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# **Software Requirements Specification**

**for**

**GRAPHYTTI**

**By Team 17**

**MEMBERS:**

**Vivek Datir 140101020 , Mohd Imran 140101041**

**Likhith Pallagni 140101046 , Anish V Monsy 140101081**

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# 1. Introduction

## 1.1 Purpose

To create interactive GUI application for easy analysis of data obtained from Fluorescence Intensity Decay experiment. It allows user to input raw data and parameters from the experiment and performs computation and gives a graphical representation of the result data.

## 1.2 Definitions , acronyms and abbreviations

<i>GUI</i>	<i>Graphical User Interface</i>
<i>SRS</i>	<i>Software Requirement Specifications</i>
<i>FID</i>	<i>Fluorescence Intensity Decay</i>
<i>Raw data</i>	<i>The file containing data that is obtained from experimental observations.</i>
<i>Final data</i>	<i>The deconvoluted data obtained after analysis</i>
<i>Parameters</i>	<i>Parameters specifies number of unknowns, exponential, channels specifies maximum chi square value expected from result and name of result file</i>
<i>LMA</i>	<i>Algorithm used for analysis of Raw data. In mathematics and computing, the Levenberg– Marquardt algorithm (LMA), also known as the damped least-squares (DLS) method, is used to solve non-linear <b>least squares</b> problems. These minimization problems arise especially in <b>least squares</b> curve fitting.</i>
<i>User</i>	<i>Person who interacts with the application</i>

## 1.3 Product Scope

“Graphytti ” is a PC-GUI based application which helps experimentalists doing FID to analyze raw data of experiment. The user provides the observed raw data and his preferred file of parameters which then acts as basis for LMA algorithm. After analysis the results are presented in different plots to make results of experiment clear.

## 2. Overall Description

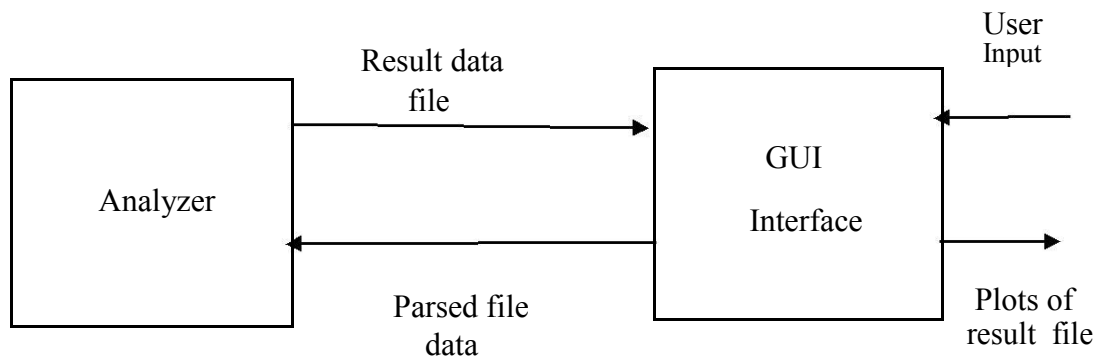
### 2.1 Product Perspective

Graphs are beneficial because they summaries and display information in manner that is easy for most people to comprehend. We aim to provide a software to the targeted users to obtain a quick graphical representation of data that they obtain from FID.

The software described consists of an application for analyzing raw data from FID. The raw data is not ideal exponential decay, but is convoluted with instrument response. Our analyzer uses the LMA algorithm to deconvolute the raw data using input parameters. Based on the above result, our application plots an interactive graph consisting of intensity decay, residuals and autocorrelations.

There are two components in the application , one is GUI interface and the other is analyzer.

- GUI interface: It takes input from users in the form of raw data and parameter file. It plots the appropriate graphs of the final data.
- Analyzer : It performs LMA algorithm on the raw data taken as input based on input parameters. It passes the final data to GUI interface.



### 2.2 User Characteristics

The user should have a background of FID experiment and should be able to give appropriate input parameters.

User is not expected to remember a list of commands while using this software.

## **2.3 Constraints**

Application takes input from a file which has text in specific format. Application can handle raw data of single experiment at a time.

## **2.4 Assumptions and Dependencies**

No assumptions and dependencies have been identified

# **3. Specific Requirement**

## **3.1 External Interface Requirement**

### **3.1.1 User Interface**

The software allows user to browse and choose raw data and input parameters files. It also provides controls to start analysis. The interface shall provide control for switching between cycles. For each cycle there will be three graphs displayed corresponding to intensity decay, residuals and autocorrelation.

### **3.1.2 Hardware Interfaces**

There are no hardware interface requirements for the software.

### **3.1.3 Software Interfaces**

The application shall make use of the system calls of operating system to access the file management system.

### **3.1.4 Communication Interface**

None

## 3.2 Functional Requirements (to module level):

The major class of our project is the Main Window

The Main Window handles the following functions:

- Buttonclick event handlers which respond to handle the user's choice of Raw Data file and also Parameters file through FileDialog Box
- Parses files Raw Data and Parameters files and hands over the data to the Analyser object.
- After receiving confirmation of successful analysis, the temporary result data file is parsed and its data is loaded into FileData object
- Loads FileData into the array of ExptCycle objects
- Displays Data onto the screen based on data in FileData object
- Plots the following graphs from current ExptCycle
  1. Fluorescence Intensity vs Time
  2. Residuals vs Time
  3. Autocorelation vs Time
- Changes current ExptCycle object on user input
- Show user coordinated of the any point on graph on clicking on it
- Allow user to scroll through the main graph by dragging
- Allow user to zoom on to the graph.

The MainWindow contains objects of the following classes:

- Analyser
- ExptCycle

The Analyser handles the following functions:

- Based on the data in the Parameters file it performs the LM algorithm on the Raw Data file

- The analysis results are stored in a temporary result file

The ExptCycle class

- Contains all the data associated with a particular experimental cycle in the FID experiment

Use cases:

- User can upload a file for plotting on clicking on the Upload button. On successful upload of file in proper format show the location of file. In case of failure, shows an error message.
- User can switch through various cycles by clicking on next and previous buttons.
- User can get the co-ordinated of the point by clicking on it.
- User can scroll through the graph by holding left click and dragging.
- User can zoom on to the graph.

### **3.3 Performance Requirement**

No specific performance requirement by the client side.

### **3.4 Safety Requirement**

No safety requirement has been mentioned.

## **3.5 Software System attributes**

### **3.5.1 Portability**

The same source code of the application can be built on different platforms.

- Windows
- Linux
- Mac OS

## **3.6 Legal Requirements**

The product uses libraries licensed under GPL v3. Following the regulations of the license, this product is also licensed under same.