Subject: Engineers at Texas A&M University at Qatar Foundation's Education City innovate to combat COVID-19

Hi _____,

While COVID-19 continues to impact the world, professors and lab engineers from Texas A&M University at Qatar Foundation's Education City in Doha, Qatar (TAMUQ), have mobilized their resources to combat the spread of this virus with unique designs.

The TAMUQ team built upon the prototype of a snorkeling mask that could be converted into a ventilator using just an adapter, and modified the design to be non-invasive. The filter and valves modified by the TAMUQ team ensure there is little to no leakage of contaminated air from patients, as well as keeping positive pressure inside lungs.

I've included more information below and would be happy to put you in touch with someone from the TAMUQ team to discuss further.

Best,

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Engineers at QF partner university transform snorkeling masks to ventilators
July 28, 2020
https://www.qf.org.qa/stories/engineers-at-qf-partner-university-transform-snorkeling-masks-to-ventilators

TAMUQ researchers modify commercially available masks to aid in fight against COVID-19

Doha, Qatar, July 28, 2020: Several months ago, when COVID-19 started to change the world as we know it, the possibility that this might pose a bigger challenge than we had anticipated was not lost on the scientific community. While the medical community braced itself for what was to come, engineers and researchers were not far behind.

Professors and lab engineers from Texas A&M University at Qatar mobilized their resources to develop face shields, valves, and other tools that would help fight the virus. One such prototype was that of a snorkeling mask that could be converted into a ventilator using just an adapter and being plugged into ventilating machines at hospitals, or used as a substitute for the widely used N-95 masks.

A startup company in Italy first began to apply this model – using snorkeling masks manufactured by Decathlon, a sporting goods company, and modifying them to be plugged into ventilators. Using the open source information available online, Dr. Marwan Khraisheh and Dr. Yasser Al-Hamidi of Texas A&M University at Qatar's (TAMUQ's) Mechanical Engineering

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Program led the efforts to design and develop similar versions for Qatar. Qatar Foundation Research, Development and Innovation arranged for the masks to be donated by Decathlon to the engineering team for modification.

The team at the Qatar Foundation partner university began by designing a better-engineered version of the open-source concept available, and used the fabricating facilities and 3D printers available in their laboratories. The idea was to repurpose these commercially available snorkeling masks by connecting them to adapters/valves to be used as non-invasive ventilators.

For patients with respiratory difficulties, a ventilation procedure called intubation is typically employed, which involves inserting a tube into the trachea. Using the adapter designed in-house connected to a snorkeling mask, the invasive procedure can be omitted entirely.

Additionally, these masks feature a filter and a PEEP valve that the team at TAMUQ worked to modify, to ensure little to no leakage of contaminated air once worn by a patient with COVID-19, and to keep positive pressure inside lungs to keep lungs from collapsing. This could significantly reduce the risk to healthcare workers treating COVID-19 patients. It would also make it a good option for healthcare workers to use as it dials down the risk of contracting the virus.

Having already delivered hundreds of modified face shields to both Qatar Foundation and Qatar Red Crescent, TAMUQ has also delivered prototypes of the snorkeling mask adapters to Hamad Medical Corporation, should there be a need to use them. Other innovations in the works include isolation chambers for patients and hands-free door openers for the general public now that countries are opening up again.

"We certainly know that we, as an institution, are constantly innovating and are prepared to help during these turbulent times. We have manufactured the adapters and valves and modified the masks proactively, but thankfully, the situation in Qatar has been handled well from the beginning, which means we have not needed to use them. However, if there are opportunities to use them to help less fortunate countries with overwhelming cases, we are happy to help," Dr. Khraisheh, Professor and Chair of TAMUQ's Mechanical Engineering Program said.

"I think this is the first time we have put so much effort into something and are hoping it will never be used," Dr. Al-Hamidi, the Laboratories Manager in the Mechanical Engineering department said. Dr. Al-Hamidi and his team were given special permissions early on in the pandemic to work in the TAMUQ laboratories to finalize their prototypes.

"As an engineering school, we have the capability to design, develop, and manufacture a number of innovations that can help in a situation like this, and we are grateful to have the opportunity to support the medical community during this time," Dr. Khraisheh added.

Qatar Foundation – Unlocking Human Potential

Qatar Foundation for Education, Science and Community Development (QF) is a non-profit organization that supports Qatar on its journey to becoming a diversified and sustainable

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economy. QF strives to serve the people of Qatar and beyond by providing specialized programs across its innovation-focused ecosystem of education, research and development, and community development.

QF was founded in 1995 by His Highness Sheikh Hamad bin Khalifa Al Thani, the Father Amir, and Her Highness Sheikha Moza bint Nasser, who shared the vision to provide Qatar with quality education. Today, QF's world-class education system offers lifelong learning opportunities to community members as young as six months through to doctoral level, enabling graduates to thrive in a global environment and contribute to the nation's development.

QF is also creating a multidisciplinary innovation hub in Qatar, where homegrown researchers are working to address local and global challenges. By promoting a culture of lifelong learning and fostering social engagement through programs that embody Qatari culture, QF is committed to empowering the local community and contributing to a better world for all.

For a complete list of QF's initiatives and projects, please visit: www.qf.org.qa

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