Espec Software User Guide

Introduction

Welcome to Espec, a pioneering software designed to enhance the functionality of second-generation spectrophotometer hardware. Crafted with the core principles of the iGEM spirit, Espec aims to streamline and simplify spectrophotometry for both novices and experts.

Prerequisites

Software License: Espec is open-source software, released under the MIT License. Copyright (c) 2023 by CSMU-Taiwan.

Required Hardware: Second-generation spectrophotometer setup as detailed in the corresponding hardware assembly guide.

Getting Started

1. **Initiating Espec**:
   - Launch the Espec application.

2. **Connection to Arduino**:
   - Enter the IP address of the ESP32.
   - The software will validate the IP and provide options to reconnect if any discrepancies arise.

3. **LED Customization**:
   - Users can select from red, green, or blue LEDs based on their experimental needs.

4. **Data Harvesting from Arduino**:
   - The software retrieves data every 5 seconds.
   - Data categories displayed include illumination, blank, test, and computational values.
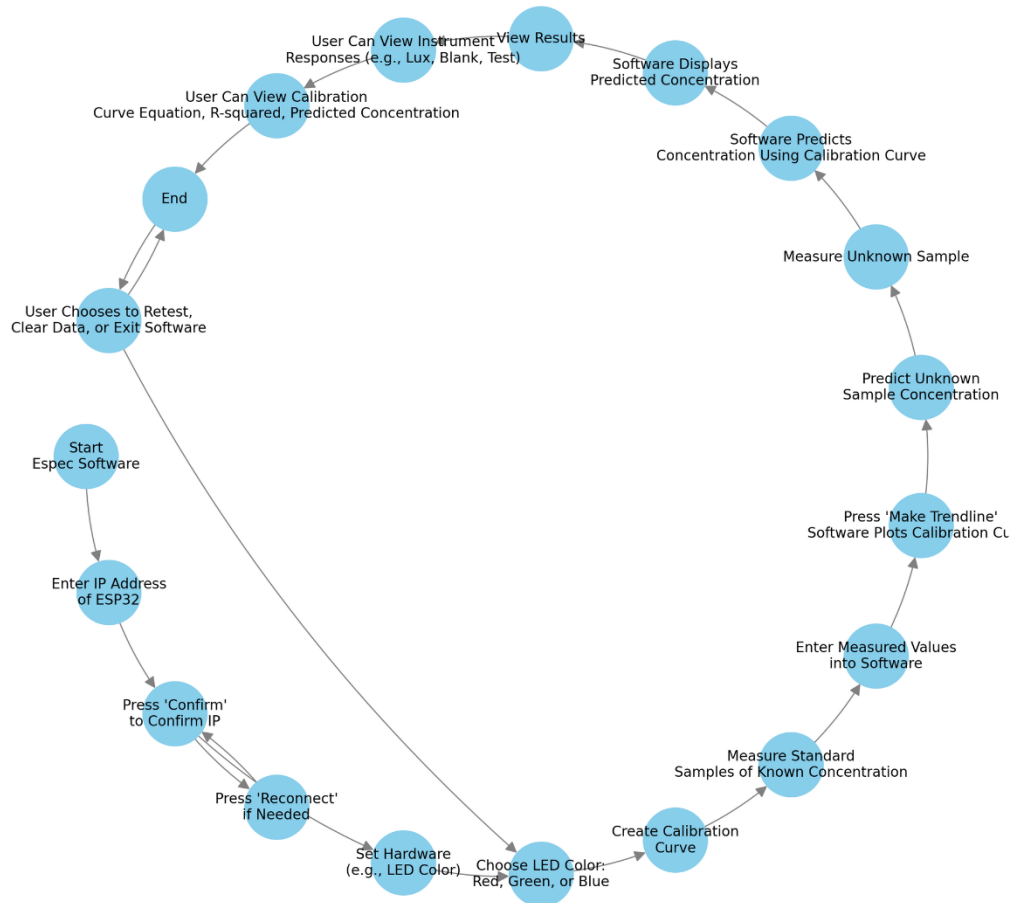
5. **Calibration Curve Insights**:
   - Users can add, save, or delete data points.
   - Options to clear all data or generate a trendline for in-depth analysis are available.

6. **Trendline Data Exposition**:

- o The software displays predicted concentrations, trendline equations, and R-squared values for comprehensive analysis.

Espec Software Operational Flowchart

Navigating the User Interface

1. **Dashboard**: This central hub allows users to connect to Arduino, choose LED colors, and view real-time data.

2. **Data Visualization and Trendline Analysis**: Transform raw data into insightful graphs and trendlines. Customize, save, or reset visual representations based on user preferences.

Spectrometer

Data for Trendline

	Calculate	Concentration	Actions	
1	1.0505	0.8	Delete	Save
2	1.0032	0.7	Delete	Save
3	0.4196	0.01	Delete	Save
4	0.7521	0.4	Delete	Save

Add Row Clear Data Make Trendline

Trendline's Data

Statistic Type	Value	Actions
Predicted Concentration	0.7310	Test
Trendline Equation	$y = 0.813x + 0.418$	
R-Squared Value	0.9972	

Limitations & Future Prospects

While Espec offers a plethora of features, it's primarily optimized for second-generation hardware. Future updates seek to expand device compatibilities and integrate more advanced features based on user feedback.

Conclusion & Acknowledgments

Espec is a testament to the potential of open-source solutions in synthetic biology research. As we embark on this journey, we extend our gratitude to the iGEM community for their continuous support and inspiration. We invite everyone to test Espec and contribute to its evolution.

Acknowledgments:

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