Semi-Supervised Learning for Speech Denoising

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Data Collection Scenarios

Silent

Noise 1   Noise 2

A. Signal Denoising in Babble Noise Environment
   - Noise recorded in UTD's SU using a Shure mid-side microphone.

B. Signal Denoising in Machinery Noise Environment:
   1. Fan Noise:
      - Noise recorded in the lab using a Shure mid-side microphone and two stereo speakers on both sides of the mic.
   2. Car Engine Noise:
      - Noise recorded from one side of my car while opening the hood.

Ch 1   Ch 2

Clean Signal   Clean Signal

$+$ $+$

S + N1   S + N2

System KPIs

1. Training Computational Efficiency:
   - Using Multiple GPUs (NVIDIA GeForce GTX 1050 and the integrated Intel GPU), we were able to achieve the following training times.

Network Training Scenario	Machinery Noise	Babble Noise
5 Convolutional Triples, 50 Epochs	140 min	198 min

System KPIs

2. Testing Computational Latency:

	1 Layer	3 Layers	5 Layers
Latency	2.5 ms	3.5 ms	5 ms

3. Subjective Evaluation:

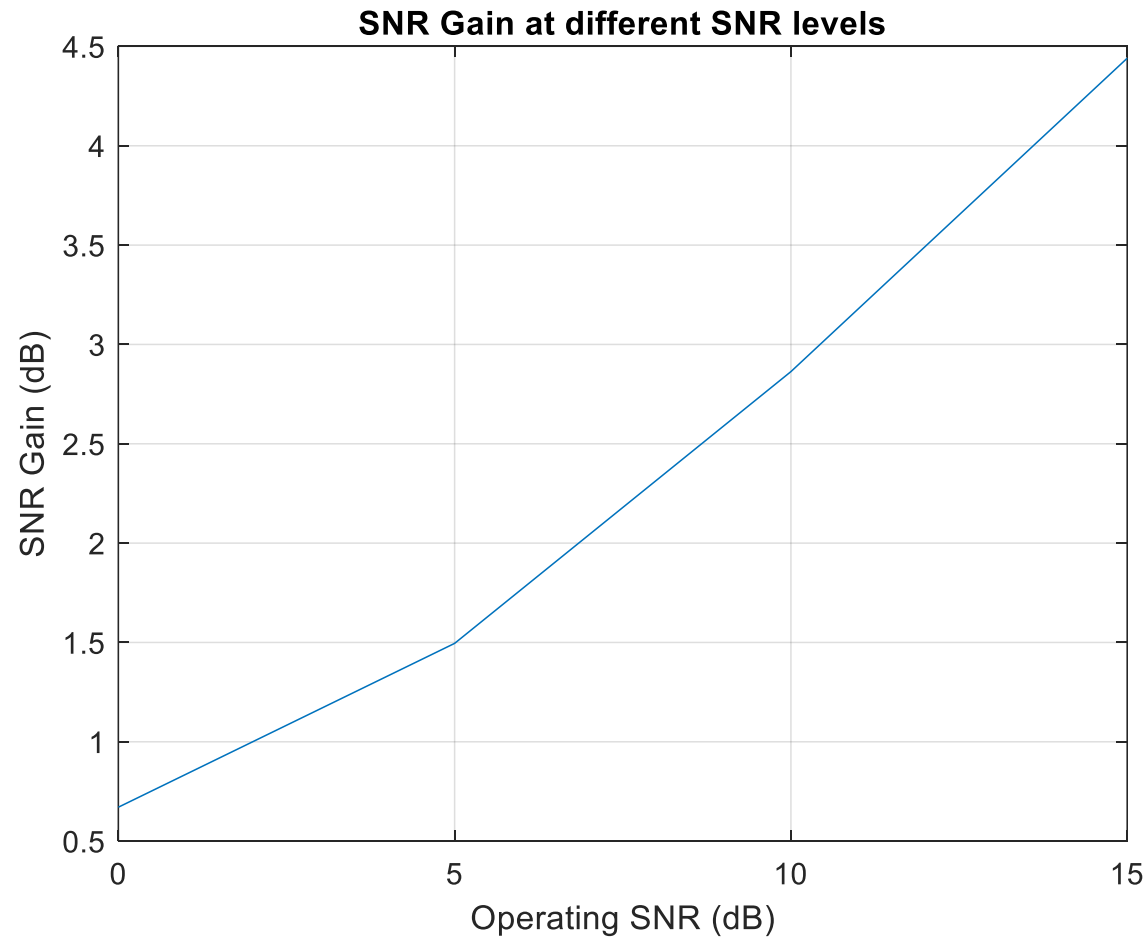|	Machinery Noise	Babble Noise
Average Subjects Evaluation	1.85	2

