# TINKERING AUDIO

Dr Michael Scott

## Introduction

> *"The programmer, like the poet, works only slightly removed from pure thought-stuff. He builds his castles in the air, from air, creating by exertion of the imagination. Few media of creation are so flexible, so easy to polish and rework, so readily capable of realizing grand conceptual structures"*
>
> — Fred Brookes

> *"Students come into programming classes with a broad range of backgrounds—some have experience in several programming languages, others have never programmed before in their life! Being able to engage with the community and support each other is important."*
>
> — Robert Macredie

In this assignment, you are required to write a computer program that will *tinker* with computer generated audio in a creative way.

Creative computing encompasses the broad realms of digital media, computer programming, and human-computer interaction. It is important to draw these areas together in an applied way. You will, therefore, leverage the principles you have learned to exercise your creativity through computer software. This will prepare you to tackle challenges in many creative domains.

This assignment is formed of several parts:

(A) **Select**, as a **pair**, **TWO** of the contracts provided by your tutor and:
  i. **state** which contract you will work on;
  ii. **declare** the terms of your software license;
(B) **Write**, as a **pair**, a draft computer program in C# that will:
  i. **address** the requirements implied by the contract;
  ii. **comply** with relevant intellectual property law;
  iii. and **implement SEVEN** algorithms for tinkering audio.
(C) **Write**, as an **individual**, a final computer program in C# that will:
  i. **satisfy ONE** contract;
  ii. and **revise** any issues raised by your tutor and/or your peers.
(D) **Present**, as an **individual**, a practical demo of the computer program to your tutor that will:
  i. **demonstrate** your academic integrity;
  ii. as well as **showcase** your **individual** programming knowledge.

## Assignment Setup

This assignment is a **pair programming task**. Fork the repository at:

Tidal is an algorave language. It allows you to code musical patterns live using text, describing sequences and ways of transforming and combining them, exploring complex interactions.

https://github.com/Falmouth-Games-Academy/comp120-tinkering-audio

Use the existing directory structure and, as required, extend this structure with sub-directories. Ensure that you maintain the readme.md file.

Modify the .gitignore to the defaults for **C#** and **Unity**. Please, also ensure that you add editor-specific files and folders to .gitignore.

## Part A

Part A consists of a **single formative submission**. This work is **collaborative** and will be assessed on a **threshold** basis.

To complete Part A, write about your contract in the readme.md document and select the contract on LearningSpace.

There is no feedback for Part A.

## Part B

Part B is a **single formative submission**. This work is **collaborative** and will be assessed on a **threshold** basis. The following criteria are used to determine a pass or fail:

(a) Submission is timely;
(b) Enough work is available to conduct a meaningful review;
(c) A broadly appropriate review of a peer's work is submitted.

To complete Part B, prepare draft versions of the computer programs. Ensure that the source code and related assets are pushed to GitHub and a pull request is made prior to the scheduled peer-review session. Then, attend the scheduled peer-review session.

You will receive immediate **informal feedback** from your **peers**.

## Part C

Part C is a **single summative submission**. This work is **collaborative** and will be assessed on a **criterion-referenced** basis. Please refer to the marking rubric at the end of this document for further detail.

To complete Part C, revise the computer program based on the feedback you have received. Then, upload it to the LearningSpace. Please note, the LearningSpace will only accept a single .zip file.

You will receive **formal feedback** from your **tutor** three weeks after the final submission deadline.

## Part D

Part D is a **single summative submission**. This work is **individual** and will be assessed on a **threshold** basis. The following criteria are used to determine a pass or fail:

(a) Enough work is available to hold a meaningful discussion;
(b) Clear evidence of programming knowledge **and** communication skills;
(c) No breaches of academic integrity.

To complete Part D, prepare a practical demonstration of the computer programs. Ensure that the source code and related assets are pushed to GitHub and a pull request is made prior to the scheduled viva session. Then, attend the scheduled viva session.

You will receive immediate **informal feedback** from your **tutor**.

# Additional Guidance

It is critically important that you do not neglect your individual roles in the development process. Programming in pairs means that you work together on the same computer—switching between driver and navigator. It is a great opportunity to develop your technical communication skills and overcome common misconceptions about programming. It should not, however, be treated as a 'free ride'—you will get to review each others' progress.

