Public Invention Q1 Report, 2021

-- Robert L. Read,4/11/2021

This the Q1 quarterly report of Public Invention for 2021.

Executive Summary

- We hosted a successful conference on Jan. 9th which was attended by 66 people.
- We constructed 15 units of the VentMon T0.4, and have shipped 5 of them free of charge: 3 to the UK, 1 to India, and 1 to Rice University.
- Three Rice University teams are working with Public Invention, one of them producing very interesting results.
- HardwareX accepted our paper on the VentMon T0.3.
- We are down to only $18,000 in cash.
- Public Invention remains at the center of the humanitarian engineering response to the pandemic and is connected to major nonprofits in that space: Helpful Engineering (HE) and Open Source Medical Supplies (OSMS), COSMIC, JOGL.
- Head Invention Coach Robert L. Read was featured in the Fashionably Late podcast.
- We propose the Freespireco project and plan to ask for a grant to support it.

Projects

A majority of Public Invention's work is organized into projects; our main mission is to invent things that help all people. These are our most active Public Invention projects:

VentMon

The VentMon device was the flagship project of 2020. HardwareX, a peer-reviewed academic journal for open source hardware, has accepted our paper on the VentMon.

Our construction of 15 of the VentMon T0.4 models is a major goal achieved. We will announce this soon, and at our planned conference in May. The VentMon is a critical part of the Freespireco proposal.

Ventilation Standards and Utilities

Our work defining respiration standards has been met with acceptance by a number of people. Our use of it continues to improve in software. We now have a Docker file image which allows the VentMon logging system to be installed locally, in addition to the cloud-based IoT work.

The Ox: Public Invention Oxygen Concentrator

The Public Invention Oxygen Concentrator has been renamed "the Ox". We have a functioning preliminary prototype. Ben Coombs has taken an prestigious job, which is a potential problem for his time commitment, but he plans to continue the work and has even begun coaching a new volunteer.

Moonrat: A Portable Incubator

A portable, battery-powered incubator allows bacterial analysis of drinking water, which is a special concern to Public Invention and Engineers Without Borders due to the severe burden of water-borne diseases around the world. We created a promotional video that highlights this work.

Public Inventor Halimat Farayola has made progress measuring the thermal efficiency of a Thermos-bottle style solution. She is now constructing an Arduino Shield which should be sturdy enough for field testing. A new volunteer, Harshit Kumar, will soon begin building a second prototype and designing an enclosure.

REc - Rapid E. coli detection

The Moonrat team gained three new volunteers (thanks to Rachel Carp). These are Alex Musicat, Alana Lue Chee Lip, and Nathan Sage. The influx of biological knowledge that Nathan and Alana offer has allowed us to create the REc project as a separate project that is doing very interesting research on order-of-magnitude (hours instead of days) quantification. Alex is working on building a Public Invention Facebook page to promote the project as it progresses.

Math Tablet / Euler Notebook

The Math Table project has been renamed "Euler Notebook". David Jeschke and I continue to co-hack on this, approximately once a month . We are making slow progress.

PolyVent

The PolyVent team of 10 engineers and Invention Coach Victor Suturin have made considerable progress. We hope to have 3 working prototypes of their bellows-based "air drive" by the end of May. Public Invention has provided PolyVent with approximately $1500 in financial assistance for materials and equipment.

Regulatory Sunlight

We have begun creating a new agreement/license specifically to create a shared free-culture public commons of regulated medical device designs. We call this the "Regulatory Sunlight Agreement." Marc Jones (board member) is the Invention Coach of this project.

Observations

We observe:

- Our large list of potential projects is finally starting to pay off in that, particularly for Universities seeking projects for students, it gives some valuable flexibility in choosing interesting humanitarian projects.
- Along with Helpful Engineering, we believe we have now shown that paying for supplies and equipment for engineering teams so that they have No Out-of-Pocket Expenses ("the NOOPE principle")

Outreach

From inception, Public Invention has planned to hold events and publish inventions through peer-reviewed academic publishing and non-peer-reviewed popular media.

Peer-reviewed Publications

Public Invention volunteers Enrique Villacres and Megan Cadena have begun authoring a longer version of this work based on careful simulations using the MatLab Simulink software starting with an open source model from MIT. This work was overseen by Dr. Erich Schulz. It is in final preparation to be sent to Respiratory Care.

Popular Media

Marc Jones and I spoke at LibrePlant 2021 in March. This talk was well attended by about 85-100 people.

I was interviewed for a professional podcast called "Fashionably Late":

Partnerships and Cooperation

Public Invention believes the future of invention is open collaboration; in that spirit, collaboration with other organizations is important to our mission, both for learning and teaching.

I have accepted a seat on the Board of Directors of Helpful Engineering, a closely aligned organization. Although this will be time consuming, it will assure the two organizations cooperate.

Public Invention Projects at Rice University

Rice University has had two teams select Public Invention-defined projects as senior engineering capstone projects. The first, “Ecopot”, is an attempt to build a more efficient cooking pot for the one billion people who still laboriously cook on open campfires, leading to pollution and carbon emissions. The second, “Minicubator”, is an extension and continuation of the Moonrat project begun by public inventor Sam Daugenbaugh, senior EE at the University of Texas, and continued by public inventor Halimat Farayola, which in turn was based on work I did previously with Engineers Without Borders Austin.

Additionally, a new Freshman Design project has started with technology based on the VentMon to try to make Bag Valve Masks safer to use (to prevent barotrauma.)

Furthermore, there is an additional Rice University Freshman design team working on yet another version of the Moonrat portable incubator.

VentOS

I am a co-leader of the VentOS (Ventilator Operating Software/Open Source), a project of HelpfulEngineering. This is not exactly a Public Invention project, but it is aligned with our other work, and strengthens our connection to HelpfulEngineering. I have put significant work into this.

Slow Social Media Growth

Despite our efforts, our social media presence has not grown as much as we would like:

1. Our YouTube channel has 145 (from 128) subscribers.
2. Our Twitter handle has 109 (from 76) followers.
3. Our Google Group has 57 (from 48) members.
4. Our LinkedIn page has 105 (from 78) followers.

Strategy for the Coming Year

Our strategy for the coming year is centered around the Freespireco Project. The highest priority is to apply for a grant to support the Freespireco Project.

However, other strategies are:

- Building a Facebook page
- Creating more high-quality videos
- More volunteer recruitment

Although we have a diverse board and diverse volunteers, all of our six Invention Coaches are currently white males. We welcome volunteers who can become Invention Coaches who will diversify this group. The job of an Invention Coach is to drive an invention idea to a successful development so that the invention successfully helps people.

Conclusion

Public Invention now has six Invention Coaches and a larger volunteer base than ever. The delivery of the VentMon T0.4 is a major accomplishment. The creation of the Freespireco concept and driving it to success is a clear path forward.

We will likely run out of money by the fall if we do not have a major influx of donations.