System KPIs
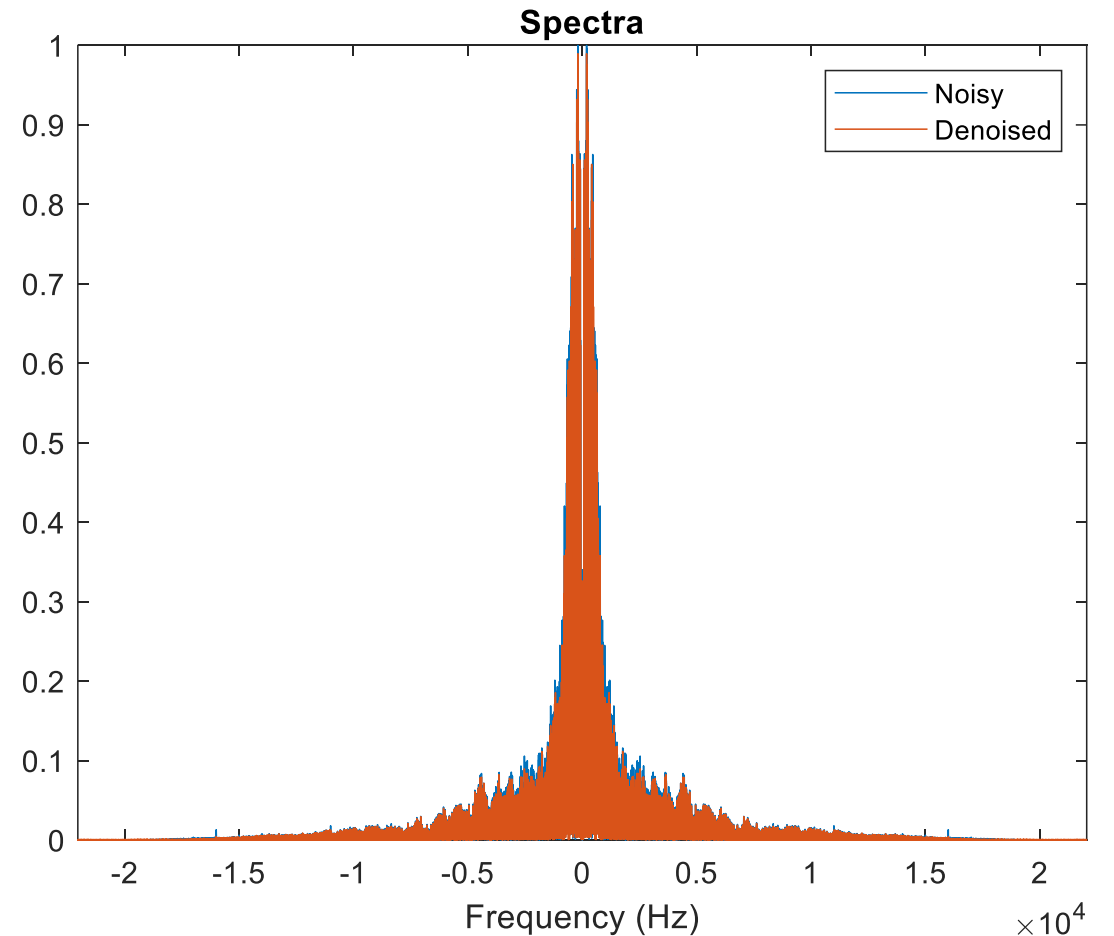