COMP3000 Computing Project

2024/2025

Project Title

Guitar Tuner Sound Analysing

Links

Source code: *https://github.com/Settings2022/GeorgeArghyrou_Comp3000.git*

Project Vision

This assignment aims to develop an application for laptop and desktop computers that will allow users to tune a stringed instrument by ear. The product could be used by amateur musicians and bedroom enthusiasts and most musicians would know that tuning up to pitch can provide greater tuning stability. The minimum viable product will be six buttons on screen that when clicked will sound a note from the 6 standard guitar strings. A user would be able to compare these with sound from an instrument and tune up or down to the correct pitch. It would then be possible to add other tunings and instruments and to also display the sound effects graphically in different ways. The addition of storage such as database, could benefit a user in that they could save files such as pdf files including tabs for music they are working with. The ideal would be to also add listening functionality so that the application would inform the user whether they need to tune up or down.

The title and vision for this project are not immutable and as such may change as ideas are developed through the project life cycle. To factor the possibility that the project takes me so far out of the scope of my abilities one solution might be to focus on the effects on sound signals of different processing algorithms, so that signal is detected, then manipulated and represented again either as another sound or graphically or both. Producing this kind of analysis could help identify potential uses for certain sound processing algorithms.

Further product enhancement would be to develop a multi-platform application that could be used on mobile phones, and tablets as well as desktop or lap top computers.

Key Aspects

The development of an accurate stringed instrument tuner requires signal processing, pitch detection, and real-time audio analysis. An understanding of digital signal processing with mathematical modelling with efficient algorithm design to demonstrate advanced technical skills.

Front end development of a user interface will be intuitive and user friendly requiring an understanding of user experience (UX) principles.

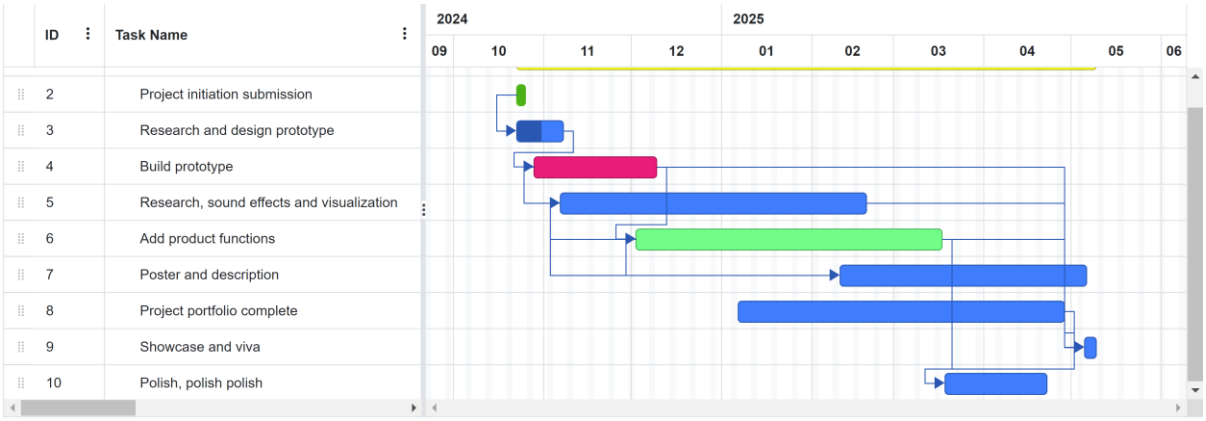
As an enthusiastic guitar hobbyist myself, I will bring personal insight into the needs and expectations of users. This will ensure that the product is not only technically sound but also user friendly and practical. Further product validation also sought from other musicians to gather useful feedback about the product's applicability.

The development of this application from concept to completions allows for the demonstration of knowledge regarding project management, software development life cycle, version control, and testing methods that are key competencies in computer science. Incorporating these aspects will demonstrate this project as a valuable and challenging learning experience that showcases a comprehensive level of computer science skill.

Risk Plan

Risk	**Mitigation**
Inaccurate Project initiation	Clear scope, but remain flexible
Absence	Exemplary attendance, risk of absence is unlikely, latency built in.
Schedule overruns	Use schedule slack to catch up, monitor progress against the plan to ensure staying on track
Difficult learning technologies	Use official resources, research and increase self-learning practices, use compatible technologies
Technical failure	Ensure regular backup, oneDrive, github, usb stick, and version control. Consider insurance claim for hardware failure.
Component integration failure	Research technologies to ensure compatibility, likely to be working with python so many libraries should be available and compatible.
Unforeseen circumstances	Build latency into the plan to guard against overruns.

Proposed Gantt chart



Keywords

- Graphical sound effects display
- Audio signal manipulation
- Digital sound analysis
- Sound signal processing
- Musical pitch detection
- Music database integration
- Pitch comparison software
- Guitar tuning by ear
- Guitar tuning by ear
- Instrument tuning app
- Guitar tuner software
- Stringed instrument tuning
- Ear tuning application
- Music theory and tuning stability
- Desktop guitar tuner
- Multi-platform music apps
- Music PDF/tab storage
- Real-time pitch detection
- Algorithmic sound processing
- Tuning stability enhancement