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**BSE 4100: SOFTWARE ENGINEERING PROJECT I**

**WIMEA-ICT Automatic Weather Station (AWS) Setup Guide**

**Software Requirements Specification**

**Group: BSE19-3**

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Software Requirements Specification

for

WIMEA-ICT AWS Setup Guide

Version 1.0 Approved

Prepared by BSE19-3

WIMEA-ICT

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# 1 Introduction

This document contains the system requirements for the WIMEA-ICT Automatic Weather Station (AWS) Setup Guide Setup Guide application for simulating the assembling process of the WIMEA-ICT AWSs, developed under the WIMEA-ICT project. The requirements presented in this document have been derived from various sources including WIMEA-ICT project [1], analysis of the questionnaires distributed to the AWS deployment teams of the various meteorological services in Uganda [2] and Tanzania [3], and from the laboratory demonstrations conducted in the WIMEA-ICT laboratory at Makerere University Kampala.

## 1.1 Purpose

This document is intended to provide the requirements for the development of the WIMEA-ICT AWS Setup Guide application. It has undergone a series of reviews by the stakeholders who have confirmed the completeness of the requirements for the WIMEA-ICT AWS Setup Guide hence it serves as the **Approved SRS** for the WIMEA-ICT AWS Setup Guide

## 1.2 Document Conventions

This document follows the IEEE format. Bold faced text has been used to emphasize sections and subsections. Each requirement has been given a unique identifier (ID) i.e., each functional requirement has been prefixed with FR and followed by two to three characters indicating the system feature to which it belongs. For example, FRMA indicates a functional requirement which belongs to the Manual-assembly feature, FRAA represents a functional requirement belonging to the Auto-assembly sub system and FRAWA denotes the functional requirements belonging to the About WIMEA-ICT AWSs feature. On the other hand, nonfunctional requirements are identified with NFRxx and General functional requirements with, GFRxx. Each use case shall also be assigned a unique identifier in the format UCxx where xx can be a number between 00 and 20.

The terms product and system shall be used in text to mean the WIMEA-ICT AWS Setup Guide Application. CamelCase[4] shall also be used to for Object-oriented elements for example use case names.

## 1.3 Intended Audience and Reading Suggestions

### 1.3.1 Intended Audience

The project stakeholders interested in this document include but are not limited to the system developers, requirements engineers, project implementers, system testers, WIMEA-ICT AWS installation personnel and weather station installation and Inspection division personnel from the meteorological services in Uganda[2][5], Tanzania [3] and South Sudan.

### 1.3.2 Types of Readers

* AWS project managers will use this document to plan and schedule resources required for the development of the WIMEA-ICT AWS Setup Guide Application.
* WIMEA-ICT AWS Setup Guide programmers will use this document as a requirements reference to design and implement the application.
* AWS maintainers: - these will use the document to know the various items or components required to set up an AWS and how the various components are connected.
* Meteorologists who will set up and configure the AWSs during station deployment.
* Any other researcher who might be interested in knowing the requirements for setting up an AWS using graphical simulation tools.

### 1.3.3 Technical Background Required

For a general understanding of this document, readers should be computer literate, they should have some basic knowledge in electronics in order to understand the basic electrical equipment used. Readers should also have general knowledge about AWSs. A meteorological background such as basic weather station information and weather data may be helpful in understanding the purpose of the project and any weather-related parameters mentioned in this document.

### 1.3.4 Reading Suggestion

All readers of this document need to read **Section 1** to gain an overview of the project, this section contains the scope of the project, the purpose of the document and the type of readers of this document.

In order to understand the application functions, the reader must read **Section 2,** which addresses the product perspective, high-level architecture of the product, user classes and their characteristics plus the operating environment of the product. **Section 3** discusses the external interface requirements in terms of the User interfaces, Hardware interfaces, software and communication interfaces to be adopted during the development of the product. **Section 4** provides a description of the system features by providing a use case model of the system detailing how the users interact with the system.

Lastly, **Section 5** describes the nonfunctional requirements concerning the performance, safety, security and the quality of the product.

