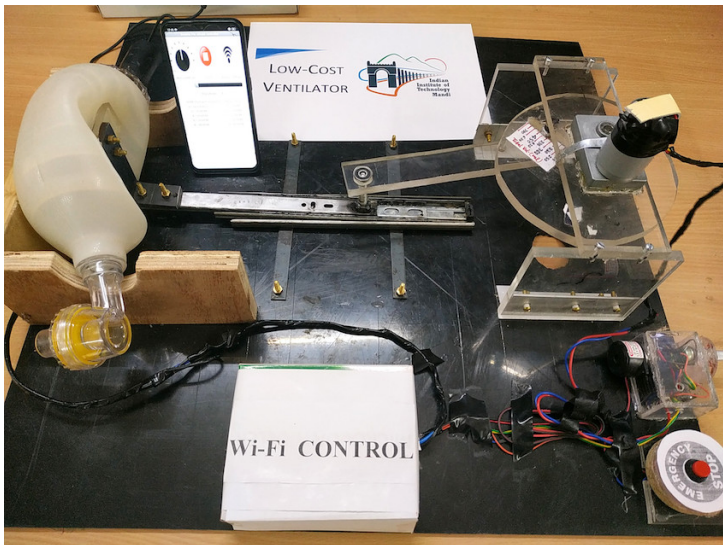


## IIT-Mandi develops low-cost portable ventilators

29 May 2020 | News

**The developed prototypes do not require compressed air and can be used in remote locations as well**



Indian Institute of Technology Mandi researchers have developed two low-cost portable ventilators. The developed prototypes are easy to use and can be taken to remote locations in case of a medical emergency.

### Wi-Fi Operated Smart Ventilator

Dr. Arpan Gupta, Associate Professor, School of Engineering, IIT Mandi, along with research scholars, Lokendra Singh and Sourabh Dogra, have developed a smart ventilator costing only Rs 4,000. The developed prototype is a mechanised Artificial Manual Breathing Unit (AMBU) bag with options to control breath rate and volume of air going into the patient's lungs.

The unique feature of the developed product is, apart from manual operation, it can be controlled by a mobile application over wifi as well. For the same, the smartphone application, 'IIT Mandi Ventilator' has been developed at IIT Mandi. This mobile application can start-stop the ventilator and change the Breath/ Minute (BPM) rate. The designed prototype uses a slider-crank mechanism to pump air and is easy to manufacture, assemble and operate.

Speaking about the ventilator, Dr. Arpan Gupta said, "Designed especially for COVID-19 pandemic, this low-cost ventilator can be operated manually as well as using a smartphone app connected over Wifi. It can offer some protection to our medical staff, who can operate the ventilator remotely."

There is also an emergency switch on the ventilator and the mobile application that stops the ventilator and alarms in case of any malfunction. The ventilator can be directly operated with an AC supply or from an external battery. The present ventilator is for non-critical patients who need some help in respiration. The prototype was developed in consultation with a medical team consisting of Dr. Chander Singh, Medical Officer, IIT Mandi and Dr. Manjul Sharma and Dr. Jasdeep from Jagriti Hospital, Mandi.

## **Low-cost Mechanical Ventilator**

Dr. Rajeev Kumar, Associate Professor, School of Engineering, IIT Mandi, along with his research team have developed a mechanical ventilator by using a low-cost self-inflating bag operated by an electric motor costing under Rs. 25,000.

The research team has used the motor generally used in an electric ventilator along with the Artificial Manual Breathing Unit (AMBU) bag or self-inflation bag to achieve the goal. In this ventilator, a single rack and pinion mechanism has been used in which the self-inflatable bag is compressed from one side that would blow the oxygen into the patient's lungs either through invasive or noninvasive mode. The developed ventilator has an interface between the ventilator to the patient and the ventilator to the operator.

Speaking about the innovation, Dr. Rajeev Kumar said, "In this time of COVID-19 pandemic, this low-cost ventilator will be very useful especially for the rural patients because of its portability."

Along with this, the ventilator is portable and has user-specified Breath/Minute (BPM), tidal volume and exhale-inhale time ratio facility. It also has a display of settings and status and alarms for high airway pressure. Such features are usually found in the ventilators which are much costlier than the developed prototype.