Iteration 3 Report
EECE 2140: Computing Fundamentals for Engineers

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Important: Each student must submit individually, even though the project is completed as a team. Prepare this report in **Overleaf** and export it as a **PDF** for submission.

GitHub Link: `https://github.com/king-mason/audio-visualizer`

Contents

1 Summary of Team Progress and Development Updates

Provide a brief overview (1–2 paragraphs) of your team's progress during Iteration 3 of the Student Registration System. Include:

- Key goals set for this iteration and which were achieved.
- Modules or features developed or refined (e.g., registration validation, student database updates).
- Testing or debugging completed during this phase.
- Any pending tasks to be addressed in Iteration 4.

In terms of the team's development progress, we created a shared github repository for all team members to code and collaborate. We started the implementation of recording live mic inputs and created visualizations based on the recorded audio. We also researched methods to input audio files and have the system output visualizations be more dynamic.
For iteration 4, we plan to have a more developed user interface and incorporate audio file input into our visualizer as well.

2 Implemented Core Features

Describe the main features developed during Iteration 3. For each feature, provide:

- **Feature name and purpose** (e.g., database integration, user authentication, course management).
- **Design and implementation:** How the feature was coded using Python (mention key classes or modules).
- **Validation:** How the feature was tested and confirmed to work correctly.

The core features that our team implemented for Iteration 3 include having 2 methods of **recording live mic input and visualizing it**: one using sounddevice and one using pyqt. The sound device records audio for a given amount of time and stores the audio as a numpy array. We then used matplotlib to plot the array. Pyqt uses an object-oriented class structure and includes functions like update_plot, that updates the plot while the system is still recording mic input. We have only done manual testing so far, which includes running each method for at least 10 seconds and seeing how the visualizations are affected.

3 Challenges and Resolutions

Briefly discuss the main technical or organizational challenges faced during Iteration 3 and how they were resolved.

- **Challenge 1:** Example—Database lock error during multiple student registrations. **Resolution:** Used context managers in Python (`with sqlite3.connect()`) to handle safe transactions.
- **Challenge 2:** Example—Duplicate course registration issue. **Resolution:** Added composite primary key (student_id, course_id) to prevent duplicates.

In terms of the challenges that our team faced in the Iteration 3 Development phase, we found that **integrating different code editors** for the project was a challenge. We had to figure out how Github works for sharing code through both Spyder and VS Code. We also found that implementing features such as a **color gradient or particle animation visualizations** based on amplitude or pitch was much more involved than we initially expected. We hope to implement this functionality in our next iteration with more research, testing, and program debugging.

4 Leadership Rotation and Team Contributions

Summarize leadership rotation and contributions of each team member during Iteration 3. Even though this is a team project, each student must describe their *individual role and contribution* here.

Leadership Summary

Iteration	**Leader**	**Responsibilities**	**Key Outcomes/Goals**
3	Rose Martin	Core Fundamentals	Verified basic mic input and visualizations
4	Raghav Mathur	Improving UI/UX	Fix bugs, create multiple modes for users and add audio file input
5	Mason King	Final Testing and Documentation	Fix persisting bugs and prepare the project for presentation

Individual Contributions

Team Member	Contributions (Technical / Documentation)	Hours
Rose Martin	Researching visualization modes, coordinating daily progress and ensuring team communication	4 hrs
Mason King	Display live mic input on a waveform and research GUI interface options	4 hrs
Raghav Mathur	Implementing live microphone input and researching audio file input	3 hrs