## 1.4 Scope of the Product

The WIMEA-ICT AWS Setup Guide shall be an open source desktop application intended to be used by the meteorological services in Uganda, Tanzania and South Sudan in simulating the setting up / assembling process of the various components of the WIMEA-ICT AWSs. The WIMEA-ICT AWS is made up of gateway (device that sends the weather data to a remote repository) and four nodes (weather data capturing devices) i.e., two-meter node, ten-meter node, sink node and the ground node. The product shall therefore cover the simulation of setting up/ assembly of the WIMEA-ICT AWS. It will also enable users to assemble the AWS nodes and the Low Power Gateway (LPG) themselves.

Users shall be presented with tools that make up the WIMEA-ICT AWS and shall be required to identify the parts. Later on, users’ knowledge of assembling the AWS shall be tested using drag and drop features. Users shall also be provided with an automated way of assembling, which does not require them to interact but only watch the process. This shall especially be useful for first time users. Tutorials on technologies such as IEEE 802.15.4 [6] shall also be loaded in the emulator in order to provide more information on how the technologies apply to the operations of the AWS. Text displayed on the user interface shall be in English language.

The application source code will be stored on the Github repository for WIMEA-ICT project [7] to enable users and other developers to access it and modify it where necessary.

## 1.5 References

[1] J. Reuder and J. Sansa-otim, “WIMEA-ICT: Improving Weather Information Management in East Africa for effective service provision through the application of suitable ICTs,” no. November, pp. 1–6, 2013.

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[13] B. Krishnamachari and A. Networks, “An Introduction to wireless sensor networks,” no. July, p. 4, 2018.

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# 2. Overall Description

This section provides an overall description and the product perspective of the WIMEA-ICT AWS Setup Guide. It discusses in detail the functionalities of the product, its users and their characteristics, the operating environment and the assumptions put into consideration for its effectiveness.

## 2.1 Product Perspective

WIMEA-ICT [8] is a combined research and capacity building project coined by the Norwegian Agency for Development Cooperation (NORAD) under the Norwegian Program for Capacity Development in Higher Education and Research for Development (NORHED) scheme. WIMEA-ICT partners are Makerere University (MUK) in Uganda, University of Juba (UoJ) in South Sudan, Dar es Salaam Institute of Technology (DIT) in Tanzania and the Geophysical Institute of the University of Bergen in Norway.

WIMEA-ICT has been designing, installed and is maintaining Wireless Sensor Network (WSN) based AWSs since 2015. Currently, WIMEA-ICT is deploying the first batch of AWSs in the three countries including Uganda, Tanzania and South Sudan. However, during the deployment phase, a number of challenges were identified. These include limited technical skills of the observers, complex terminologies used, and damage of equipment used to train the AWS deployment among others.

The purpose of this project is to develop a graphical tool that will simulate the AWS setup process, which shall enable users understand the WIMEA-ICT assembly process. Components to be included are; the sensor nodes and the LPG. It will also enable the AWS deployment personnel of the meteorological stakeholders to virtually set up the nodes of an AWS before physically doing so in the field. This will reduce on the components wasted during the training programs, reduce on costs of training personnel and increase technical knowhow of setting up and assembling WIMEA-ICT AWSs.

### 2.1.1 Overview of WIMEA-ICT AWSs

The Automatic Weather Station[9] is a kind of weather station for which the weather parameters such as rainfall, wind speed, sunshine insolation, temperature among others are captured by electronic sensing devices which are deployed in the environment at the weather station. Under the WIMEA-ICT project each AWS is made up of four nodes (weather data capturing devices), where each node has distinct sensing devices to capture different weather parameter and these are;

1. Two-meter node (2m-node) which has sensors for capturing Relative Humidity and Temperature. This node is placed two meters from the ground.
2. Ten-meter node (10m-node) which has sensors for capturing sunshine insolation, wind direction and wind speed. This node is placed ten meters from the ground.
3. Ground node (gnd-node); this node is placed at the ground level and it has sensors for soil temperature, soil moisture and the electronic rain gauge.
4. Sink node; this node is connected to the LPG and is responsible for receiving all the weather data captured by all other nodes via wireless radio wave signals. Then the gateway (LPG) can send the weather data received by the node via stronger internet protocol.

