Supplementary Material

Table S1. The components of DNN's architecture, the output of each layer, and the parameters

Layer (type)	Output Shape	Param #
Hidden_Layer_1 (Dense)	(1, 256)	320512
Hidden_Layer_2 (Dense)	(1, 256)	65792
Hidden_Layer_3 (Dense)	(1, 256)	65792
Hidden_Layer_4 (Dense)	(1, 256)	65792
Hidden_Layer_5 (Dense)	(1, 128)	32896
Batch Normalization	(1, 256)	1024
Hidden_Layer_6 (Dense)	(1, 128)	16512
Hidden_Layer_7 (Dense)	(1, 128)	16512
Batch Normalization	(1, 128)	512
Hidden_Layer_8 (Dense)	(1, 64)	8256
Hidden_Layer_9 (Dense)	(1, 64)	4160
Hidden_Layer_10 (Dense)	(1, 64)	4160
Hidden_Layer_11 (Dense)	(64)	4160
Output Layer (Dense)	(4)	260

Total params: 606,340
Trainable params: 605,572
Non-trainable params: 768

Table S2. The components of CNN's architecture, the output of each layer, and the parameters.

Layer (type)	Output Shape	Param #
Conv_Layer_1	(1, 1247, 50)	300
MaxPooling2D	(1, 415, 50)	0
Conv_Layer_2	(1, 411, 50)	12550
MaxPooling2	(1, 137, 50)	0
Conv_Layer_3	(1, 133, 50)	12550
MaxPooling2	(1, 44, 50)	0
Conv_Layer_4	(1, 40, 50)	12550
MaxPooling2	(1, 13, 50)	0
Flatten	(650)	0
Hidden_Layer_1 (Dense)	(64)	41664
Hidden_Layer_2 (Dense)	(64)	4160
Batch Normalization	(64)	256
Hidden_Layer_3 (Dense)	(32)	2080
Hidden_Layer_4 (Dense)	(32)	1056
Output Layer (Dense)	(4)	132

Total params: 87,298
Trainable params: 87,170
Non-trainable params: 128

Table S3. The components of RNN's architecture, the output of each layer, and the parameters.

Layer (type)	Output Shape	Param #
LSTM_1	(None, 1, 128)	706560
LSTM_2	(None, 128)	131584
Hidden_Layer_1 (Dense)	(128)	16512
Hidden_Layer_2 (Dense)	(128)	16512
Output Layer (Dense)	(4)	516