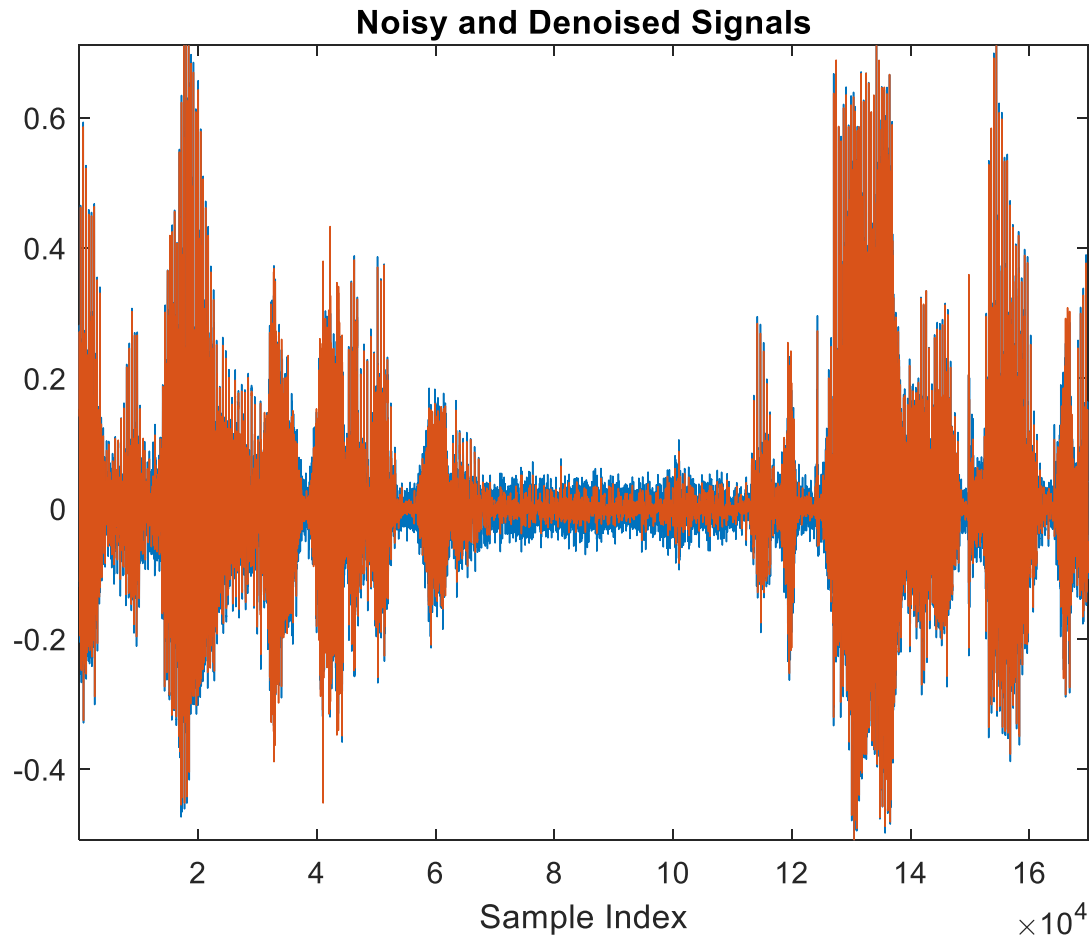
4. SNR Enhancement Analysis (Babble Noise):

