Rain Logger
SRS

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1 Introduction

1.1 Purpose

This document describes the specifications for the Rain Logger system. It is a guideline for Professor Zalewski and classmate developers on the functionality and problems this system may contain.

1.2 Scope

This document will outline the specifications for the Rain Logger software. It is an introduction and orientation to the Rain Logger software. In it we discuss the purpose of the software, specific requirements and functions.

1.3 Definitions, acronyms, and abbreviations

Rain gauge. - Rain gauge will read the rainfall amounts

Wired, tipping bucket rain gauge - Bucket used to collect rain.

Rainfall data logger - Battery operated logger fits in any rain gauge.

Serial port connector - Stainless steel PC interface cable.

1.4 References


1.5 Overview

This document will describe the Rain logger software. How it collects rainfall and records amounts. The hardware and software specifications will be documented as well as how the recorded amounts shall be downloaded into the rain logger database. The software requirements shall have an overall description that will explain factors that affect the products and the requirements. The product perspective shall be describing the relationship between the gauge and the software.
2 Overall Description

2.1 Product Perspective
Software Title: Rain Logger

The system will be a database and GUI interface system. The primary goal will be to collect rain data daily. After collection of data, the data will be uploaded and analyzed. The end results will be calculations and reports of daily and weekly rainfall in certain areas of the country.

The Rain logger database will collect rainfall and record amounts. The recorded amounts will be downloaded into the rain logger database where the user will perform analysis and generate reports. Data will be displayed in text and graphical format. The reports generated will display daily totals of rainfall events.

The context diagram below in Figure 1 illustrates the proposed system.

Lines of communication will exist between the software and all peripherals attached to it. Data from the rain logger software will flow over all communication lines shown. A direct link will be run from the rain logger to the user terminal as illustrated above in Figure 1.
The rain logger will be a standalone complete system. This document will be useful if interest on integrating it with other weather software systems such tracking particular weather systems in area at time of rainfall.

Figure 2, below, represents the use case diagram of the system. The actor, left, would be the user at the terminal, making a query for data, uploading, calculating, or writing to the database. Reports can then be printed out from the queries or calculations.

2.1.1 System Interfaces

The data logger will be a standalone PC with a free serial port.

2.1.2 User Interfaces

The data logger software will be a Windows based graphical user software. The user will be able to query the software, do calculations and print to screen or printer.

2.1.3 Hardware Interfaces

The data logger will connect to the serial port of a computer and data will be transmitted to the Windows database.
2.1.4 Software Interfaces

The data logger software will be on a Windows operating system. It shall be compatible with Windows XP, Windows 98, Windows ME, Windows NT workstation, and Windows 2000 workstation. The rain logger software will be a graphical user interface that will analyze and generate reports.

2.1.5 Communication Interfaces

The data logger will be connected to the PC with a serial port; a serial 9600-baud protocol for readings and logged data. The data will be transmitted from the data logger to the PC. The rain logger software will then interface with the database that was uploaded into the PC.

2.1.6 Memory constraints

The PC will have a minimum of 64Mb of RAM. An amount of 256Mb of RAM would be optimal.

2.1.7 Operations

The data logger shall have one mode of operation, initiated by the user. During this mode, several operations may be performed. These operations include data entry, data analysis, report generation, and printing of reports.

The information collected shall be backed up on CD, ready to reinstall at any time of hardware or software failure.

2.1.8 Site adaptation requirements

The collection bucket will need to be mounted on a rooftop free from obstructions such as antennae, A/C units, and any other items. The bucket will have a communications cable attached to it that will send data down to the user terminal. This communication cable must be encased in a weatherproof material to prevent damage.

2.2 Product functions

The data logger shall perform the following functions:

- Collection of rainfall
- Data entry (downloading of rainfall information to database)
- Data analysis
- Report generation

These functions are listed in order of operation; with the first item being performed listed first, and all consecutive functions to follow.
Figure 3, below, is a diagram showing, roughly, how the system will be set up. Data will be collected in the bucket, data from the collection will be downloaded to the PC, data analysis will take place, and reports can then be generated and printed.

2.3 User characteristics

The data logger shall be able to be used by anyone possessing a high school education and above. The graphical user interface shall make the system easy to use by even a novice PC user, and little technical experience shall be necessary for the user to perform the required functions.

