Metronome

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# Feasibility Study

I would like to make a metronome. A metronome is a constant sound that is used by musicians to stay in time.

I know that this problem is solvable because the problem can be solved in a finite number of steps. The main calculation is converting a BPM to the delay (in milliseconds) between each beep. This is computationally simple using a theoretical approach.

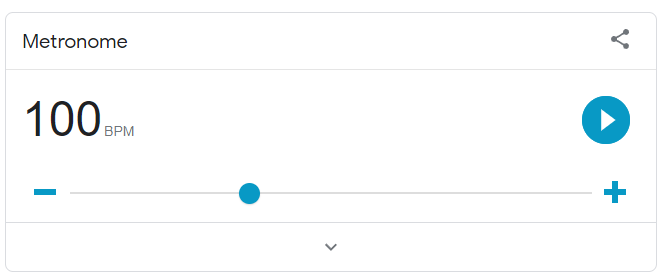
The budget is limited (£0) and we have 2 weeks to complete the project.

# Analysis

## Stakeholders

Matt is a 17-year-old boy who’s just started playing the piano and is needing a metronome for staying in time.

## Research



<https://www.google.com/search?q=google+metronome&rlz=1C1GCEA_enGB813GB813&oq=google+metronome&aqs=chrome..69i57j0i512l9.2992j0j1&sourceid=chrome&ie=UTF-8&safe=active&ssui=on>

Google has a built-in online metronome. It’s free and easy to use. It has nice visual effects such as a pulsing button meaning that you don’t need to have audio enabled to use it. Although, it doesn’t indicate how far through each tick you are like a normal metronome.

## Essential features

My solution must allow you to set the BPM and to start and stop the metronome. On each beat it should make a sound and should give a visual indication to assist for people who can’t hear the noise.

The solution must work on web enabled device with a clear, touchscreen friendly interface.

There should be limited text so that it’ suitable for any age.

There should be buttons that allow you to change the BPM by 5 without stopping the beat.

It should be available online for free.

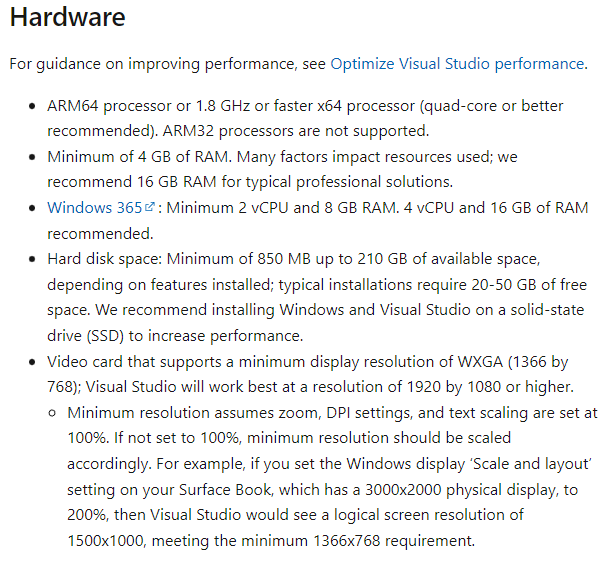
## Limitations

There is insufficient time to add additional features to the metronome but they could be added later if given extra time. My solution will not allow you to compare your playing to the beat. There will be no feature to log in and track your progress. Adding a feature to change the BPM automatically over time would be good but since it’s not essential, I won’t be able to add it within the time.

There is no requirement to make the metronome a native app since the metronome will be purely web based and freely available to as many people as possible.

## Hardware and Software requirements

For development, I need to be able to us Visual Studio 2017 which requires:



<https://learn.microsoft.com/en-us/visualstudio/releases/2022/system-requirements>

For the stakeholders to run the metronome they need a web available device running a modern browser (e.g. chrome)

This is so that all features of css / javascript / HTML5 work as expected.