System KPIs

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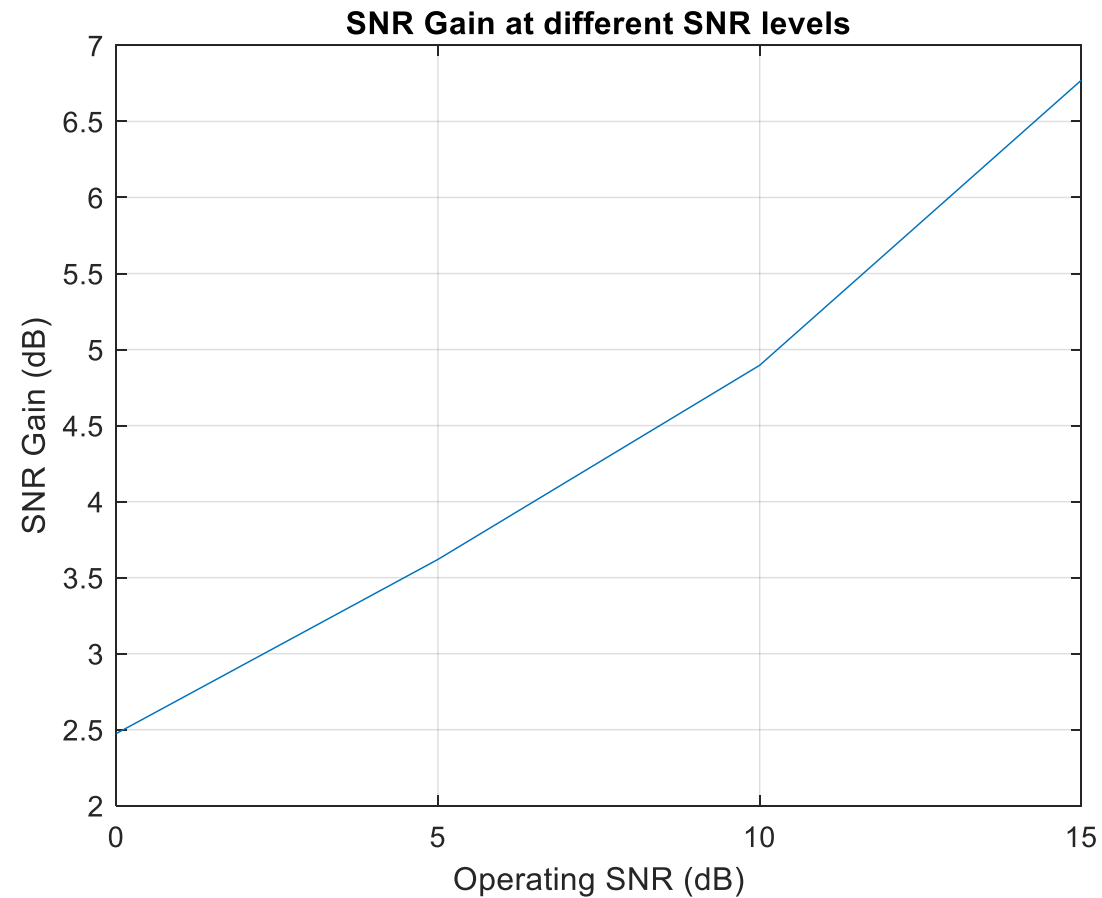

