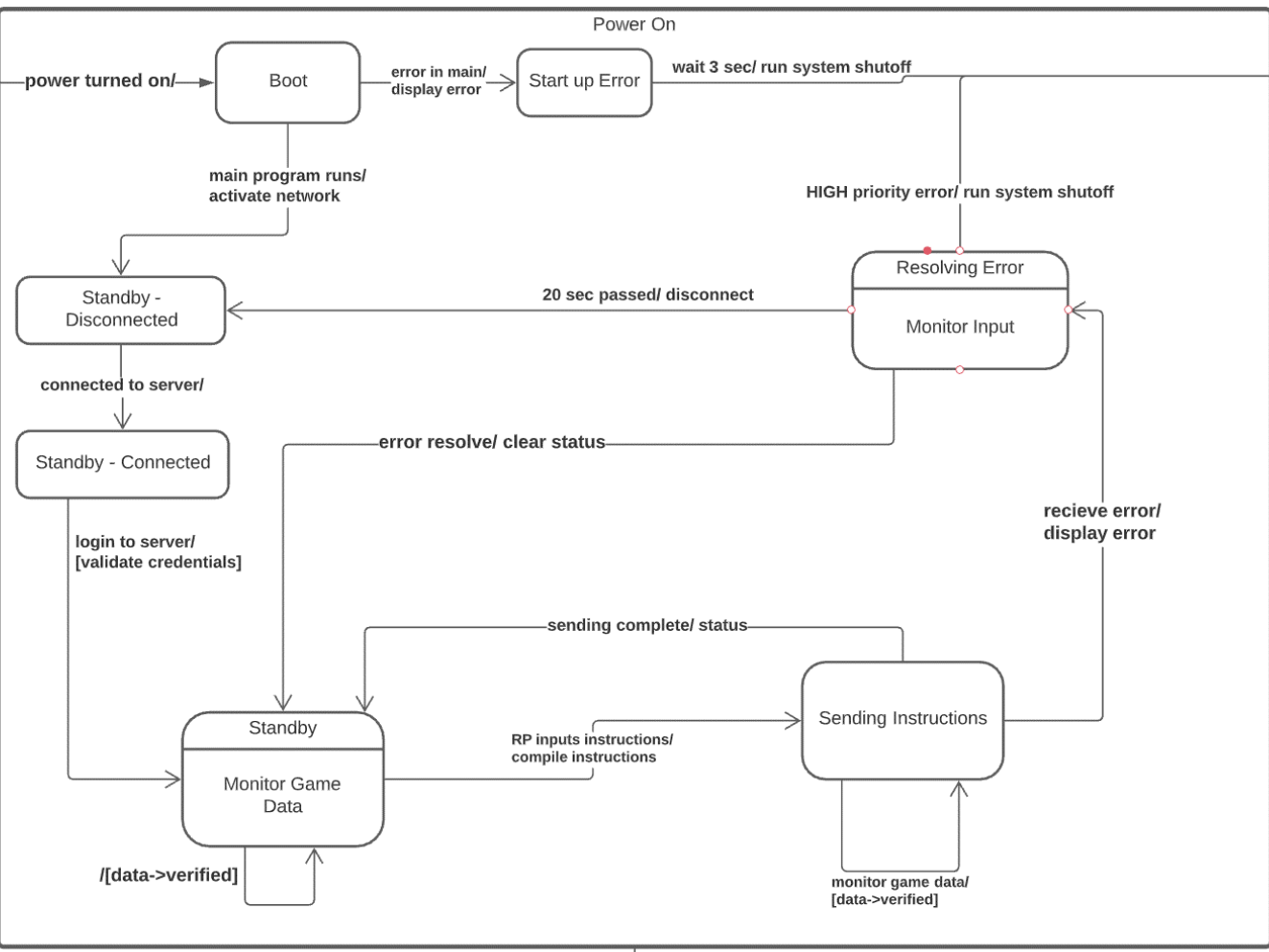
ID	UC-10
Description	The LP and/or RP can update the system settings.
Actors	Remote Player, Local Player
Secondary Use Cases	UC-09: LP Settings, UC-08: RP Settings
Preconditions	The RP or the LP are viewing their respective system settings.
Main Flow	<ol style="list-style-type: none"> <li>The LP or RP change a system setting</li> <li>The LP or RP try to submit the setting to the system</li> <li>If the server and HUE/BERT accept the change: <ol style="list-style-type: none"> <li>The settings are updated and saved.</li> </ol> </li> </ol>
Postconditions	The RP can see and edit the settings available to them.
Alternative Flow(s)	<ol style="list-style-type: none"> <li>If the server and HUE/BERT reject the changer <ol style="list-style-type: none"> <li>The error message is displayed.</li> <li>The RP and LP are prompted to retry or alter the attempted setting change.</li> </ol> </li> </ol>



### 3. State Charts

The HUEBERT system has two relevant state charts, the subsystems HUE and BERT. Both these systems can take on a variety of states which involve power status, interacting with the outside environment, and security permissions. Both these charts are below.





**BERT  
STATECHART**

## 4. Hardware Software Partitioning

The HUEBERT system's functionality will be partitioned into hardware and software according to the following table.

HW/SW	BERT/ HUE	Function	Description
HW	BERT/ HUE	Power on	For both HUE and BERT, powering on will be controlled by a hardware-based switch
HW	BERT	RP display	The RP will view the game environment through a local hardware display
HW	BERT	RP interaction	The RP will communicate with BERT through a local game controller
SW	BERT	Compile RP output data	Data being sent to the RP to view will be compiled on the local side and formatted for proper viewing
SW	BERT	RP user input	The RP's local interaction will run instructions in BERT's software program
SW	BERT/ HUE	Change settings	The RP/LP's actions to update settings will be verified and activated by the server
SW	BERT/ HUE	Login	THE RP/LP's local interactions to login will be verified and authenticated by the server
SW	BERT/ HUE	Server-side data verification	All data being transferred through the server will be verified for accurateness, completeness and authentication
HW	BERT/ HUE	Data transfer	Data transfer will commence from the RP/LP's local internet connection and be transferred through the server
SW	HUE	Data verification	All incoming instructions to HUE will be verified to ensure they are secure, possible and won't damage the system
SW	HUE	Interpret actuator controls	All incoming instructions to HUE will be reformatted so HUE can efficiently run them
SW	HUE	Compile sensor data	All of HUE's sensor data will be interpreted and transferred in HUE's software program
HW	HUE	Actuate frame	Stepper motors will be triggered to actuate HUE's frame
HW	HUE	Sensors	Multiple sensors, including potentiometers, voltage sensors and current sensors will continually measure vital local metrics
HW	HUE	LP interaction	The LP will interact with HUE's software program with a computer.

This table corresponds to the task graph below

#### 4.1.1 Task Graph for HUEBERT

