

Senior Design Project Description

Company Name	<i>Rethink Respironics</i>	Date Submitted	<i>06/17/2020</i>
Project Title	<i>The Shared Manifold Ventilator</i> (RETHINK VENT)	Planned Starting Semester	Fall 2020

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

Discipline	Number	Discipline	Number
Mechanical	2	Electrical	1
Computer	2	Systems	
Other ()			

Company and Project Overview:

Rethink Respironics is a startup company primarily pursuing ventilator designs. Our main project is the Conformal Vest Ventilator. We are seeking cooperation on a second type of ventilator, the Shared Manifold Ventilator which has specifically been invented to provide ventilator support for an entire hospital ward at much lower cost per patient than current designs to aid the COVID-19 pandemic. Project funding will be provided via a Grant from the NC Manufacturing Extension Partnership, through a sub-grant to the Industrial Solutions Lab at UNC Charlotte.

Project Requirements:

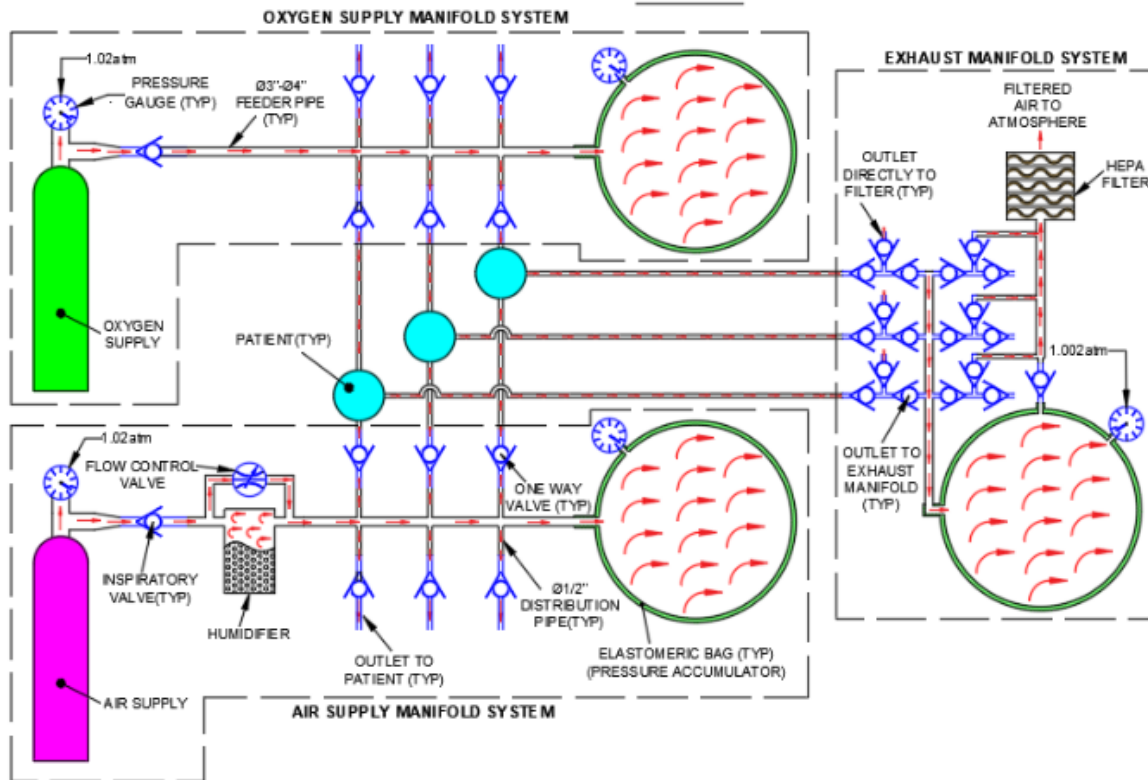
Current ventilators cost between \$20,000 and \$50,000. They are designed to work with one patient. The Shared Ventilator concept is a design that will allow this expensive equipment to be shared by several users at the same time. The Shared Ventilator would help to cope with surges in patient volumes due to the COVID-19 virus, especially in areas of the world that cannot fund or obtain individual ventilators. The idea of this project is to multiplex the use of expensive components, but still allow custom settings for individual outputs.

The project involves specifying pneumatic and control components for the ventilator and programming the control and feedback settings within the system. The portion that connects to the patient is 100% prior art. The project entails controlling the air, oxygen, and exhaust manifolds and their interfaces with the patient through solenoid valves and also feedback controls from pulse oximeters and oxygen sensors.

This is a flow diagram for the conceptual design:



FIGURE 2



The student team will do a detail design for this concept and develop a working prototype.

Expected Deliverables/Results:

- Working model of the Shared Manifold Ventilator
- Solenoid valves and controls specified and demonstrated
- Programming to control inhalation and exhalation using data from pulse oximeters and other flow measuring devices.
- Failsafe features studied, including software, hardware, and device failure modes

Disposition of Deliverables at the End of the Project:

The prototype will be used as part of an effort to get the project financed. This project is primarily aimed at saving lives in 3rd-world countries that are not able to purchase sufficient numbers of ventilators of the current designs available.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- Knowledge of current ventilator systems would be useful
- Familiarity with pneumatic controls would be useful
- Experience with pulling sensor data into control logic programming is important