**The Low Power Gateway**

This is a device used by WIMEA-ICT AWSs to capture the weather parameters (data) from the sink node and relay it over the internet to the remote WIMEA-ICT server. Once the weather data is in the repository at the server, it can undergo analysis and other modifications as required by WIMEA-ICT and the meteorological authorities in the mentioned countries. This name suits it because it consumes relatively less power compared to the earlier gateway approaches (Raspberry PI [10]) which were used by WIMEA-ICT project**.**

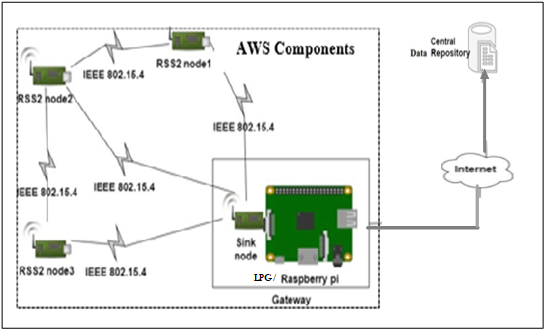


Figure 2. 1 Architecture of WIMEA-ICT AWSs

### 2.1.2 High-level System Architecture

WIMEA-ICT AWS Setup Guide shall be composed of two major features These are: **Auto-assembly** and **Manual-assembly**. It also consists of the About WIMEA-ICT AWSs for providing detailed information concerning automatic weather stations developed by the WIMEA-ICT.



Figure 2. 2 AWS Setup Guide High-level Architecture

## 2.2 Product Functions

In order to solve the problems mentioned in subsection 2.1 above, the WIMEA-ICT AWS Setup Guide will perform the functions listed below;

1. The system shall provide the user with two options including **Auto-assembly,** where by the user shall only start the simulator and all the steps shall be performed without their intervention, while the second option shall enable users to perform assembling of the AWS components themselves by manually attaching the components (**Manual assembly**).
2. The system shall provide a complete set of components (items) used to set up a given AWS node or low power gateway (LPG). It will also enable users to study a single component by exposing the various views of the component in order to show the connection interfaces.
3. The system shall provide pictures and descriptive information about the various equipment (items) which make up the WIMEA-ICT AWSs. It shall also provide detailed information about the component in the browser.
4. The system shall enable the user to choose and setup or assemble the AWS node or LPG by themselves. Here, the user shall be able to select, drag and drop the items and connect them together.
5. Users shall be able to move the selected components to the working area (canvas), be able to move them across the canvas and zoom in and out.
6. The system shall also enable the user to configure the AWS node. For example, adjusting the electrical properties of some devices such as batteries.
7. The system shall provide properties of the selected component in terms of its dimensions, voltage, power and other electrical characteristics.
8. The system shall also award points foreach correctly connected component of the AWS.
9. In case components are wrongly connected, the system shall reject the connection, informing the user of the rejection with an audio message.
10. The system shall also enable the user to save the assembled components during Manual assembly.
11. The system shall provide a simulation environment to assist in emulating the WIMEA-ICT AWS, including setting up the wireless sensor nodes (AWS nodes) and the low power gateway.
12. The system shall provide an audio output directing the user on how to assemble the various WIMEA-ICT AWS nodes and the LPG.
13. WIMEA-ICT AWS Setup Guide application shall enable users to pause and resume the automatic simulation for the assembling process of the AWS nodes or the LPG.
14. The simulator shall provide users with the option to increase or reduce the speed at which the auto-assembly option operates.
15. The simulation will also enable the user to increase/reduce the volume of the audio played during the simulation.
16. Once the AWS is successfully assembled, the user shall be able to see how the data moves from the sender nodes to the sink node and later through the cloud to the remote location (server).

## 2.3 User Classes and Characteristics

WIMEA-ICT AWS Setup Guide will be used by meteorologists’ personnel in charge of assembling AWS components and setting up AWSs. These users are expected to be computer literate and have basic knowledge about the automatic weather stations. AWS designers who will assist in maintaining and troubleshooting the application (WIMEA-ICT AWS Setup Guide), adding new features to the application in case new components or technologies are introduced in the WIMEA-ICT AWSs.

