

USER GUIDE FOR MATLAB BASED HEARING TEST SIMULATOR GUI FOR CLINICAL TESTING

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1. INTRODUCTION

The Optimizer GUI (Graphical User Interface) is designed for clinical testing to evaluate subjects' hearing ability in noisy environments with different SNR(Signal to Noise Ratio) values. With this software package, examiner will be able to identify which words are correctly perceived and then collect testing data in various conditions to measure the performance of the subjects in hearing tests. From subjects' responses, word recognition rates are saved by the examiner with different noise types such as babble, traffic, machinery, and white noise. Additionally, the subjective tests are completed through repeated test circles. All hearing testing data and word recognition rate are saved into the database for later use purpose and analysis. This computer aided simulation makes a reliable and cost effective to create real environment conditions for clinical testing. Our MATLAB based GUI addresses the needs of both clinical evaluation and engineering. The contents of this User Guide provide you how the simulator works and steps to be followed the installing the Optimizer GUI on laptop. This software package is an open source and portable research platform for improvement studies.

This user guide includes the software tools that is used to develop this GUI, and the flow charts to describe the process of usage in clinical testing. The MATLAB codes and executable application are available for 'The Optimizer-Hearing Aid Test for Noisy Environments' on the following website : <http://www.utdallas.edu/ssprl/hearing-aid-project/>. The codes can be accessed and used with proper consent of the author for further improvements in research activities related to hearing aids. The screenshot of the main screen of the GUI is as shown in Figure 1.

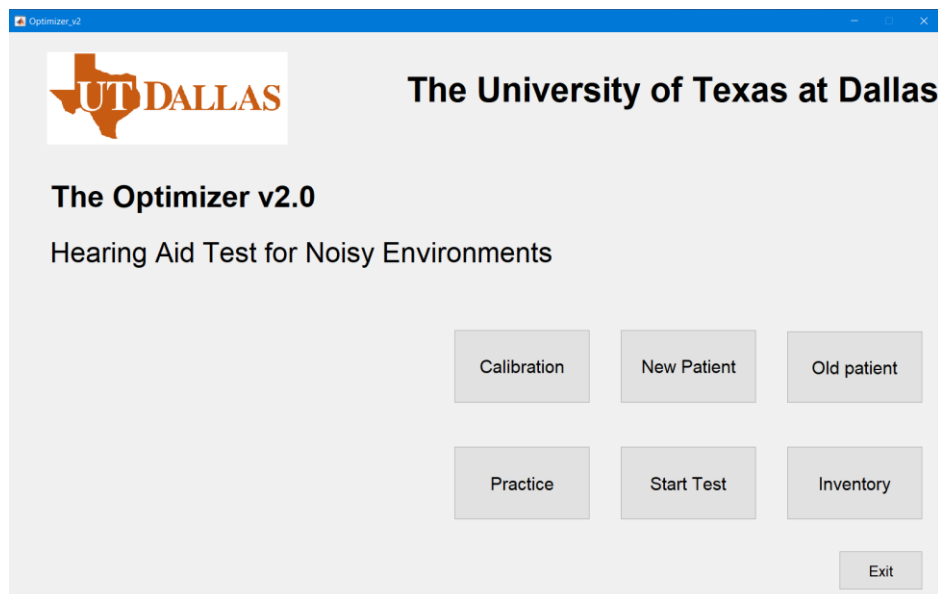


Figure 1 Main screen of the GUI

2. OVERVIEW OF THE OPTIMIZER SOFTWARE

The software is developed for providing the clinical testing process to measure hearing-impaired subjects' responses, word recognition rates and save with different noise types such as babble, traffic, machinery, and white noise. In the testing each database combinations from the HINT speech database will be played and subjects will type their responses after listening each audio files. This software package logs the patient's response files in excel data format for later use purpose and analysis.

