

# Design and development of multi channel Ventilator components for fighting with global pandemic COVID 19

Developed by

Centre for Advanced Studies

Dr. A.P.J. Abdul Kalam Technical University (AKTU) Lucknow

in joint collaboration with

Sanjay Gandhi Post Graduate Institute of Medical Science (SGPGIMS) Lucknow

To meet the new emerging challenges of the global pandemic COVID 19, Dr. A.P.J. Abdul Kalam Technical University (AKTU) Lucknow and Sanjay Gandhi Post Graduate Institute of medical science (SGPGIMS) Lucknow joints hands together under the leadership of Prof. Vinay Kumar Pathak, Vice chancellor AKTU and guidance of Prof. Manish Gaur, Director Centre for Advanced Studies AKTU. Dr. Anuj Kumar Sharma of Centre for Advanced Studies AKTU Lucknow and Dr. Ashish Kannaujia of SGPGIMS Lucknow have jointly developed the ventilator splitter adopter and other necessary components which are required to develop the multi channel ventilator. Four M.Tech students of Mechatronics first year, Mr. Avinash Bhaskar, Mr. Deepak Chandra Joshi, Mr. Nitin Singh and Mohd. Ilyyas have been working under the guidance of Dr. Anuj Kumar Sharma for developing the various components of ventilator. As the number of CORONA affected patients are increasing rapidly, it urges the need of having sufficient quantity of ventilators in the hospitals. To overcome this shortage of ventilators a splitter is designed and its prototype is developed in the 3D printing lab of Centre for Advanced Studies, an in-campus research driven institute of AKTU, Lucknow. This splitter (shown in Figure-1) will be used in existing ventilators which would assist in ventilating up to four patients at a time. Moreover, in next stage, treatment of more than four patients would be attempted using developed ventilator.

## Multi channel Ventilator adapter and other parts

Out of two designs of multi channel ventilator splitter adapter (Design-1 & 2) developed in 3D printing lab of Centre for Advanced studies AKTU Lucknow. The Design-2 (Figure-2) was finalized on the basis of preliminary successful clinical testing at SGPGIMS Lucknow. Moreover, CAS AKTU design team has designed and developed some other components of multi-channel ventilator (Figure-2) as per following details:

The collage contains several news snippets:

- एक वेंटीलेटर से चार मरीजों को मिलेगा इलाज**: Discusses how a single ventilator can now serve four patients using a splitter.
- एकटीयू ने बनाया मल्टी चैनल वेंटीलेटर स्प्लिटर**: Reports on AKTU's development of a multi-channel ventilator splitter.
- एकटीयू ने बनाया मल्टी चैनल वेंटीलेटर स्प्लिटर**: Another report on the same development, highlighting the use of 3D printing.
- एकटीयू ने बनाया मल्टी चैनल वेंटीलेटर स्प्लिटर**: A third report on the development, mentioning the collaboration with SGPGIMS.
- एकटीयू ने बनाया मल्टी चैनल वेंटीलेटर स्प्लिटर**: A fourth report on the development, focusing on the technical aspects.
- एकटीयू ने बनाया मल्टी चैनल वेंटीलेटर स्प्लिटर**: A fifth report on the development, discussing the future plans.



Design-1



Design-2

1. Flow regulator to regulate the flow of oxygen and air supply as required for different age patients (like low flow rate for young patient as compared to high flow rate to old age patient)
2. Thumb grip for insertion into respiratory pipe of patients for supporting the inhalation pipe of ventilator.



Thumb grip



Flow regulator

3. Butterfly valve to stop or control the supply of oxygen and air from the individual outlet of splitter.
4. Apart from the above mentioned components of ventilator, the design team is currently working on developing Non Return valve (NRV) to stop the back flow of exhaled air from the patients into the inhalation line. This will prevent the contamination caused due to mixing of inhalation and exhalation of air to and from the patient.



Butterfly valve

