

Heartbeat Alteration Using AI Selected Music:
Readme:

Purpose Of This Document:

The purpose of this document is to provide a description of the environment configuration. This will include a walkthrough of what packages and libraries need to be installed, and finally how to actually start the application itself.

Dependencies Installation Guide:

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Technology:	Type:	Purpose/Installation Guide:
Garmin Vivosmart 4	Hardware	<p>The Garmin Vivosmart 4 is the ANT+ compatible heart rate monitor. The current heart rate of the user is necessary in order to predict the future heart rate of the user.</p> <p>Your Garmin Vivosmart 4 will need to be in broadcast mode in order for its data to be received, instructions on how to set the Garmin Vivosmart 4 to broadcast mode can be found in the following link: https://www8.garmin.com/manuals/webhelp/vivosmart4/EN-US/GUID-3629BD02-A0FB-4F18-B1A4-600C2643C835.html</p>
Garmin USB ANT Stick	Hardware	<p>The Garmin USB ANT stick acts as a radio receiver for ANT+ wireless communications. This USB stick is necessary to receive the heart rate from the Garmin Vivosmart 4. Do note that this USB stick only has a range of only around 12 feet from where it is plugged in.</p> <p>Plug in the ANT+ USB stick to your computer.</p> <p>You will have to install the drivers manually, the drivers are located in the 'drivers' folder that came with the download for the project. Here is a guide on how to manually locate and install drivers: https://support.microsoft.com/en-us/windows/update-drivers-manually-in-windows-ec62f46c-ff14-c91d-eead-d7126dc1f7b6</p>
Windows 11	Operating	Windows 11 operating system has been identified as

	System	compatible with ANT+ communications drivers which are necessary for communicating between the application and the heart rate monitor. The testing environment must be conducted on a Windows 11 computer.
python 3.12	Dependency	python serves the general backend for this project. The testing environment must have this version of python installed. Python can be downloaded from this link: https://wiki.python.org/moin/BeginnersGuide/Download
openANT 1.3.1	Dependency	openANT is a python implementation of ANT+ wireless communications protocol - allows python programs to communicate with ANT+ heart rate monitor devices. openANT must be installed in the testing environment. openANT can be downloaded from this link: https://github.com/Tigge/openant/tree/master/openant Alternatively, it can be installed with the following command: pip install openant
pyusb 1.2.1	Dependency	pyUSB is a requirement for openANT and allows python to communicate to USB devices. Pyusb can be downloaded from the following link: https://pypi.org/project/pyusb/ Pyusb can also be installed with the following command: pip install pyusb
librosa 0.10	Dependency	librosa is a python package for audio analysis. librosa allows audio files to be broken down to their base characteristics (tempo, pitch, length). It is necessary to break audio files down to their base characteristics in order for the machine learning model to be able to identify how a music file will impact heart rate. Librosa can be installed from the following link: https://librosa.org/doc/latest/install.html Librosa can also be installed using the following command: pip install librosa
PyTorch 2.3	Dependency	PyTorch is a python library for construction of machine

		<p>learning models. PyTorch will be used to create a machine learning model that will predict heart rate based on music characteristics and current user heart rate.</p> <p>Pytorch can be installed from the following link: https://pytorch.org/</p> <p>Pytorch can also be installed using the following command: pip install torch</p>
Flask 3.0.3	Dependency	<p>Flask allows communication between a HTML front end and a python based backend.</p> <p>Flask can be downloaded from the following link: https://flask.palletsprojects.com/en/3.0.x/installation/</p> <p>Flask can also be installed using the following command: pip install Flask</p>
Flask-Bootstrap 3.3.7.0	Dependency	<p>Allows integration of the popular 'bootstrap' framework into Flask. This allows the frontend to be more responsive and integrate javascript features.</p> <p>Flask-Bootstrap can be downloaded from the following link: https://bootstrap-flask.readthedocs.io/en/stable/basic/#installation</p> <p>Flask-Bootstrap can also be installed using the following command: pip install bootstrap-flask</p>

Starting The Application:

- 1.) Download the .zip containing all files for the application. Unzip the file in your desired location.
- 2.) Copy the directory and file path for the python file webapp.py.
- 3.) Make sure your Garmin Vivosmart 4 is turned on, and set to broadcast mode, and that the drivers have been installed manually, and that the pyUSB stick is plugged in.
- 4.) Open command prompt.
- 5.) Change the directory using cd, paste the directory you previously copied.
- 6.) Type the following:
python webapp.py
- 7.) The application should start. If the application is not working, double check to make sure your Garmin Vivosmart 4 is on broadcast mode.