I. INTRODUCTION
Air quality is an important concern for health all over the world. Primarily in developing countries like India, it becomes even more significant. Studies show that air quality is far below the safe levels in most metropolitan cities in India especially its capital Delhi [1-4]. The present work is planned to keep Delhi pollution at the centre of the project. Studies reveal that the most prominent factors causing pollution in Delhi are particulate matter (PM), sulphur dioxide (SO\textsubscript{2}) and nitrogen dioxide (NO\textsubscript{2}). [1]. Most of the commercial air purifiers in India are using high-efficiency particulate absorbent (HEPA) filters along with activated charcoal filters. Such filters are good in removing bacteria, viruses, and volatile organic compounds but have limited effect in arresting these gas molecules. HEPA filter can arrest particulate matter having size >0.3 µm. Whereas the size of such molecules is few tens of nano-meter. Sulphur dioxide has good solubility in water (11.28g in 100g of water at 293K) [5]. At the same time nitrogen dioxide hydrolysis in water [6] showing high solubility. Many particulate matter ions are soluble in water. Keep these properties in mind present design was fabricated and found to be effective.

II. PRESENT DESIGN
Present design includes the following step by step processes:
1. Prefiltering: It removes the dust particles, organic floating fibres from the air. For this, double layer and low-density Polyurethane foam sheet of thickness 2 inches is used. Low density helps in fast flow of air.

Fig.1 Step by step progression of the process

2. Pre-filtered air is sucked by the vacuum pump through a 6 cm diameter CPVC pipe. Air allowed to pass through the 20cm water column. This gives sufficient time to dissolve NO\textsubscript{2} and SO\textsubscript{2} in water. Water is additionally added with silver nano-particles. Silver nano-particle in water known to have a property to kill pathogenic bacteria [7].

3. Air then is allowed to pass through activated charcoal lumps. This helps in the removal of volatile organic compounds.

Fig.2 Hybrid Air-purifier

4. Photoactivated titanium dioxide nanoparticles are known to be sanitizer [8]. For photoactivation, incandescent bulb with a fused-quartz filter is used to obtain Ultra-violet radiation 360-400nm.

5. Air Ioniser to remove air-born Acinetobacter is used just before exist of purified air.

III. EXPERIMENTAL RESULTS AND DISCUSSIONS
PM1, PM2.5, PM5, PM10, the particle of size>0.3µm -10 µm, show a drastic decrease at the outlet of the air purifier when the purifier is switched on. The graph in Figure 3 clearly indicates the decrease of PM1, PM2.5, PM5, PM10, the particle of size>0.3µm, >1µm, >2.5µm, >5µm and >10 µm decreases when the purifier is switched on. Their number starts increasing as soon as air-purifier is switched off. Only Particle size >1 µm and >10 µm show delayed trend. This primarily is attributed to slow response time of detectors as trend is of repeated nature.

IV. CONCLUSION
The present design is a simple design. It is quite effective for reduction of SO\textsubscript{2}, NO\textsubscript{2} and particulate matter. As far as maintenance is concerned it requires change of water after running for 200hour subject to moderate pollution. In case of high pollution, water can be changed after 100 hr of running.

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V. REFERENCES


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