% I used subtractive synthesis and AM to generate the sound of

% the engine. 2 sounds (base layer and high-pitched turbocharger) were

% generated with simple triangle matlab function from the engine frequency, I then

% used OLA method to synthesize a modulator for the base layer of the

% engine. I chose a sampling frequency of 10000 Hz because I wanted aliasing to distort the High-pitched turbocharger engine

% sound a little. I filtered the OLA and base sound with low pass filters, and the high-pitched sound with a

% high pass filter. I also used a delay line (comb filter) and convoluted

% it with the engine sounds.

%

%

% Wind was achieved by filtering white noises with 2 bandpasses

% with varying frequencies, dependent on speed. This was also done with OLA

% method. All was then multiplied by rescaled values of speed and RPS, to

% change the volume. I used impulse response Cement Blocks 2

% from the website https://www.voxengo.com/impulses/ on the wind sounds.

FM synthesis was used (only sine waves) to create the sound of synthetic piano. I used a comb filter and 2 additional detuned voices to create the illusion of space and a body. To eliminate unwanted harmonics, I used frequency-dependent filters, mostly LP. The frequency modulator has its own exponential envelope, while the carrier has an ADSR envelope.

The same approach I used to make the sound of violin ensemble, with the difference that the core wave was not a FM sine, but a simple saw wave, which was modulated with an LFO for

a vibrato effect. To achieve an 'ensemble' effect, I again detuned 2 voices and ran the result through comb filter.

As in the case of piano, I used LP filters to shape the harmonics so they resemble violins.

I did post processing in the synthchallenge.m file, where I introduced a convolution reverb from the website https://www.voxengo.com/impulses/, and I split the audio into 2 stereo channels, so I could introduce Haas effect of 20 ms.