## 2.4 Operating Environment

The WIMEA-ICT AWS Setup Guide application will be accessible and usable on desktops which run windows 7 and later versions. It will use the standard hardware components of the device onto which it is installed e.g. desktops and laptops.

The application will also interact with the browser so as to load the details of the AWS node or LPG component of interest.

## 2.5 Design and Implementation Constraints

User should have installed Adobe flash[11] on their computers in order to load the application.

Users computers should have graphics drivers in order to support the visuals provided by the application without distortion of image quality. For users to hear / listen to the audio description of the components during auto-assembly, they should have installed audio drivers on their computers.

The system should be scalable in order to enable addition of new AWS node components in case new technologies are incorporated in the WIMEA-ICT AWSs.

## 2.6 User Documentation

We shall provide users with help options about the application to enable them learn the possible actions performed by the system and those that they can accomplish with the system.

User manual will also be written to guide the users on how to use the system. A system design document will also be written to guide the system implementation.

## 2.7 Assumptions and Dependencies

* The user has a browser installed on the computer onto which the application operates.
* User has internet access in order to load and view the AWS component from the internet using a browser. This shall be required in case the user wants to get more details about the AWS components.
* The application shall run on Windows Operating System (OS).
* The application shall not need internet to run Auto Assembly and Manual assembly activities.

# 3. External Interface Requirements

This section discusses the user interface requirements, and the communication interface requirements of the WIMEA-ICT AWS Setup Guide desktop application.

## 3.1 User Interfaces

From the user interface perspective, the WIMEA-ICT AWS Setup Guide shall be based on Graphical User Interface (GUI). It will allow its users to interact with it via menus, audio outputs, drop-down select options for choosing among alternatives, buttons, dialog boxes, sliders, links and other GUI elements. The choice for the GUI is due to the graphical characteristics of the system’s functions and to provide a convenient way of using the system.

For clarity of the visuals and the system interface elements, the system shall require a minimum screen resolution of 1024 X 768 pixels to display its screen features without distortion.

This subsection provides sketches and a brief description of the key interfaces of the WIMEA-ICT AWS Setup Guide desktop application.

### 3.1.1 Start Interface (choose operation mode)

This interface will be loaded every time the system is started. From this interface, the user will be able to choose the mode in which the application should run, either *Auto-assembly* or *Manual-assembly* mode by clicking the preferred choice. It is on this interface where the user shall also be able to click the link which provides information about WIMEA-ICT AWSs i.e., *About WIMEA-ICT AWSs*.



Figure 3. 1 Start Interface.

### 3.1.2 Choose AWS Node or LPG

The user will be able to choose whether to assemble manually or run automatic simulation of either the AWS Node or LPG from this interface. This interface will be displayed depending on the mode of operation chosen by the user from the start interface.



Figure 3. 2 Choose AWS Node or LPG interface

### 3.1.3 Choose AWS Node Type

This interface will enable the user to select the kind of AWS node to assemble manually or simulate automatically. <<Text on this interface shall change depending on the mode chosen earlier.>>



Figure 3. 3 Choose AWS Node Interface.

### 3.1.4 Auto-assembly

This interface will enable users to view an automatic simulation of the AWS node or LPG assembly process. From this interface, the user shall be able to start/stop, play/resume/pause, increase/decrease speed of the automatic simulation, reduce/increase the volume of the audio output of the simulator.



Figure 3. 4 Auto-assembly Interface

### 3.1.5 Manual-assembly

This interface will enable the user to assemble the AWS node or LPG by themselves by dragging the components from the components pane and dropping them on the working area (canvas) and connecting them using tools from the Tools bar.



Figure 3. 5 Manual-assembly Interface

### 3.1.6 About WIMEA-ICT AWSs

This interface will provide the user with information about the WIMEA-ICT AWSs. On this interface, the user will click on a node and its information will be displayed in details i.e., the weather parameters the node captures, the components the node has.



Figure 3. 6 About WIMEA-ICT AWSs

## 3.2 Hardware Interfaces

The WIMEA-ICT AWS Setup Guide will run on typical PCs (laptops and Desktops) and therefore shall use the hardware resources of the typical PC.

