



expertise in infrared imaging for missile applications. DRDO in collaboration with industry partner has innovated and developed algorithms for thermography in outdoor conditions. Advanced face detection techniques have been used over thermal images.

The system consists of a thermal camera and a desktop/laptop computer. Artificial Neural Network, trained with a very large in-house thermal database, allows face recognition directly on the running video from the IR thermal camera. A large number of people can be thermally profiled outdoors without disturbing their movements. Persons showing more than pre-set thermal threshold can be earmarked, recorded and real time inputs can be given to authorities.

The system developed by DRDO using its hardware and software



**Crowd Temperature Monitoring System**

resources has already been deployed at Hyderabad-based laboratories. Test results show that the system can be used in indoor environments as well as in areas where a large number of people gather/move regularly. The two camera and lens options have been worked out as: (i) 320 x 240, 17 μ, 7 mm (2-3 m typical standoff) and (ii) 640 x 480, 17 μ, 50 mm (25-30 m typical standoff).

Estimated unit cost of the system would be about 2 to 2.5 lakhs for the basic configuration (camera, computer) with about 0.5 lakh for accessories (tripod, reference).

**Automated System For Decontamination of N95 Face Masks**

An Automated System for Decontamination of face masks has been developed based on ultraviolet (UV-C) germicidal irradiation for killing the bacteria and virus. The system comprises two sub-systems; the Air Sterilization Unit (ASU) and the Automated Feeder for supplying face masks configured as per time required for sterilization of every mask. Very high intensity radiation is achieved inside the ASU to the tune of 69.07 J/s/cm<sup>2</sup> that ensures the high Sterility Assurance Level (SAL). Further studies are being carried out in Bio Safety Cabinet (BSC) class II-b in a contained environment.



**Automated Mask Decontamination System**

The prototype has been realized and US-FDA requirement of “viricidal activity of atleast 3 log reduction” has been met. The face masks treated in this system can be reused for many cycles.

**Protecton™ Bio-Suit & Mask**

Protecton™ is a protection technology developed initially as protective clothing for medical responders who deal with patients contaminated with radiological agents during CBRN scenario. The technology was transferred to M/s Frontier Protective Wear (P) Limited and since then it has made headway in many applications, based on state-of-the-art technologies, by integration and optimization processes.

Spread of Corona Virus necessitated the need of PPE for the frontline warriors against Corona. Protecton™ was further modified, tested and validated as Bio-Suit for prevention of risk of infectious agents like Corona Virus. The technology complies with ASTM 1671 Tested using Phi X 174 Bacteriophage), which prevents entry of biological organisms four times smaller than the size of Corona Virus, and NFPA 1999:2018 standard that allows it to use multiple times (25 cycles certified) after every work cycle in open field and isolated wards, making it useful for both health and non-health care workers.

**Salient Features**

- \* Re-usable (as per NFPA 1999: 2018 compliance) PPEs that can be reprocessed for complete month
- \* Laundry Washable (as per EN ISO 6330: 2012 6N Procedure)-25 Certified tested for Water Absorption Resistance Test [NFPA

1999-2018 modified test (section 8.13) as per standard of AATCC 42].

- \* Complied with ISO 4920:1981 (liquid integrity); ASTM D 5034-09 (2013)/ D3787-07 (2011): (high tensile & burst strength); ASTM D 2582/5587 (extremely resistant to tears); ASTM E 96-00 method BW /F 1868 (part C)/para 8.42 of NFPA 1999 (comfortable for long term wear & breathable) & ASTM D 1230-10 (2016) e1 (fire resistant for open field operations)
- \* Fits into the category of compliance of protective clothing for emergency medical operations as per NFPS 1999: 2018 certification

**Protecton™ India 365 Mask**

Protecton™ India 365 Mask, has been designed and developed for long term protection. Re-washable (100 times) mask would replace the existing three-ply disposable mask at a cost less than a rupee per day.

**Benefits**

- \* Per day utility cost is less than 240 INR with enhanced protection level; saving utilization month cycle for 1000 Health Care Workers (w.r.t. Rs 1500 INR per PPE kit of export quality; single day use) = > 80 % (approximately minimum saving of Rs 3 crore 50 lakhs per 1000 HCWs requirement)
- \* Biological waste reduction by 30 times (as well associated cost and labor)
- \* Export potential with economic earning of DRDO (@ 2% royalty) = > 50 crore per supply of 50 lakh suits (containerized supply to



**Protecton™ Biosuit and Mask**

other countries especially SAARC, BRICS association)

At present, multiple manufacturers are developing/trying multiple fabrics with varying level of design issues not complying with breathable standards faulty seam tapes. Quality control is major challenge as only “Synthetic Blood Penetration Test” is considered as primary criterion. The supply of such high quality DRDO PPE to healthcare workers—uniform protection for all (no discrepancies between various workers at reception or isolated wards)—will boost their

confidence and reduce probability of occurrence of infection.

Protection™ Disinfection/ Decontamination (pair of Suits with India 365 Mask) for Sanitation Workers and Protecton™ Disaster Management (for urban flooding to Dirty Bomb attacks/Covid-19) are also available. Protecton™ CBRN Combat+ (lightweight strategic force suits for surgical strikes, NSG and ATFs of various states) are being in process of integration and optimization.