

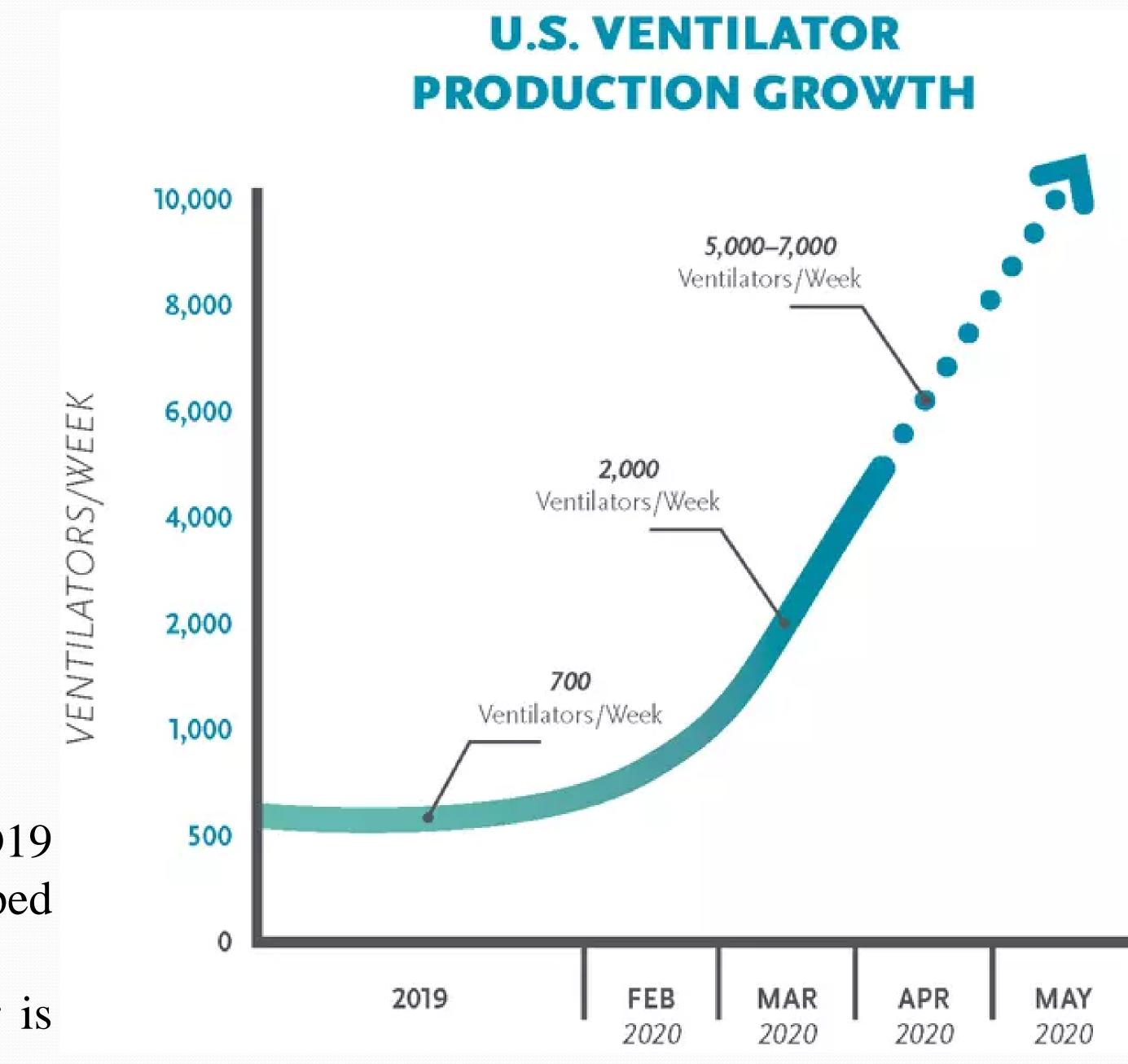
# Electronic Ventilator for COVID19 Patient Treatment