It includes 6 interfaces, namely, Calibration, New Patient, Old Patient, Practice Session, Regular Session, and Inventory. New Patient module is to create a new patient file and use in the Regular Session for test purpose. Old patient module indexes all patient files to open previous database file and conduct new test if any of the patient file is chosen. Inventory module can open the database files directly. Other modules details will be given in the rest of the user guide. Main usage of the Optimizer GUI described with flow chart in Figure 2.

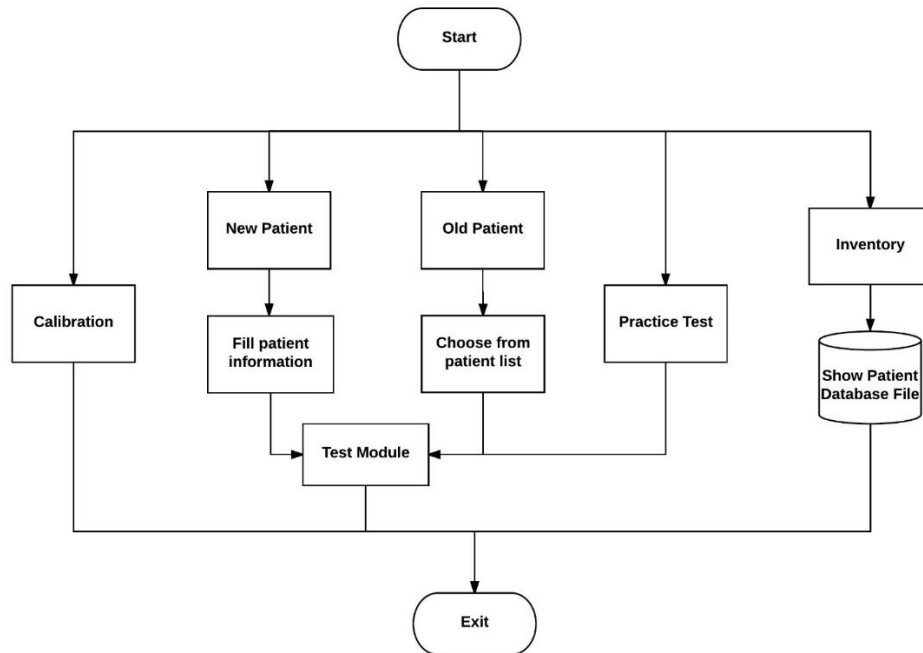


Figure 2 Flow chart of main procedure

Calibration module is used to make changes in testing environment to measure SNR level with SPL (Sound Pressure Level) meter. In this module, examiner choose the SNR level of noise or speech calibration to play in the test setting before starting test. Figure 3 shows the flow chart of Calibration module.

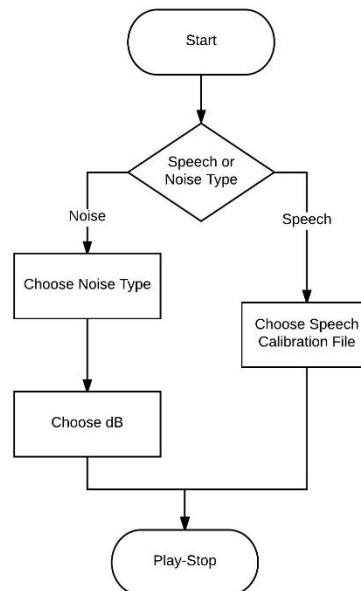


Figure 3 Flow chart of calibration module

Practice Session and Regular Session have similar GUI and same purpose of use except regular session. In this interface examiner chose a type of noise file and combination of speech file order to play in test and asks the patient whether subject is ready to listen. When patients type their responses inside the testing booth with remote controlled laptop, examiner will see their response and score it after comparing with the original sentence. The detailed process of the regular session is drawn in Figure 4 and Figure 5 shows the screenshot of testing session interface.

