**Inverse Requirements:**

There are some of the inverse requirements that has to be taken care of for the proper functioning of this software. Some of the requirements are stated below.

* Valid input should be given to the software to get a proper output. User must enter Numerically possible values for physical quantity (some quantities are always positive) and no alphabets should be given as input in numerical inputs.
* A valid address of GPIB (can be verified from hardware) connection should be provide by the user**.**
* There should proper connections (GPIB cable, interconnecting wire) among the devices(Ohmmeter(6517B), Temperature controller, PC) and the testing sample (input wires of ohmmeter) for the functioning of software.
* The software should not forcefully closed when it is in between a process. It may corrupt the data and also harms the working devices.

**Design Constraints:**

While using or developing this software, some design constraints must be followed. This will work as precaution for the use of this software. The constraints are listed below:

* This software is specifically designed for the Keithley 6517B model and 332 lakeshore Temperature Controller, so this software follows the logics that are compatible with these devices and give the correct output.
* For the interfacing between the software and the devices a GPIB connection is require. For using this GPIB connection a GPIB driver must be installed in the system which supports the device model(6517B).
* This Software can be used in windows and Linux as well but the version (of LabVIEW) in which this software is developed must be same as in the system (despite of the OS) it is being used.
* The compatibility of the driver that is being used by the software (GPIB-488) should be confirmed with the OS in which it is being used.
* The platform that is being used for developing or using software must be same as in which it was formed or developed previously.
* The output results during this process will be shown on the software itself (temporarily till the next task is not started or window has not been closed) also recorded data will be stored in the form of text file (permanently) in the system.

**Non-functional Requirements:**

These are the requirements which are not do any thing with the software functionalities but as important as functionalities. The requirement of

**Reliability:**

The is totally reliable but as its input depend on other device, the reliability of this software dependence also on reliability of the corresponding devices.

**Compatibility:**

The software is compatible with both windows and Linux OS but the version of the LabVIEW or the platform on which the software is being used must be same as the developing platform (or LabVIEW version). And also, as the software is made for using it in a Temperature range of 7K-300K (Kelvin) but it will also work in higher temperatures ranges.

**Availability:**

This software is available to all the user who have installed it properly with the other required configurations or files.

**Maintainability:**

This software can recover from the system crash as the auto saving property stores the data in the storage continuously. Recovery from the disk crash is may not be possible.

Before using this software, a 1-hour pre-training is required under a well practitioner to the software or by using the user manual as a guide. This help in under standing the use of software and also the associated attributes in GUI (Graphical User Interface), the connections among the devices and the other requirements for using software.

**Introduction:**

**Overview:**

This Software Requirement Specification(SRS) document describes the Software Application for Interfacing and Controlling a High Resistance Meter and Temperature Controller. This software will contain two parts one will be used for displaying (graphs and numerical values) and also showing the measured data from the High Resistance Meter (Keithley 6517B) and Temperature Controller (Lakeshore 332) and also to store them, and the other part will just plot the graph for the user’s inputted data. This SRS will describe the comprehensive details in a systematic manner. Firstly, there will the introduction section of the software that contain the purpose, scope and some definitions that will helpful in making the understanding better, then a general description(refer section 2 of index) about the software is provided which will supply the general details about the software (like functions, user characteristics etc.) then some specific requirements(refer section 3 of index) are described such as interfaces (external), functional and non-functional requirements then some other requirements. In this sequence the description of the software is provided.

**Purpose:**

The main purpose of this software is to facilitate an interface between the devices and the users so that the output can be displayed in more understanding manner (such as graphs) and also to do all calculation itself to provide direct outputs (here Resistivity and Temperature). And also, it can be used to plot graphs for user’s inputs (manually).

**Scope:**

The interfacing software’s scope is limited to the devices which are getting used (High Resistance Meter (Keithley 6517B) and Temperature Controller (Lakeshore 332)) and can be extended to the similar devices (works on same logics, input, output and the interfacing drive/medium). But on the other hand, the graph forming part of this software have no limitation on its functionalities as it is independent of the other devices and only depends upon the user’s input.

**Definitions and Abbreviations**:

**GPIB (General Purpose Interface bus)** - An IEEE 488 standard parallel interface used for attaching sensors and programmable instruments to a computer. This require to set the same address (for GPIB address setting, check the device manual or user’s manual) between the devices that has to be interfaced.

**IEEE (Institute of Electrical and Electronics Engineers) 488 –** It is a digital communication bus specification invented by Hewlett Packard and used to connect short range communication devices. This connection can be made easily achieve by wired connection using suitable ports.

**DAQ (Data acquisition)**: It is the process of measuring an electrical or physical phenomenon such as voltage, current, temperature, pressure, or sound with a computer. A **DAQ** system consists of sensors, **DAQ** measurement hardware, and a computer with programmable software.

**GUI (Graphical User Interface)**: It is a type of user interface that allows users to interact with electronic devices through graphical icons and visual indicators such as secondary notation, instead of text-based user interfaces, typed command labels or text navigation.

**Temperature Controller:** As the name implies, a **temperature controller** - often called a **PID controller** is an instrument used to control temperature. The temperature controller takes an input from a temperature sensor and has an output that is connected to a control element such as a heater or fan.

**PID controller** (**proportional–integral–derivative)**: It is a control loop feedback mechanism widely used in industrial control systems and a variety of other applications requiring continuously modulated control.

**High Resistance Meter:** It measures voltage across the test sample having low current supplies.

**References:**

* National Instruments website for details and tutorials about LabVIEW software. Link- <http://www.ni.com/en-in/shop/labview.html>
* User’s manual of High Resistance Meter (Keithley 6517B). Link - <https://www.tek.com/low-level-sensitive-and-specialty-instruments/high-resistance-low-current-electrometers-series-650-6>
* User’s manual of and Temperature Controller (Lakeshore 332). Link- https://www.lakeshore.com/ObsoleteAndResearchDocs/332\_Manual.pdf
* GPIB learning link- http://g2pc1.bu.edu/~qzpeng/gpib/manual/GpibProgTut.pdf
* Google Search engine for gathering other requisite information and knowledge.