## 3.3 Software Interfaces

The system will run on Windows OS (Windows 7 and later versions) or desktops.

The system shall also interact externally with the browser to search for and display the specified component details from the internet.

# 4. System Features

This section discusses the system features that the WIMEA-ICT AWS Setup Guide system shall present to its users. The functional requirements described in subsection 2.2 are each assigned a unique identifier and allocated to the system feature which realized it.

**General Functional Requirements**

Table 1 General Functional Requirements

|  |  |
| --- | --- |
| ID | Functional Requirement |
| GFR01 | The system shall provide the user with two options i.e., **auto-assembly** where by the user shall only start the simulator and all the steps shall be performed without their intervention, while the second option shall enable users to perform assembling of the AWS components themselves by manually attaching the components (**manual assembly**). |

## 4.1 Features

### 4.1.1 Auto-Assembly

This feature will enable the users to run an automatic simulation showing how the various WIMEA-ICT AWS nodes or LPG components can be connected together. It will also provide a descriptive audio information guiding the users on how to assemble the AWS node components. This feature has the highest priority because most of the times the users will be interested in learning how the AWS components are set up before setting them up in the field physically. The functional requirements for this feature are;

Table 2 Auto-Assembly Functional Requirements

|  |  |
| --- | --- |
| ID | Functional requirement |
| FRAA01 | The system shall provide a simulation environment to assist in emulating the WIMEA-ICT AWS, including setting up the wireless sensor nodes (AWS nodes) and the low power gateway. |
| FRAA02 | The system shall provide an audio output directing the user how to assemble the various WIMEA-ICT AWS nodes and the LPG. |
| FRAA03 | WIMWA-ICT AWS Setup Guide system shall enable users to pause and resume the automatic simulation for the assembling process of the AWS nodes or the LPG. |
| FRAA04 | The simulator shall provide users with the option to increase or reduce the speed at which the auto-assembly option operates. |
| FRAA05 | Once the AWS is successfully assembled, the user shall be able to see how the data moves from the sender node to the sink node and later through the cloud to the remote location (server). |
| FRAA06 | The user shall also increase/reduce the volume of the audio played during the simulation. |

### 4.1.2 Manual-Assembly

The Manual-assembly feature shall one of the two modes of operation of the WIMEA-ICT AWS Setup Guide desktop application. This feature shall enable the users to assemble AWS node or LPG components by themselves through dragging components and dropping them in the working area and connecting them. The functional requirements for this feature are;

Table 3 Manual-Assembly Functional Requirements

|  |  |
| --- | --- |
| ID | Functional requirement |
| FRMA01 | The system shall enable the user to choose and setup or assemble the AWS node or LPG by themselves. Here, the user shall be able to select, drag and drop the items and connect them together. |
| FRMA02 | Users shall be able to move the selected components to the working area (canvas), be able to move them across the canvas, zoom in and out. |
| FRMA03 | The system shall also enable the user to configure the AWS node, for example, adjusting the electrical properties of some devices such as batteries. |
| FRMA04 | The system shall provide a brief view of the properties of the selected component in terms of its dimensions, voltage, power and other electrical characteristics. |
| FRMA05 | The system shall also award points to for each correctly connected component of the AWS. |
| FRMA06 | In case the components are wrongly connected, the system shall reject the connection, informing the user of the rejection with an audio message. |
| FRMA07 | The system shall also enable the user to save the assembled components during Manual assembly |

### 4.1.3 About WIMEA-ICT AWSs

This feature will enable users to learn more about the technologies used by WIMEA-ICT AWSs. It will explain the components, nodes and weather parameters captured by the AWSs in detail. The functional requirements for this feature are;

Table 4 About WIMEA-ICT AWSs Functional Requirements

|  |  |
| --- | --- |
| ID | Functional requirement |
| FRAWA01 | The system shall provide a complete set of components (items) used to set up a given AWS node or low power gateway (LPG). It will also enable users to study a single component by exposing the various views of the component in order to show the connection interfaces. |
| FRAWA02 | The system shall provide pictures and descriptive information about the various equipment (items) which make up the WIMEA-ICT AWSs. It shall also provide detailed information about the component externally in the browser. |

## 4.2 Use Cases

The use case model of WIMEA-ICT AWS Setup Guide is based on the advanced concepts provided in [12]. Each use case is assigned a unique identifier in order to keep track of which use case realizes which functional requirement. The traceability matrix is provided in the appendices section (Appendix C) to map the requirements to the Use Cases.

