



**Jet Propulsion Laboratory**  
California Institute of Technology

May 14, 2020

# VITAL

**VENTILATOR INTERVENTION  
TECHNOLOGY ACCESSIBLE LOCALLY**

A VENTILATION DEVICE TO COMBAT THE COVID-19 GLOBAL CRISIS

## **Briefing to the UN Office of Outer Space Affairs (UNOOSA)**

**Leon Alkalai, JPL Fellow**

## WHAT ARE WE DOING?



A new **high-pressure ventilator** was developed by JPL engineers **targeted to treat coronavirus (COVID-19) patients**.

This ventilator, which can be **quickly built** using **fewer parts**, most of which are **currently available** in supply chains, should allow emergency rooms to save ICU ventilators for the most critical patients.

## DEVELOPMENT STORY:

**JPL is a Federally Funded Research and Development Center for NASA;** managed by the California Institute of Technology, whose work includes **robotic exploration of the solar system, astrophysics and Earth science missions**

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In mid-March, a chance meeting in the cafeteria led two engineers to ask: **“How can we help the current COVID crisis?”** That conversation resulted in a plan to **design a ventilator that could be readily made from easily accessible parts**

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JPL engaged local doctors to **better understand the specific needs of COVID patients and healthcare workers**

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In **37 days**, about 40 engineers, **90% of whom tele-worked**, designed and developed a new ventilator, ready for testing.

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On Day 38, JPL sent this ventilators to **Mt. Sinai Hospital in New York City to test the design**

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We are currently awaiting **FDA Emergency Approval** for the device

## DEVELOPMENT STRATEGY:

**Rapid design / rapid prototyping** of ventilating device based on inputs from healthcare advisers

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**Partner** with industry, government and medical Doctors and institutions during the design process

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**Work with the FDA** from initiation to validate requirements and establish qualification strategy

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**Design for manufacturing** by industry partners

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**Don't interfere** with supply chains for existing ventilators

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Design to **scale up** production rapidly

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Intuitive use to **minimize training** of end users

## KEY CHARACTERISTICS OF THE VITAL DESIGN:

**Two designs** produced to accommodate different operating environments and maximize component availability

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Simple design, low parts count (**1/7th the number of parts** as commercial ventilator)

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**Utilizes easy to obtain parts** from outside the medical industry

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Low cost enables **disposability instead of service and repair**

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Internally controlled by simple micro-controller vs. high end computers to **reduce hardware and software complexity**

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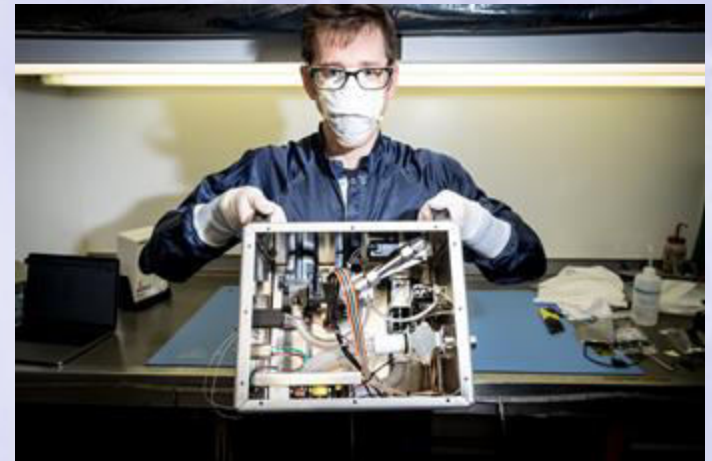
**Supplies the high pressures** required by COVID-19 patients with severe ARDS

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Targeted functionality to satisfy the needs of most COVID-19 patients; **freeing up high end units for the sickest of patients**

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**FDA reviewed** for Emergency Use Ventilation



## MILESTONES AND NEXT STEPS



As seen during testing of the device at Icahn School of Medicine at Mount Sinai on a high fidelity human patient simulator (monitor in foreground shows data from the test venue).

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**April 21, 2020: Prototype unit demonstrated at Mount Sinai Hospital in New York City**

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**April 22, 2020: FDA Emergency Use Authorization (EUA) Application Submitted**

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**April 24, 2020: Caltech announces they will award royalty free licenses**

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**April 27, 2020: 100+ US and foreign companies have expressed interest in producing the design**

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**April 30, 2020: FDA approves VITAL for Emergency Use Authorization (EUA)**

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**May 21, 2020: (est.): Award licenses in the USA and internationally**

# Applications for VITAL License

## NOTES:

- \* Manual edits
- Registration Dashboard consists of data collected. **Not all entries have been reviewed**
- \*\* Click the metric to see it
- Data will fluctuate depending on duplicate submissions