Graduate Students
Science & Engineering

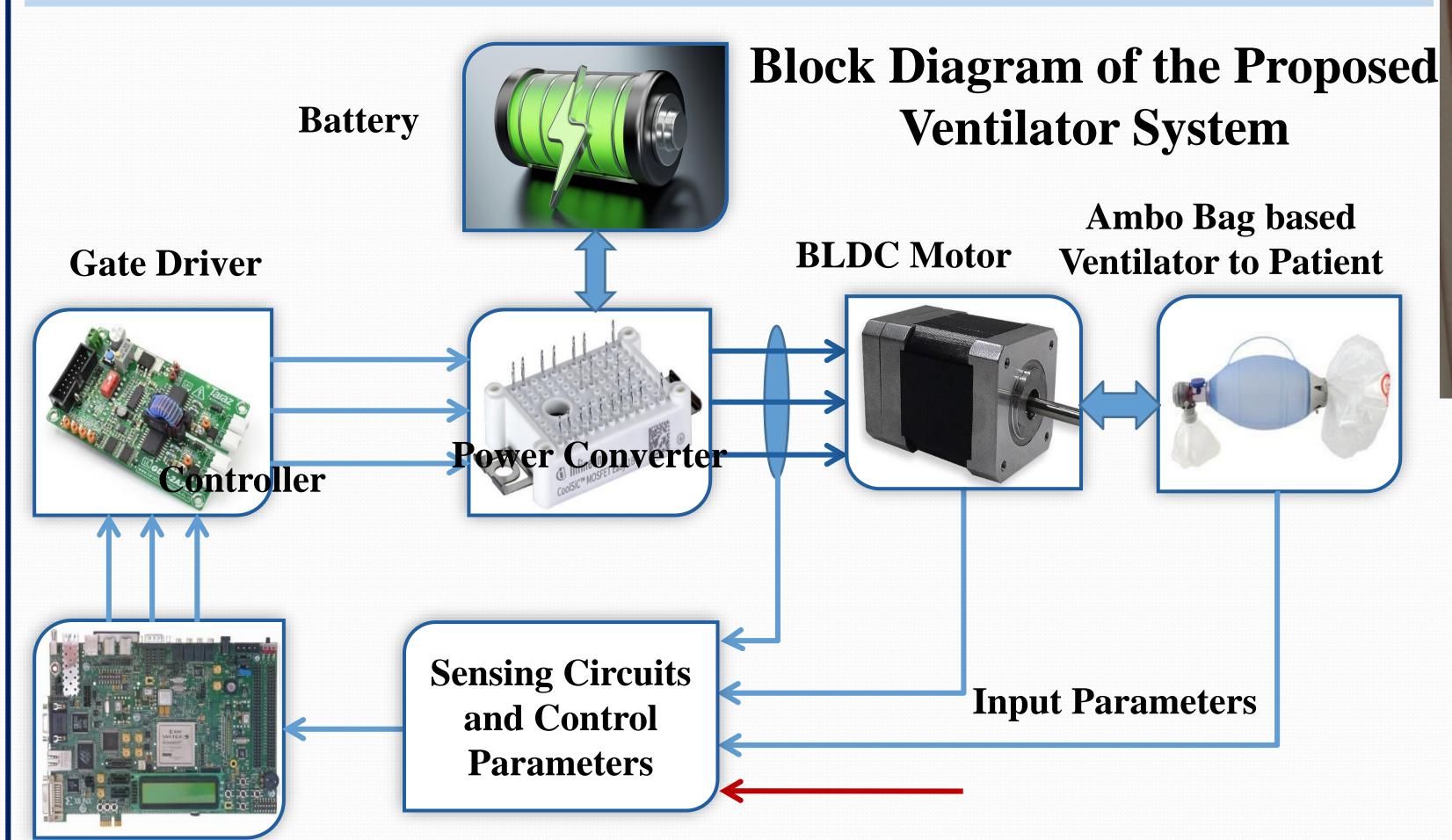
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#### Importance of Ventilator for COVID-19 Pandemic HOW **VENTILATORS** VENTILATOR UNIT WORK contains air pressure system and controls One in six COVID-19 patients can develop breathing difficulties, → EXHALED CO2 some of them may develop FROM PATIENT ARDS (Acute Respiratory Distress Syndrome); It is a life-threatening condition and such patients need ventilator support HUMIDIFIER to maintain body temperature and add moisture LUNGS TUBE INSERTED NEWS 18 INTO AIRWAY