You are being expected to not only *transform* and *repurpose* existing encodings (i.e. existing melodies and sound effects), but generate new encodings from primitive input. When using audio you have not authored yourself, the

source should be noted in the GitHub README.md file and all relevant intellectual property rights (e.g., copyright) recognised.

You can and should go beyond the techniques introduced in the lectures and the Guzdial book (e.g. researching algorithms for producing or manipulating graphics). The solutions must be written in C#, and Unity should be used. You are welcome to extend your solution with third-party libraries.

You are not being assessed on speed or memory performance. Do not worry too much about framerate, etc.

A common pitfall is poor planning or time management. Often, students underestimate how much work is involved in first learning programming concepts and then actually applying them. Programming is quite unlike other subjects in that it cannot be crammed into a last minute deluge just before a deadline. It is, therefore, very important that you begin work early and sustain a consistent pace: little and often.

The first deadline is quite close to the start of the course and not much material will have been covered by this point. Please rest assured. This first formative submission is supposed to be a simple analysis of requirements. We expect there to be errors. However, it is very important to make a start on this project so you recieve early feedback to give you some direction and to encourage you to practice your programming skills across the entire duration of the course. Ideally, you should be programming every day!

The peer-review component of this work does sometimes raise alarm. However, the only way to learn how to review code is by reviewing code. Your tutor will guide you through the process and provide advice. With practice, it will become clear what is satisfactory by discussing the quality of work with your peers and your tutor during the peer review sessions.

## FAQ

- **What is the deadline for this assignment?**
  Falmouth University policy states that deadlines must only be specified on the MyFalmouth system.
- **What should I do to seek help?**
  You can email your tutor for informal clarifications. For informal feedback, make a pull request on GitHub.
- **Is this a mistake?**
  If you have discovered an issue with the brief itself, the source files are available at:

  https://github.com/Falmouth-Games-Academy/bsc-assignment-briefs
  .
  Please raise an issue and comment accordingly.

## Additional Resources

- Guzdial, M.J . and Ericson, B. (2015) Introduction to Computing and Programming in C#: A Multimedia Approach, 4th Edition. Pearson: New York.
- Martin, R.C. (2008) Clean Code: A Handbook of Agile Software Craftsmanship. Prentice Hall: New York
- http://guide.agilealliance.org/guide/pairing.html
- http://www.pairprogramming.co.uk/

# Marking Rubric

All submissions and assessment criteria for this assignment are individual.

| Criterion | Weight | Near Pass | Adequate | Competent | Very Good | Excellent | Outstanding |
|---|---|---|---|---|---|---|---|
| Basic Competency Threshold | 30% | At least one part is missing or is inadequate. | Adequate ability to generate ideas, problem solving, concepts, technical competency and proposals in response to set briefs and/or self-initiated activity. The work demonstrates an adequate, ethically informed, real-world experience of industry/business environments and markets. Enough work is available to hold a meaningful discussion. Adequate participation in-class peer-review activities at least at the level of basic competency. All reviews provided to peers are constructive, are of suitable depth, and confer a sufficient volume of actionable advice. Version control has been used throughout the project. A range of programming constructs are demonstrated — e.g., sequence, assignment, branching, iteration, functions. A range of appropriate data strucutres are demonstrated — e.g., arrays, maps, linked lists, trees, stacks. A range of simple OO constructs are demonstrated — e.g., object definition through structs and classes, inheritance and polymorphism. No breaches of academic integrity. | | | | |
| PROCESS: Functional Coherence of Code | 5% | No algorithm has been implemented successfully. The source code does not compile or there are serious logical errors. | At least one algorithm has been implemented successfully. There may be obvious logical errors, or at least one significant logical error. | At least two algorithms have been implemented successfully. There may be several obvious logical errors, at least one of which is significant. | At least three algorithms have been implemented successfully. There may be some obvious logical errors, which are not significant. Brief is somewhat satisfied. | At least four algorithms have been implemented successfully. There may be a few obvious logical errors, which are cosmetic and/or superficial. Brief is mostly satisfied. | At least five algorithms have been implemented successfully. There are no obvious logical errors. Brief is clearly and completely satisfied. |
| PROCESS: Sophistication of Code | 15% | No insight into the appropriate use of programming constructs is evident from the source code. No attempt to structure the program (e.g. one monolithic function). | Little insight into the appropriate use of programming constructs is evident from the source code. The program structure is poor. | Some insight into the appropriate use of programming constructs is evident from the source code. The program structure is adequate. | Much insight into the appropriate use of programming constructs is evident from the source code. The program structure is appropriate. | Considerable insight into the appropriate use of programming constructs is evident from the source code. The program structure is effective. There is high cohesion and low coupling. | Significant insight into the appropriate use of programming constructs is evident from the source code. The program structure is very effective. There is high cohesion and low coupling. |
| PROCESS: Maintainability of Code | 15% | There are no comments in the source code, or comments are misleading. Most variable names are unclear or inappropriate. Code formatting hinders readability. | The source code is only sporadically commented, or comments are unclear. Some identifier names are unclear or inappropriate. Code formatting is inconsistent or does not aid readability. | The source code is somewhat well commented. Some identifier names are descriptive and appropriate. An attempt has been made to adhere to a conventional formatting style. There is little obvious duplication of code or of literal values. | The source code is reasonably well commented. Most identifier names are descriptive and appropriate. Most code adheres to a conventional formatting style. There is almost no obvious duplication of code or of literal values. | The source code is reasonably well commented, with doc-comments. Almost all identifier names are descriptive and appropriate. Almost all code adheres to a conventional formatting style. There is no obvious duplication of code or of literal values. Some literal values can be easily "tinkered" in the source code. | The source code is very well commented, with doc-comments. All identifier names are descriptive and appropriate. All source code adheres to a conventional formatting style. There is no obvious duplication of code or of literal values. Most literal values are, where appropriate, easily "tinkered" outside of the source code. |