2.4 Constraints

Very few constraints will limit the developer’s options when creating this system. These include:

- Signal handshake protocols—computer must be turned on and a network connection available to download rain data.
- Safety and security considerations—user must be logged into the workstation in order to complete any functions; security such as this is necessary to protect the integrity of the database.
2.5 Assumptions and dependencies

Dependencies on memory are outlined in section 2.6.1. If these requirements are not met, appropriate changes to the workstation shall be implemented.

2.6 Apportioning of requirements

No requirements shall be delayed until any future versions.

3 Specific requirements

3.1 External Interfaces

The software shall run on a computer terminal that will be connected to the rain gauge via a serial cable. A user interface shall be created which will allow users to view the real-time rain amount data.

The water measurement shall be calculated by the rain gauge and the data shall be sent through a serial cable to the computer terminal which will format the data to be viewed on the computer screen, as is represented by Figure 4 below.
3.2 Functional Requirements

3.2.1 The system shall be able to convert the rainfall amount data to a viewable format as shown in Figure 5 below.

<table>
<thead>
<tr>
<th>Rainfall Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Amount</td>
</tr>
<tr>
<td>1.00 in.</td>
</tr>
</tbody>
</table>

Figure 5 Rainfall Amount

3.2.2 The system shall be able to receive real-time data and convert it to a format that the user can understand such as Figure 6 below.

<table>
<thead>
<tr>
<th>Rain Gauge Data</th>
<th>User Interface Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.25 inches</td>
<td>1.25 inches</td>
</tr>
</tbody>
</table>

Figure 6 Rainfall Data Conversion

The following requirements are illustrated in Figure 7 below.

3.2.3 The system shall be able to input new data from the weather instrument to the software as changes occur at a rate of once every ten seconds.

3.2.4 The system shall be able to take requests from users and be able to display the users’ wanted results.

3.2.5 The system shall be able to display reports based on rainfall amount history.

3.2.6 The system shall allow the user to reset the data on the rain gauge.
3.3 Non-Functional Requirements

3.3.1 Performance Requirements

3.3.1.1 The system software shall measure the amount of rainfall in hundredths of inches.

3.3.1.2 The system software shall be used on one computer terminal per one rain gauge.

3.3.1.3 The software shall refresh the rainfall rate once every ten seconds.

3.3.1.4 The software shall allow one user per computer terminal.

3.3.2 Software System Attributes

3.3.2.1 Reliability

3.3.2.1.1 The software shall save each ten second reading to a file on the hard drive for easy retrieval in case of software failure.

3.3.2.2 Availability

3.3.2.2.1 The software shall be tested for errors before distribution and any errors found shall be fixed and patched.
### 3.3.2.3 Security

#### 3.3.2.3.1
The software shall have read only permission because the users will not need to change any of the critical values, only display them on the screen.

#### 3.3.2.3.2
The system software shall check the data for critical variables to make sure the correct information is being stored about the rainfall rates.

### 3.3.2.4 Maintainability

#### 3.3.2.4.1
The software shall allow the users to clear the data currently stored on the rain gauge.

#### 3.3.2.4.2
The software shall allow the users to delete old rainfall history that is stored in a database file.

Maintenance upon the rain gauge is done by cleaning the container, which can get dirty through use and perform less accurate readings.

### 3.3.2.5 Portability

#### 3.3.2.5.1
The code should be portable to all Windows-based machines but will not be able to be used without the rain gauge itself.

### 3.4 Design Constraints

#### 3.4.1
The system shall store the rainfall amount history on a daily basis which will allow users to look back on the rainfall amount history each day.

#### 3.4.2
The system shall retrieve data stored in the rainfall history file to display user reports that display rainfall history.

### 3.5 Organizing the specific requirements

#### 3.5.1 System mode

The system will only have a normal mode, as it must passively wait for rain to collect data on rainfall.

#### 3.5.2 User class
Data collected by the rain logger will be accessible by all users

3.5.3 Objects

The system gathers information about rainfall and therefore can be used to predict weather patterns.

3.5.4 Feature

The can be presented with inputs to be all the present information gathered over specific lengths of time.

3.5.5 Stimulus

The system must be presented with rain in order to correctly gather information on rainfall.

3.5.6 Response

Upon receiving rainfall, the system will be able to present information on the amount of rain collected and when the rain was collected.

3.5.7 Functional hierarchy

The software is a simple system that displays data after rainfall is presented to the rain logger.

***End of System Requirements Specification***