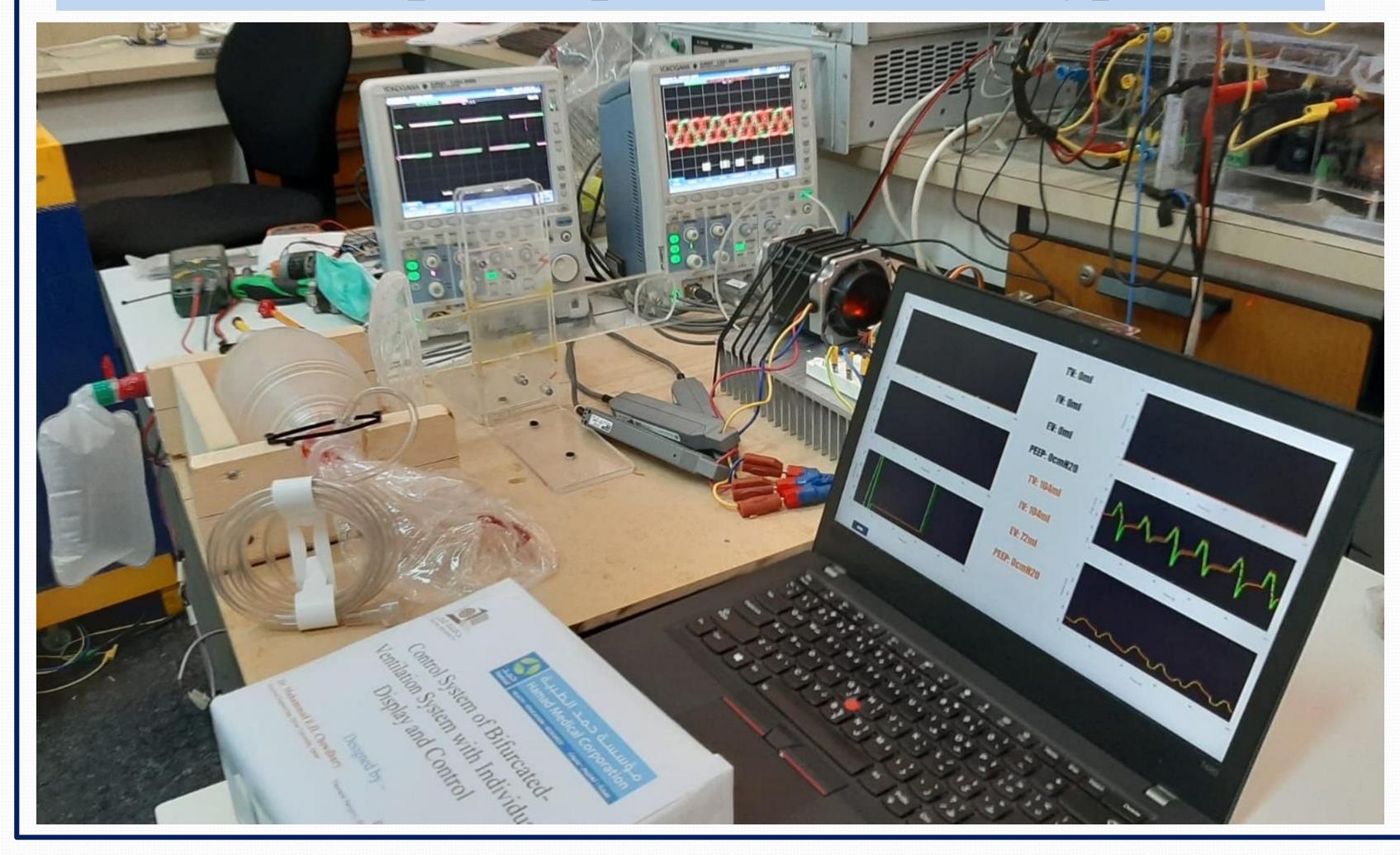
- ➤ In response to expected shortages of ventilators caused by COVID19 pandemic, globally many organizations and institutes have developed low cost and high rate production ventilators.
- ➤ Power electronic motor drive based digitally controlled ventilator is designed, developed and tested in the Qatar university laboratory