Table 5 Use Cases for WIMEA-ICT AWS Setup Guide

|  |  |  |
| --- | --- | --- |
| ID | Use Case | Details |
| UC01 | **AssembleAWSNode** | This use case is for the assembly process of the AWS nodes or the LPG either automatically (Automatic simulation) or Manually depending on the user’s choice. |
| UC02 | **DisplayAWSInfo** | This use case is responsible for the “About WIMEA-ICT AWS”; it provides the detailed description of WIMEA-ICT AWS nodes and the components which make them up. |

### 4.2.2 Use Case Narrative

This section provides a detailed description of how the major use cases of the WIMEA-ICT AWS Setup Guide will be executed as the user interact with it.

**AssembleAWSNode**

Table 6 AssembleAWSNode Use case Narrative

|  |  |
| --- | --- |
| Use case ID | **UC01** |
| Use case Name | **AssembleAWSNode** |
| Actors | Aws Deployment Team / Meteorologists  <<system’s internal controller>> |
| Triggers | User wants to simulate assembly of Nodes or LPG  User wants to assemble the Nodes of LPG by him/herself |
| Preconditions | The user has started the WIMEA-ICT AWS Setup Guide application. |
| Main Flow | 1. **If**: Auto-Assembly    1. System loads the AWS Nodes    2. User selects the node to simulate/assemble    3. System loads the components for the selected node    4. **While** there are more components on the stage:       1. System drags the components to the canvas (without user intervention).       2. System plays the audio description of the components.       3. System connects the components.    5. User controls simulation. <<pause, resume, stop, increase/reduce simulation speed, increase/reduce volume>>    6. System ends the simulations. 2. **If**: Manual-Assembly;    1. <<do: steps 1.1 to 1.3 as in Auto-assembly>>    2. **While** there are more components on the stage:       1. User drags the component to the canvas.       2. User connects the components.       3. System checks correctness of connection.       4. **If**: correct connection; award points.       5. **Else**: reject connection & notify user.    3. User saves assembled components. |
| Post-conditions | * The Automatic simulation has been run. * The AWS node or LPG has been assembled. * Points have been awarded for correct connections |
| Alternative Flow | None. |

**DisplayAWSInfo**

Table 7 DisplayAWSInfo Use case Narrative

|  |  |
| --- | --- |
| Use case ID | **UC02** |
| Use case Name | **DisplayAWSInfo** |
| Actors | Aws Deployment Team / Meteorologists.  <<system’s internal controller>>  Web browser. |
| Triggers | User wants to find out more information about WIMEA-ICT AWSs. |
| Preconditions | The user has chosen the “About WIMEA-ICT AWS” option.  The user has determined that he/she wants to view the component’s details. |
| Normal Flow | 1. User clicks “Components” menu option. 2. System loads the AWS nodes and a description about them. 3. User chooses the AWS node. 4. System loads all the components for the chosen node including it pictures and a description. 5. User clicks on a particular component. 6. System loads the component details and properties. 7. User clicks “More information” button. 8. System links to browser to load more component details. |
| Post-conditions | The AWS Component’s details have been loaded in the browser.  The AWS Component’s details were not found. |
| Alternative Flow | 8.1 Component details not found. |

### 4.2.3 Description.

Refer to the user story in Appendix B.

# 5. Other Nonfunctional Requirements

This section focuses on the other non-functional requirements of the WIMEA-ICT AWS Setup Guide.

## 5.1 Performance Requirements

This subsection describes what must be specified in order to achieve high performance of the WIMEA-ICT AWS Setup Guide.

During drag and drop of any of the selected components, the selected component shall move at a speed relative to that a user is moving the cursor and be placed at a desired location in the workspace.

## 5.2 Security Requirements

The WIMEA-ICT AWS Setup Guide application shall not require any authentication to be used. It shall also be able to save the user’s connections (users assembled components) for future reference.