Total params: 871,684
Trainable params: 871,684
Non-trainable params: 0

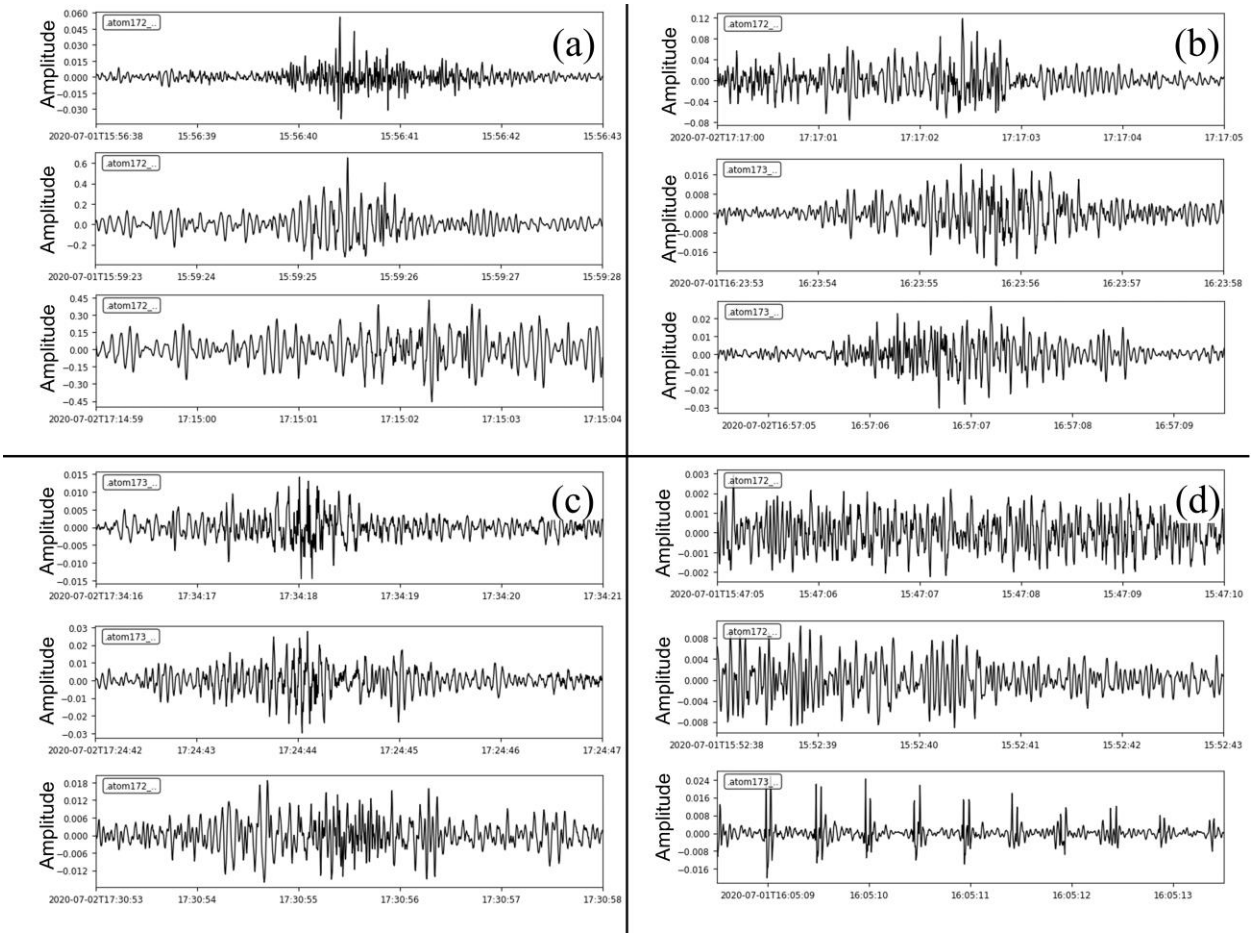

Figure S1. Examples of the waveforms used in the training process. (a) Examples for large vehicles like buses and trucks, (b) examples for medium vehicles like cars, (c) examples for small vehicles like motorcycles, (d) examples for noise like people walking, winds, and side street maintenance.

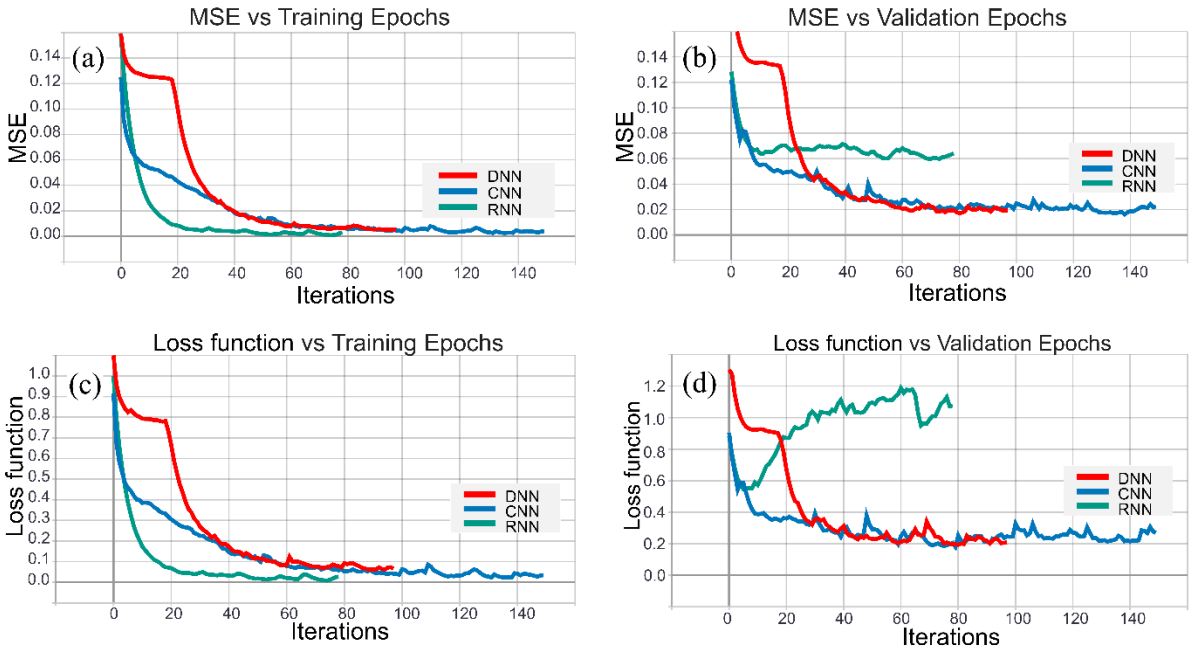

Figure S2. Other factors were monitored while the training and validation process for DNN(red), CNN(blue), and RNN (green). (a) The curve of Mean Square Error (MSE) improving while training, (b) MSE curve while validating the methods, (c) the decreasing of the loss function while training, (d) loss function curve while validating the methods.