Reporting Day: 05/13/20

**288**  
Registered\*\*

**90**  
Proposals:  
Submitted\*\*

**45**  
Proposals:  
Viable\*\*

**0**  
Proposals:  
Not  
Reviewed\*\*

**9**  
From  
Caltech  
Call List\*

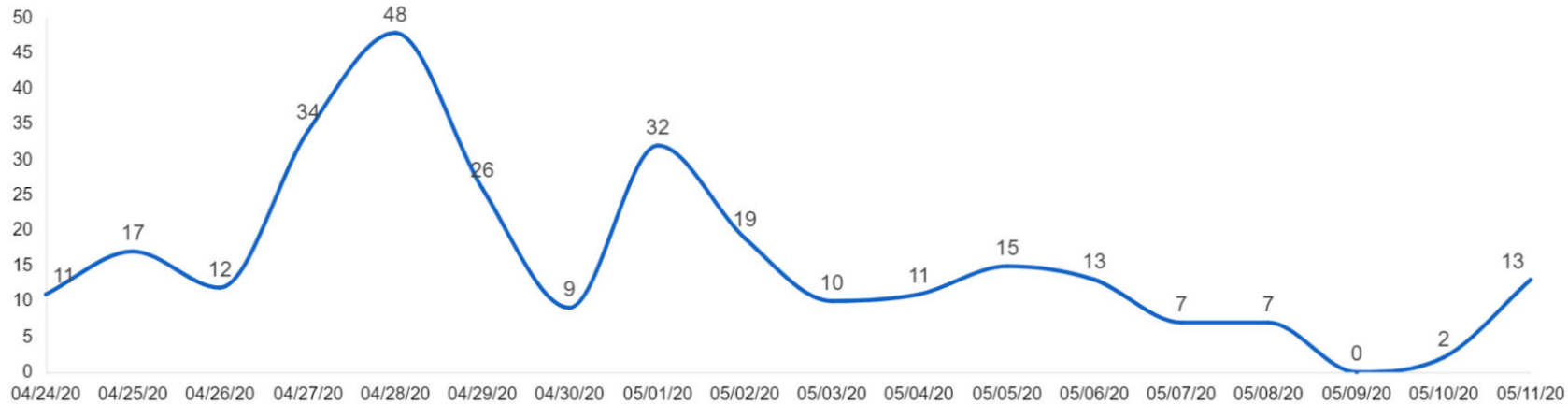
**204**  
With  
Government  
Contract  
Experience