## 5.3 Software Quality Attributes

**Usability:**

* The WIMEA-ICT AWS Setup Guide application shall be designed with usability as a priority.
* The application shall be designed in a manner that is both visually appealing and easy for the users to navigate.
* The system shall provide users with information on how to use it by providing a Help feature (NFR01).

**Safety:**

* The system will not interfere with any other applications installed on the user’s device and its internal components.

## 5.4 Business Rules.

The WIMEA-ICT AWS Setup Guide shall be open for use to anyone who needs to learn about how the WIMEA-ICT AWSs and general knowledge about WIMEA-ICT AWSs.

The general electronic rules of connecting circuits apply. For example, for any connection between components; ground connects to ground, female headers connect to male headers.

# Appendices.

## Appendix A: Glossary

|  |  |
| --- | --- |
| **Term** | **Details** |
| AWS | **Automatic Weather Station**. A weather station which uses suitable ICTs to capture weather data. |
| GUI | **Graphical User Interface** |
| ICT | Information Communication Technology |
| LPG | **Low Power Gateway.** The gateway device that relays the weather data over the Internet designed for generation 3 (Gen 3) AWSs developed by WIMEA-ICT. |
| Node or AWS node | The electrical sensing and transmitting device used on an AWS. WIMEA-ICT uses four nodes per AWS i.e., 2-meter node, 10-meter node, ground-node and sink node. |
| OS | Operating System |
| PC | Personal Computer |
| SRS | **System Requirements Specification**. A document that contain the requirements for the development of a software related system. |
| UI | User Interface |
| Weather Station | A facility either on land or sea with instruments for measuring and recording atmospheric conditions to provide information for weather forecast and studying climate. |
| WIMEA-ICT | **Weather Information Management in East Africa** through application of suitable **ICTs** |
| WSN | Wireless Sensor Network. Self-configured wireless network that monitors physical or environmental conditions [13][14]. |

## Appendix B: User story

This section provides the basic user scenario of the WIMEA-ICT AWS Setup Guide.

*Upon opening the WIMEA-ICT AWS Setup Guide, the user can choose between* ***Auto-Assembly*** *or* ***Manual-Assembly*** *(where the user assembles the AWS nodes or Low Power Gateway LPG).*

*When the user chooses Auto-Assembly (AA), the system asks the user to choose between* ***Assemble AWS Node*** *or* ***Assemble LPG****. Depending on the user’s choice, if the user chooses assemble AWS node, the system asks the user to select the kind of AWS node he/she wants to assemble from 2m-node, 10m-node, ground-node or sink node. After selecting the kind of node, the system loads the components (equipment/items) required to setup the selected AWS node and describes each component in terms of its purpose, name, and properties. On the other hand, if the user chose Assemble LPG, the system loads the components and it provides their description. The component’s properties include voltage characteristics, dimensions, power, current, specified working environment, among other. During Automatic Simulation the system also provides description and directions on how to connect the various components interfaces together.*

*When the user chooses Assemble by Self, the system asks the user to choose between Assemble AWS node or Assemble LPG. The system Asks the user to choose the kind of node to assemble (i.e., if the user chose Assemble AWS node) otherwise the user chooses Assemble LPG. The system loads the components that make match the selection criteria (either AWS node or LPG). The user can now pick (drag and drop the components) on the assembling area (work-space) and can connect them using the pins, wires and screws.*

## Appendix C: Requirements Traceability Matrix

This matrix below maps the use cases to the requirements of the WIMEA-ICT AWS Setup Guide.

Table A:C Requirements Traceability Matrix.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | USE CASES | | | |
| REQUIREMENTS |  | UC01 | UC02 |  |
| GFR01 |  |  |
| FRAA01 |  |  |
| FRAA02 |  |  |
| FRAA03 |  |  |
| FRAA04 |  |  |
| FRAA05 |  |  |
| FRAA06 |  |  |
| FRMA01 |  |  |
| FRMA02 |  |  |
| FRMA03 |  |  |
| FRMA04 |  |  |
| FRMA05 |  |  |
| FRMA06 |  |  |
| FRMA07 |  |  |
| FRAWA01 |  |  |
| FRAWA02 |  |  |