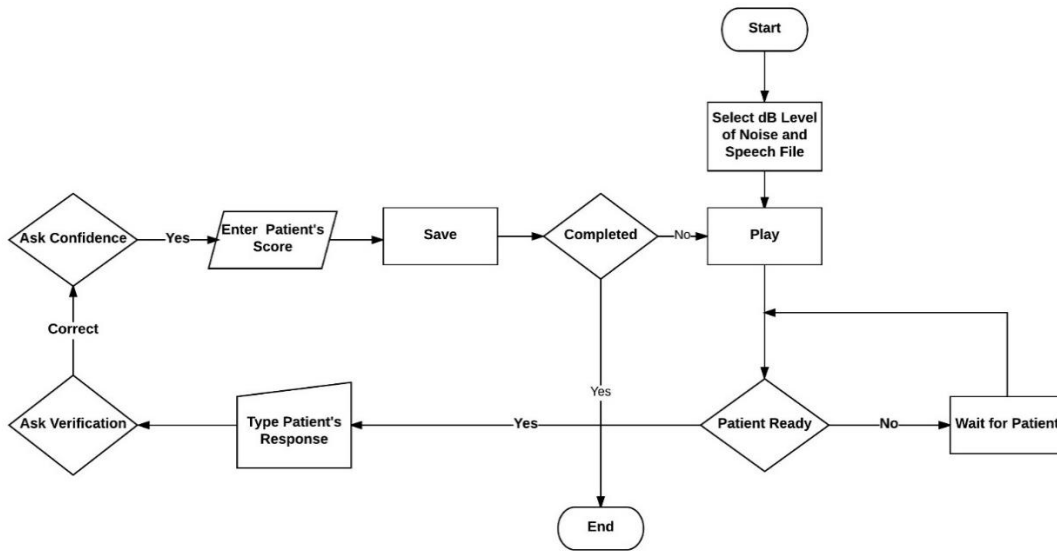


Figure 4 Flow chart of testing module

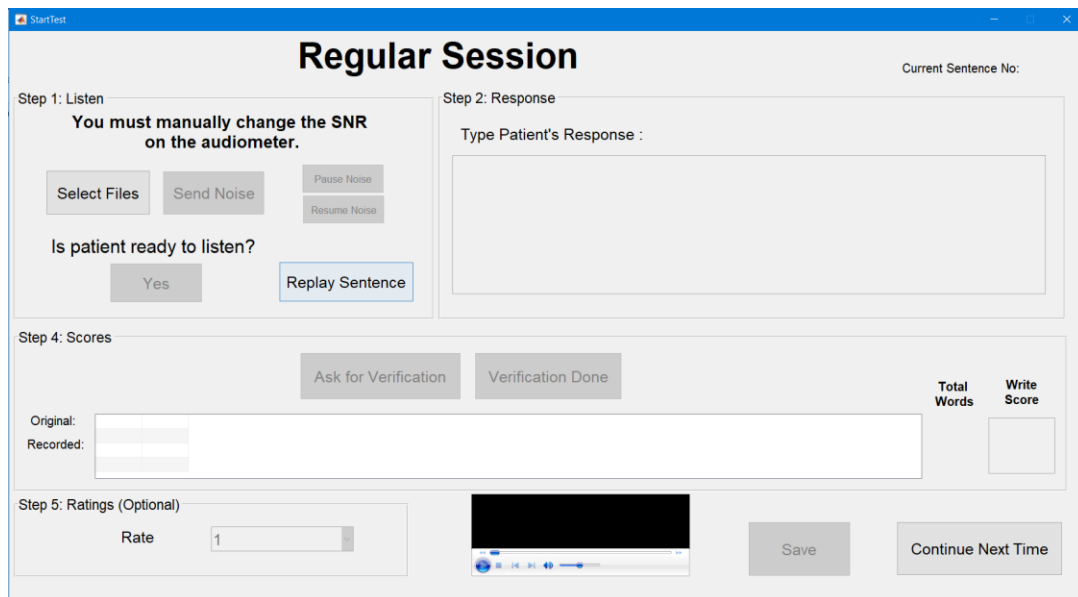


Figure 5 Screenshot of Regular Session