Caltech

JPL

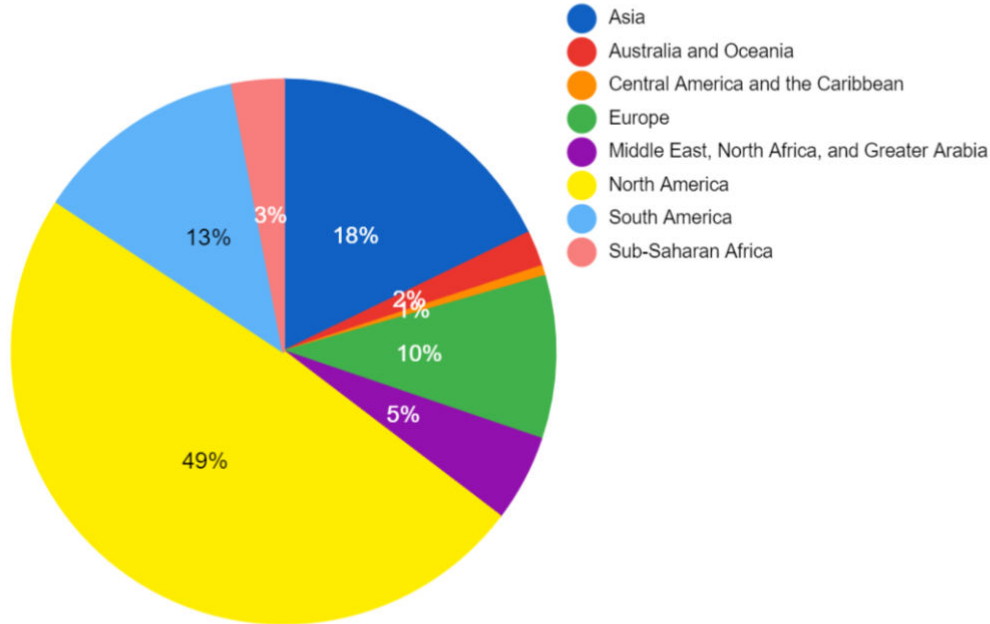
## Ventilator Registration Metrics

Day Registered

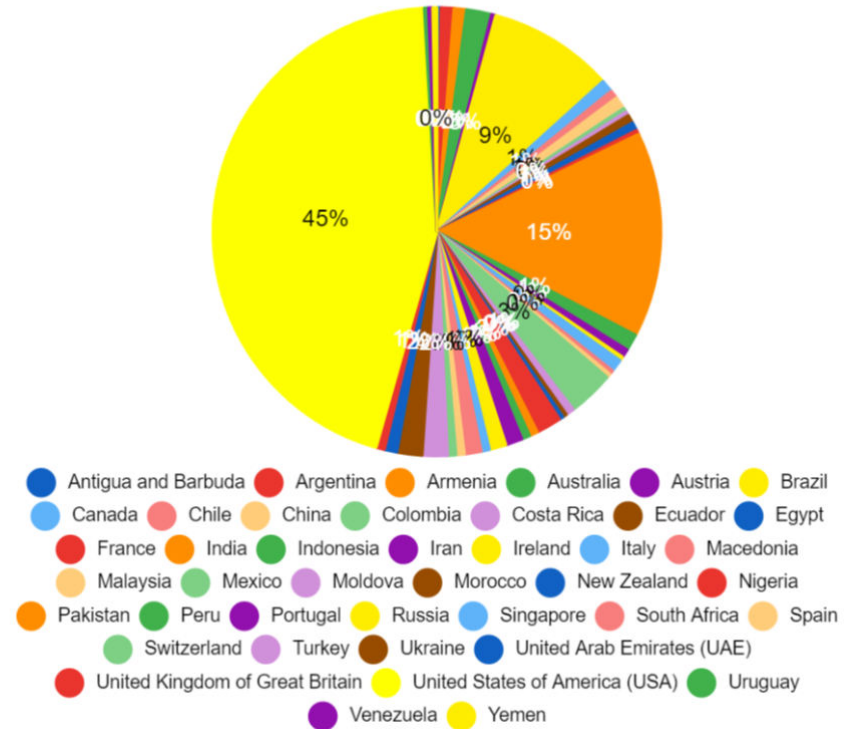


# Applications for VITAL License

By Region



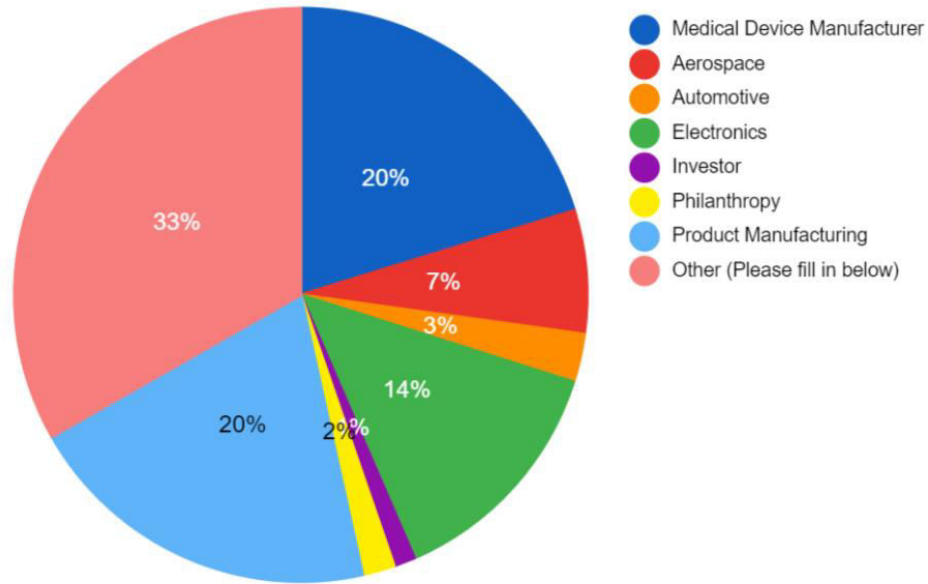
By Country



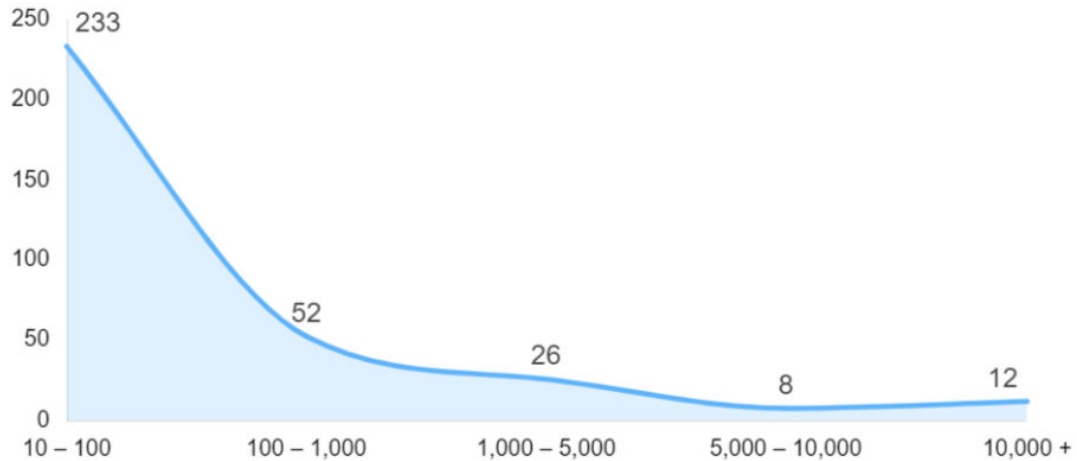


# Applications for VITAL License

## Nature of Business



## Number of Employees





# THANK YOU

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**Caltech**

**Dr. Michael Gurevitch /Huntington Hospital  
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