SNR Gain at different SNR levels

System KPIs

4. SNR Enhancement Analysis (Machinery Noise):
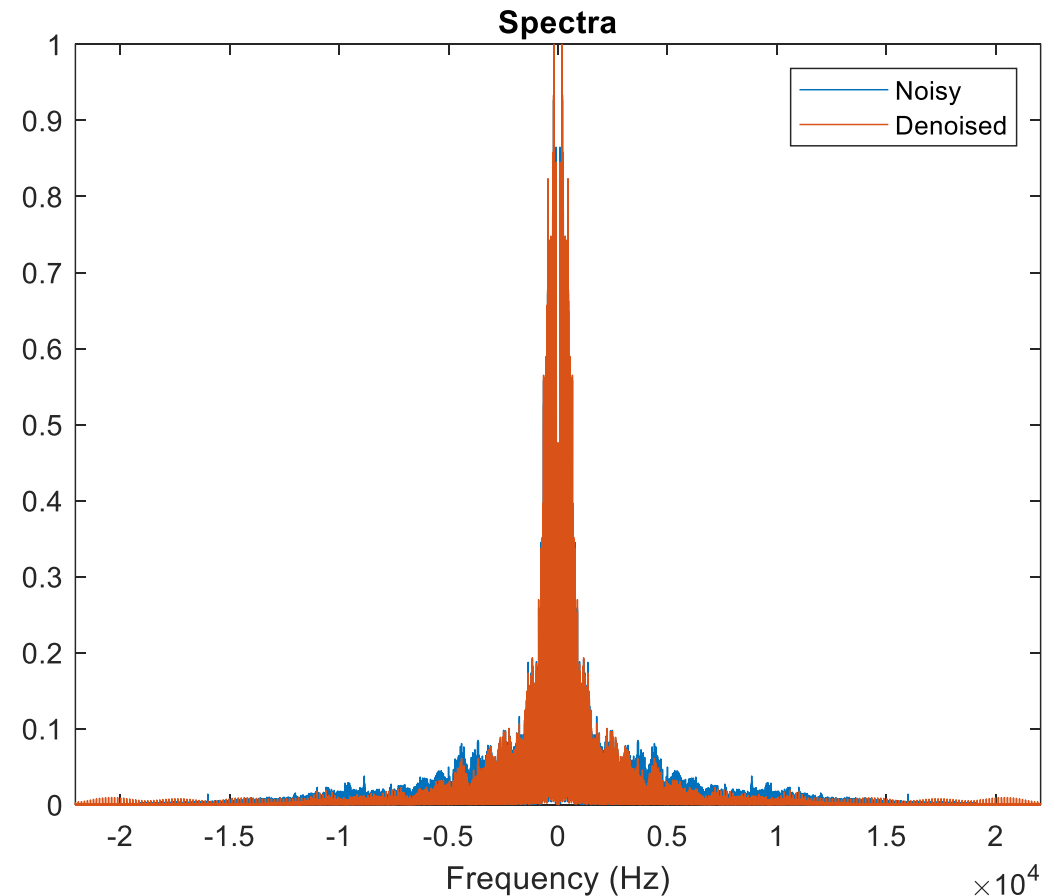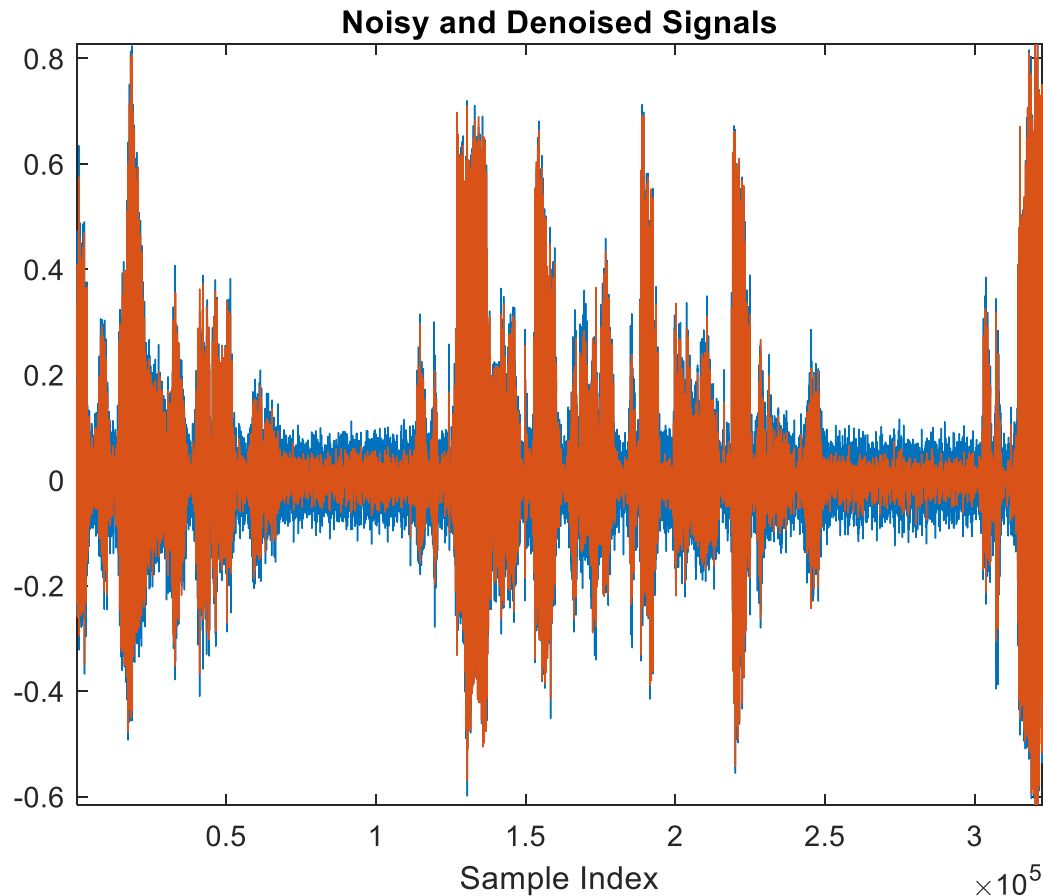
System KPIs

4. SNR Enhancement Analysis (Machinery Noise):

Thank you