

Advertisement for Incubation of Technology

Title of the technology	Powered Air-Purifying Respirator (PAPR)
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Current state of Technology

- ✓ Basic principles observed
- ✓ Technology concept formulated
- ✓ Experimental proof of concept
- ✓ Technology validated in lab
- ✓ Demo system available (with limited functionality)

General Information

PAPR is personal protective equipment used for personal safety in certain hazardous environments. It allows controlled intake of filtered air while providing full-face shielding and air sealing. It is achieved by pumping filtered air at a desired rate to create a positive air pressure inside the face-mask.

Features/Specification of system

- Full-face snorkel mask as face-mask. No need of face-fit test
- Face-mask can be easily removed from the system. Easy cleaning/sanitization/replacement of mask
- Waist-mount filter and electronics. No extra weight on head, comfortable for long working hours.
- HEPA filter, provides more than 97% efficiency
- Adjustable air flow
- 8 hrs of operation on a single charge
- Optical indications for low battery, charging, rate of air flow etc.

Specification of the Current System:

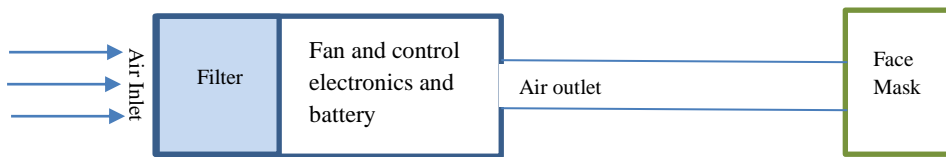
- Full-face snorkel mask
- HEPA filter having more than 97% efficiency
- Default air flow rate: ~210 lpm. But it can be adjusted by the user on the go.
- Li-ion battery (3.7V, 25 Ah)
- 8 hrs of operation
- LED indication of air flow rate, low battery and charging of battery

Parameters	<i>For Current System</i>	<i>For Target System</i>
Flow rate	210 lpm, default; other user selectable rates	Same as current system

Duration of operation	8 hours on a single charge	Same as current system or better
Indicators	Optical indicators for low battery, charging, flow rate	Same as current system and optical indicator for choked filter, audible indication for very low flow rate and before system shutdown
Filter	HEPA, 97%	Same as current system or better
Certifications	Not done	Certifications under EN 12941, IP 65, EN 166:2002 and OSHA assigned protection factor. Different certifications may be needed for using the product in different industries or laboratories.

Working of the System

Air coming through a HEPA filter is pumped to the face mask at a desired rate (~ 210 lpm). The full-face snorkel mask provides a natural sealing around the face and positive pressure of the pumped air ensures no leaking of outside air into the mask. The whole system is controlled by a microcontroller. The system is fail-safe in a sense that it continues to pump air at a predetermined rate even when the microcontroller stops working for some reason.



Applications of the System

- Any dusty and hazardous industrial environments like cement industry, paint industry etc.
- Pharma industry
- Front-line health workers working in a highly infectious environment like dealing with COVID patients
- Handling of highly poisonous materials which generate air-borne microparticles.
- People working in group, e.g. for erection and commissioning of plants, where maintaining social distance is not possible.

Picture/Photo of the System –



Whether the parent product/ technology/ process is patented: No

If yes, provide the details – Not applicable

Deliverables –

1. Powered Air-Purifying Respirator with certifications under EN 12941, IP 65, EN 166:2002 and OSHA assigned protection factor.
2. Circuit diagram, Gerber file in RS274 format, bill of material and all test reports
3. 3-d model of the enclosure in STEP/IGES format

Justification for Incubation – This technology may find wide applications in industries and laboratories. It will also evolve into products which will be import-substitutes in line with Atma Nirbhar Bharat initiative.

Facility and Infrastructure requirements: This technology does not need any special infrastructure or facility. It involves fabrication and assembly of printed circuit boards, plastic enclosure, HEPA filter etc. All these facilities are easily and widely available in the country.

Facility and Infrastructure to be provided by Incubatee:

Manpower/ expertise: PCB design & assembly of components, enclosure design and assembly of system into the enclosure. Some knowledge of electronic circuit design will be helpful.

Knowledge/experience of getting certifications done under IP 65, EN 12941 etc. will be very useful.

Machinery and Equipment: Soldering/rework station for assembling of electronic components, tools for assembling of parts inside an enclosure. However, all these activities may be outsourced also.

Others:

Any special requirements for plant, industry, location utilities, handling storage, safety etc.: Different kinds of certifications may be required for different industries.

Note: As per in-house technology incubation policy, the incubatee should be a licensee of the existing technology. Alternatively, the applicant will be required to take the license of the existing technology before entering incubation agreement.

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