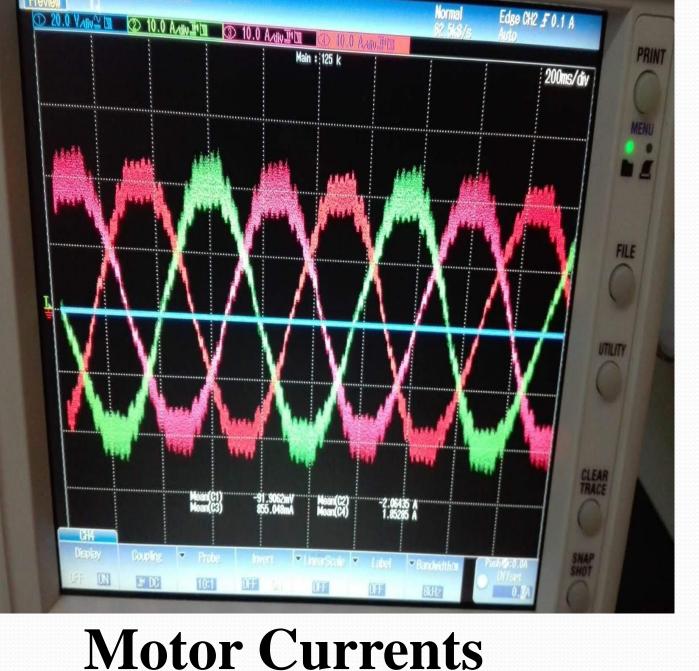


# Proposed Power Electronic Motor Drive based Ventilator



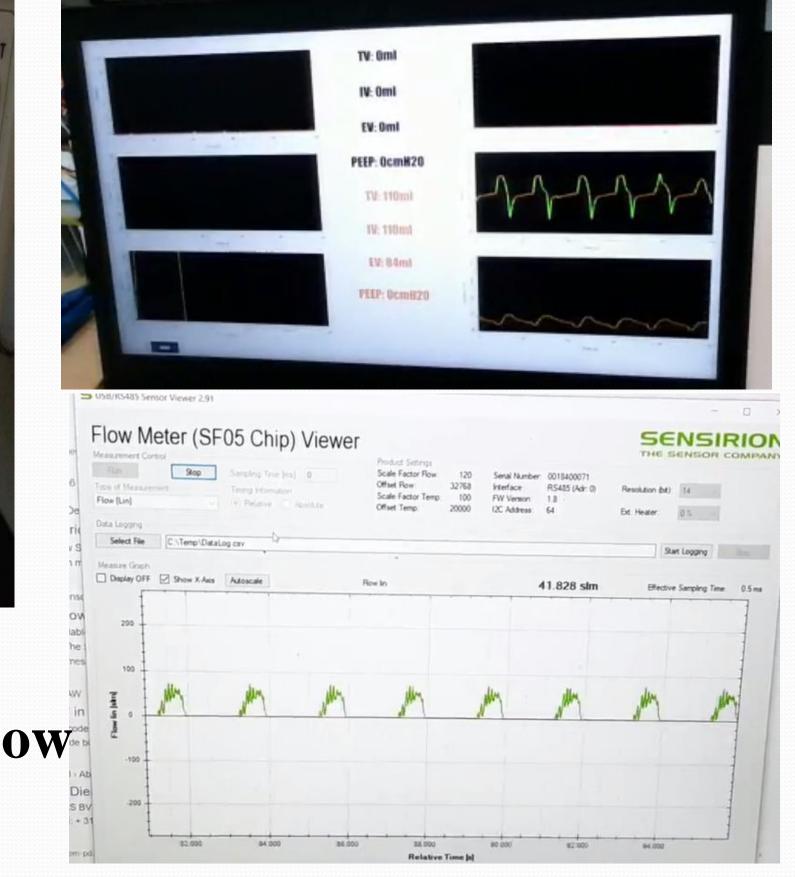
## Developed Experimental Prototype





Pressure and Flow

Waveforms



#### References

- 1) T. F. Schuessler and J. H. T. Bates, "A computer-controlled research ventilator for small animals: design and evaluation," in IEEE Transactions on Biomedical Engineering, vol. 42, no. 9, pp. 860-866, Sept. 1995, doi: 10.1109/10.412653.
- 2) Hoi-Fei Kwok, D. A. Linkens, M. Mahfouf and G. H. Mills, "SIVA: a hybrid knowledge-and-model-based advisory system for intensive care ventilators," in IEEE Transactions on Information Technology in Biomedicine, vol. 8, no. 2, pp. 161-172, June 2004, doi: 10.1109/TITB.2004.826717.
- 3) R. M. Corey et al., "Low-Complexity System and Algorithm for an Emergency Ventilator Sensor and Alarm," in IEEE Transactions on Biomedical Circuits and Systems, doi: 10.1109/TBCAS.2020.3020702.
- 4) L. Mertz, "Quick Thinking Turns out Low-Cost Ventilators," in IEEE Pulse, vol. 11, no. 3, pp. 31-34, May-June 2020, doi: 10.1109/MPULS.2020.2995436.

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