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(31) Priority Document No	:NA	(72) Name of Inventor :
(32) Priority Date	:NA	1)Dr. NIRAJ AGRAWAL
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(57) Abstract :

The invention discloses an apparatus (100) for real-time noise cancellation in audio communication. The system integrates a primary microphone (101), a reference microphone (102), a digital signal processor (103) with adaptive filter (105), and feedback sensors (106). It suppresses environmental disturbances, preserves speech clarity, and ensures energy-efficient operation through power management circuitry (108) and adaptive learning memory (107). The compact housing (109) allows seamless integration into consumer, professional, and industrial devices. Experimental validation demonstrates significant improvements in signal-to-noise ratio, battery efficiency, and user experience.

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