IEM News

COVID-19 RESOURCES AND OPPORTUNITIES - Join IEM and the broader research and clinical community as we tackle the challenges of COVID-19. Click on links below:

- **NEW:** COVID-19 Therapeutic and Vaccine Clinical Trials Resource Center
- **NEW:** Biophysical Modeling for COVID-19 Therapeutics and Vaccines
- Assistance with grant proposals addressing COVID-19:
  - NIH
  - NSF
  - BARDA
  - Minnesota Department of Health
  - …and Others
- **University Rapid Response Grants ($5,000 - $10,000) for COVID-19 research**
- Connect with experts to address medical, scientific, engineering, and data analysis challenges related to COVID-19

COVID-19 RESOURCES

**Bakken Medical Devices Center Serving as Development Facility for Low-Cost, High-Volume Ventilator for Treating COVID Patients & Other Projects**

The Bakken Medical Devices Center (BMDC) is pursuing 6 COVID-related projects, the most prominent among them is the development of the Coventor Ventilator that can be easily produced at a low cost, and rapidly-scalable to quantities that can make a big impact in addressing the critical shortage of ventilators in the U.S. and globally. The concept, which was the brainchild of Anesthesia Fellow Dr. Stephen M. Richardson, has evolved into several iterations of prototypes and the initial production of 25 units at the BMDC. “We are in awe of the tremendous outpouring of all the offers to help us in our development of a low-cost ventilation system in response to the COVID-19 crisis,” says Dr. Arthur G. Erdman, Director of the Bakken Medical Devices Center and IEM Executive Committee Member. “We have received over 350 contacts from companies and individuals who wish to help.” Among those companies have been leading medical device manufacturers and a global automobile maker. Aaron Tucker, Steven Thomalla, John Huss and Cara Piazza (current and former BMDC Lab Supervisors) Enio Perez, (MD and Current BMDC Fellow) and Garrett R. Bohach, (an Advanced Masters RA) are also working on the project (among many others). Plans are in place to go into production of the Coventor. This will be led in the near future by partners BSC and Medtronic to help fulfill the ever growing needs locally and worldwide.

In addition to the ventilator, BMDC has been pursuing the following COVID-related projects:
1. Working with the University of Minnesota's Department of Surgery to adapt back-up ECMO units, by adding a motor to the crankshaft so they can be used in an emergency.
2. Build an 'isolation box' to protect the Children's Hospital clinicians while intubating patients.
3. Working with Hennepin Healthcare to develop and produce an adapter for viral filters to be used with CPAP's.
4. Starting soon: will develop a new plastic that reduces the time the virus is active on the surface for numerous applications.
5. Collaborating with Children's Hospital to meet need for additional face shields for health care workers.

University of Minnesota is Going Full-On MacGyver Against COVID-19 >

**IEM Initiates & Coordinates Effort to Rapidly Develop & Produce an N95 Respirator**

A rapid-response, interdisciplinary university/industry initiative launched by IEM to address the limited supply of N95 respirators has led to the development of two possible alternative respirators. The first of these is a frameless, foldable single-use version similar to standard medical-grade N95s, and the second is a reusable anesthesia mask combined with a disposable filter. Both use widely available components and are relatively simple to assemble. The production launch of each is pending a final decision to move forward, which will be based upon performance, fit and decontamination tests. Both types of respirators use a filter material, very generously donated for this application by Cummins, that has been tested to have N95 properties.

The success in conceiving, developing, testing and continuously innovating these concepts, including addressing a variety of critical issues, has been due to the exemplary teamwork and individual contributions of the N95 team members, including Dr. Linsey Griffin, Assistant Professor of Apparel Design, who created the single-use design; Dr. William K. Durfee, Professor and Director of Design Education in the Department of Mechanical Engineering, who has provided engineering leadership to the team and helped to source components; Dr. Marc A. Hillmyer, Professor of Chemistry, who has played a key role in sourcing the filter media and other components used for the respirators; Dr. Chenxing Pei and Ph.D. student Qisheng Ou of the lab of Dr. David Y.H. Pui, Professor of Mechanical Engineering, each of whom have played key roles in the testing of the filter media and prototypes, which they are also doing for a variety of prospective N95 alternatives; Dr. Kumar G. Belani, Professor of Medicine, Department of Anesthesiology and Dr. Rumi Faizer, Associate Professor, Department of Surgery, each of whom provided clinical guidance and fit-testing of the prototypes; and IEM Director John C. Bischof, who has provided overall leadership to the team.