| Criterion | Weight | Near Pass | Adequate | Competent | Very Good | Excellent | Outstanding |
|---|---|---|---|---|---|---|---|
| INDUSTRY: Creative Response to Brief | 10% | No creativity. The work is a clone of an existing work with mere cosmetic alterations. | Little creativity. The work is derivative of existing works, with only minor alterations. | Some creativity. The work is derivative of existing works, demonstrating little divergent and/or subversive thinking. | Much creativity. The work is somewhat novel, demonstrating some divergent and/or subversive thinking. | Considerable creativity. The work is novel, demonstrating significant divergent and/or subversive thinking. | Significant creativity. The work is highly original, with strong evidence of divergent and/or subversive thinking. |
| INDUSTRY: Ethically Informed | 10% | There is an inappropriate license and/or misuse of intellectual property. | There is an minimally appropriate license. There is implicit recognition of intellectual property rights. | There is an appropriate license. There is explicit recognition of intellectual property rights in the readme.md. Acknowledgements are clearly demarcated in the source code. | There is a suitable license. There is explicit description of intellectual property rights in the readme.md. Authorship is demarcated in the source code. Copyright notices are present. | There chosen license is suitable. There is explicit explanation of intellectual property rights in the readme.md. Authorship is accurately declared in the header using appropriate standards (e.g. PEP257) and demarcated in the source code. Copyright notices are present and appropriate. | There chosen license is suitable. There is explicit justification of intellectual property rights in the readme.md. Authorship is accurately declared in the header using appropriate standards (e.g. PEP257) and demarcated in the source code. Copyright notices are accurately declared in the header using appropriate standards (e.g. module-level dunder names, PEP8). There may be reference to a transfer agreement. |
| INDUSTRY: Use of Version Control | 15% | Version control (e.g. GitHub) has not been used. | Source code has been checked into version control (e.g. GitHub). | Source code has been checked into version control (e.g. GitHub) at least once per week. Sensible commit messages are present. | Source code has been checked into version control (e.g. GitHub) several times per week. Commit messages are clear, concise and relevant. There is evidence of somewhat meaningful engagement with peers (e.g. code review). Comments to peers are somewhat constructive and provide some insight. | Source code has been checked into version control (e.g. GitHub) several times per week. Commit messages are clear, concise and relevant. There is evidence of meaningful engagement with peers (e.g. code review). Comments to peers are reasonably constructive and provide much insight. | Source code has been checked into version control (e.g. GitHub) many times per week. Commit messages are clear, concise and relevant. There is evidence of effective engagement with peers (e.g. code review). Comments to peers are reasonably constructive and provide considerable insight. |