My stakeholder has a Samsung phone

## Success Criteria

|  |  |  |
| --- | --- | --- |
| Number | Criteria | Justification |
| 1 | Must be accessible on an Android 12 device in Chrome connected to the internet | The stakeholder has an android 12 device with a reliable Wi-Fi connection. Any updates to the app can be automatically rolled out to the users |
| 2 | User can set the BPM | The stakeholder wants to practice between 50BPM and 120BPM |
| 3 | Any invalid BPM will be automatically corrected to the closest sensible value between 50-120BPM | The stakeholder wants to focus on playing the piano and might accidentally type invalid data |
| 4 | The user should be able to increase the BPM by 5 using a touch button | The stakeholder wants to be able to slightly change the BMP without having to start and stop the metronome |
| 5 | The user should be able to decrease the BPM by 5 using a touch button |
| 6 | There should be a start and stop button that toggles when you press it | The user should be able to control the metronome with their finger with a simple UI |
| 7 | When the metronome starts there should be an audible beep | The stakeholder wants to play along to a beep sound in headphones |
| 8 | When the metronome starts there should be a visual indication showing whenever it would ‘tick’ | Sometimes the metronome would be used with audio off |
| 9 | There should be a high contrast mode button which toggles a black and white colour scheme with larger text | Sometimes the metronome will be on a small screen far away from the musician so it will be hard to see |

# Design

## Algorithms

The user should be able to enter the BPM score (beats per minute). The browser needs to know how long to pause between each tick in milliseconds. This can be done using the following algorithm

BPM = user input

Interval = 1 \* 60 \* 1,000/BPM

## Usability features

50

+5

-5

The high contrast option should be all black and white with larger text so that I can be visible from a distance on small screens with a high DPI. It will also be usable by people who are partially sighted or colour blind.

The slider allows for the user to easily change the BPM without having to press a button multiple times although there is still the option to + or - 5 so it’s easy to change the BPM by a small amount.

# Testing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test number** | **Description** | **Success Criteria** | **Test data** | **Expected result** |
| 1 | Basic web page | 1 | Page load | A web page with a title and text box to enter the BPM score ad two buttons to increase / decrease the BPM score displays in chrome |
| 2 | BPM | 2 | 120 | Valid data is accepted |
| 3 | BPM | 3 | “” | BPM to be set to 50 |
| 4 | BPM | 3 | 30 | BPM to be set to 50 |
| 5 | BPM | 3 | 130 | BPM set to 120 |
| 6 | BPM | 3 | Potato | BPM set to 50 |
| 7 | Increasing BPM | 4 | BPM set to 60 and press increase once | BPM increases to 65 |
| 8 | Increasing BPM | 4 | BPM set to 120 and press increase once | BPM stays at 120 |
| 9 | Increase BPM | 4 | BPM set to 119 and press increase once | BPM set to 120 |
| 10 | Decrease BPM | 5 | BPM set to 100 and press decrease once | BPM set to 95 |
| 11 | Decrease BPM | 5 | BPM set to 50 and press decrease once | BPM stays at 50 |
| 12 | Decrease BPM | 5 | BPM set to 51 and press decrease once | BPM set to 50 |
| 13 | Start button | 6 | Press play button | Metronome should begin to play |
| 14 | Start button change | 6 | Press the play button | Play button should change to a stop button when pressed |
| 14 | Stop button | 6 | Press stop button | Metronome should stop playing |
| 15 | Audible sound | 7 | Press the play button when BPM set to 60 | Sound should be played every second |
| 16 | Audible sound | 7 | Press play button when BPM set to 120 | Sound should be player every two seconds |
| 17 | Visual indication | 8 | Press the play button when BPM set to 60 | Visual indication should be displayed every second |
| 18 | Visual indication | 8 | Press play button when BPM set to 120 | Visual indication should be displayed every two seconds |

# Implementation

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# Installation

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# Evaluation

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# Maintenance

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