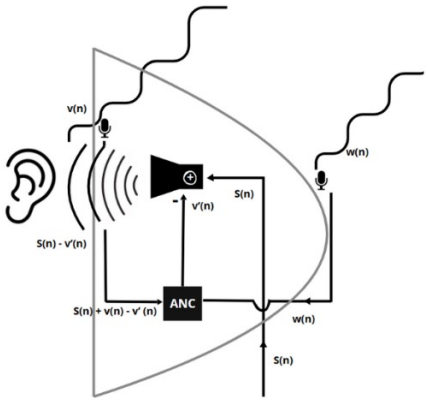
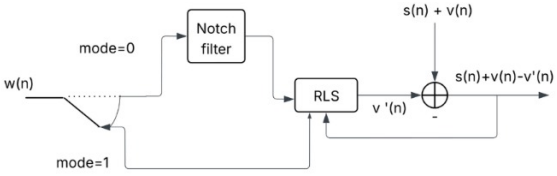
Block diagram of the Design





Design Choices, Justifications, and Trade-offs

- For full suppression, we chose the RLS algorithm. We have used the conventional RLS algorithm as described in [1].
- For partial suppression, we used notch filter.
- We implemented a switch that allows user to change the suppression mode as he/she desires. For `mode1`, the output is full suppression, while for `mode0`, the output is partial suppression.
- Using RLS filter increases convergence speed however it also increases the complexity.

Pros and Cons

- Performance of RLS is much better than LMS. It has better convergence rate [2] and good stability as well [3].
- RLS algorithm is computationally expensive and it's time complexity is $O(N^2)$. [4]
- Since the notch filter we used is not ideal, frequencies near the desired frequency will also be removed thus giving an output of reduced quality.

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