KARE 11 Story: Shop Owner Designs Mask Made from Vacuum Cleaner Bags; Volunteers Turning-Out Thousands >

**IEM Launches COVID-19 Clinical Trial Resources**

COVID-19 clinical trials are being initiated the world over, including here at the University of Minnesota. Among these is an initiative launched by Dr. David J. Odde, IEM Associate Director for Strategic Research Initiatives, to connect state-of-the-art engineering approaches to these clinical trials through two activities:

1. Clinical Trial Web Resource Center – IEM is developing a new section of its website that will facilitate collaboration and data-sharing among COVID clinical trialists and other researchers. Click here to access the Web Resource Center.
2. Biophysical Modeling Center – Dr. Odde is developing a biophysical model of COVID-19 and applying that model to COVID-19 clinical trials underway at the University of Minnesota. Updates on this effort will be posted here.

**Understanding Life Support Scenarios for COVID-19 Patients**

The Visible Heart Laboratory's Drs. Anthony R. Prisco, Cardiology Fellow, Tinen L. Iles, Assistant Professor of Surgery and Paul A. Iaizzo, IEM Associate Director for Professional Education and Outreach, have been working in collaboration with the Barcelona Supercomputing Center, to better understand life support scenarios for COVID-19 patients:
through computational simulations. Specifically, developing detailed models of the cardiac system and simulating multiple scenarios of ECMO. That is, in order to better understand and prevent complications from employing life support in such patients: e.g., north south syndrome (heart working better than lungs and oxygenated blood not being properly delivered to the brain).

**Team Led by Angela Panoskaltsis-Mortari Rapidly Develops Connector for PAPRs Used in Treating COVID-19 Patients**

In response to an urgent request by M Health Fairview, a team led by IEM Executive Committee Member Dr. Angela Panoskaltsis-Mortari, Vice Chair for Research and Professor, Department of Pediatrics, Division of Pediatric Blood and Marrow Transplantation, developed a 3D-printed adaptor to enable connection of older models of PAPRs with currently available hoods worn by frontline healthcare workers treating COVID-19 patients. This connector is needed to compensate for a current supply chain issue of not having enough of the new air blower units and hoses to connect to the new hoods. The designing and printing of this connector was performed by BME Ph.D. student Zach Galliger, and Haylie Helms who manages the 3D Bioprinting Facility.

**Other COVID 19-Related Initiatives by IEM Members:**

1. Therapeutics: Jonathan Sachs, Hubert Lim, David Odde (and many others)
2. Diagnostics: Jianping Wang, John Bischof and David Boulware are working on point-of-care devices to help testing beyond just hospitals.
3. Face Shields: Gwen Fischer is leading an effort to print 1,000 facemasks for Fairview.
4. Chris Hogan is leading a team to reduce aerosolization in a negative pressure system.

**IEM Member Highlights**

**Tim Kowalewski has received the McKnight Presidential Fellow Award**

Dr. Timothy M. Kowalewski, Assistant Professor of Mechanical Engineering, is the recipient of a special University of Minnesota's mid-career faculty award, the McKnight Presidential Fellow Award. This is a three-year award given to the most promising individuals who have been granted both tenure and promotion to associate professor in an academic year. "Tim has made outstanding contributions to our department, both in his research on medical robotics but also through innovations in our curriculum," says Dr. Susan C. Mantell, Professor and Department Head of Mechanical Engineering.

**David Boulware Discusses with Forbes the Use of hydroxychloroquine to Treat COVID-19 Patients**

**One Patient Dodges a COVID Bullet. Is She a Harbinger or Outlier?**

**Louis Mansky Discusses with China Daily the Importance of Testing for Mitigating COVID-19**

**U.S. Expands Virus Testing But Still Lags**

**Announcements**

Two Sessions of the IEM BioSciTech Symposium will be held via Zoom on Tuesday, April 7th; Event is Free but Registration is Required
IEM's second annual BioSciTech Symposium is scheduled for **Tuesday April 7, 2020**. Sessions 1, 2 and 5 have been cancelled. Session 3 and Session 4 are now being held through Zoom. We will not be hosting the event at the University of Minnesota. Free registration is still available. We hope you can join us!

- 10:30 - 12:30 - Regenerative Medicine: Cryopreservation of Cells to Organs
- 12:55 - 3:00 - Aquatic Species Cryopreservation

**Learn More**

**MN-CORPS Online Innovation Commercialization Workshops Start April 22**
While many innovators are focusing on the COVID-19 crisis (**thank you!**), others may have time to explore the potential of specific innovations emerging from their research. You've identified a specific innovation that you think you may want to commercialize. Now what? In this online program, you'll learn and apply the Lean LaunchPad tools promulgated by the [NSF I-Corps](https://www.nsf.gov/iip/insights/leankickstart) initiative.

**Click Here for Info & Registration**

**Course schedule:** Webinars will meet 4-6pm on the following dates:

- **April 22:** Lean LaunchPad Introduction
- **May 6:** Product-Market Fit
- **May 20:** Customer Discovery
- **June 3:** Commercialization Pathway
- **June 17:** Market Assessment