Public Invention Q1 Report, 2022

-- Robert L. Read (Rob), 4/9/2022

This the Q1 quarterly report of Public Invention for 2022.

Executive Summary

We hosted a conference, RespiraCon II, on January 29th and 30th. It had 400 registrants and 115 unique attendees and was considered a great success. We co-hosted the Rice BMES RespiraCon II Hackathon, which was successfully attended by nine teams.

We have $36,000 in the bank. We filed our 2021 taxes. We barely met the 30% test of public donors which automatically keeps us from being declared a private foundation. This is a significant problem for next year, where we may not make the test.

We have hired a professional grant writing team to turn the Freespireco concept into an application to the "Pathways to Open Source Ecosystems" NSF grant for $300,000. Dr. Sabia Abidi of Rice University has agreed to be a co-Principal Investigator of this grant.

Volunteer Mr. Pio Lee has been helping Victor Suturin and Robert L. Read develop the "Polyvent Educational Platform" concept. We are excited by this idea and aiming for a workshop with students in June.

Rob traveled to Auburn University to inaugurate the first Public Invention club, the "Society for Public Invention and Humanitarian Engineering".

Between board meetings, the board unanimously agreed to expend up to $5000 on grant writing for the POSE grant.

Rob may ask the board to support a $1000/month expenditure for a limited time to support a consortium of JOGL and Helpful in writing a grant for a "giant distributed testing lab."

We continue to have significant problems with volunteer recruitment and retention.

Financial Position

Thanks to an anonymous donation of $25,000, we now have $36,000 in the bank.

Projects (Non-Freespireco)

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:

Passive Ferrofluid Check Valve

Veronica Stuckey and Rob have decided to attempt to build an air pump with no moving parts (except ferrofluid) to create a full-length peer-reviewed research paper around the Passive Ferrofluid Check Valve. Veronica published our original paper at Engineering ArXiv. This requires building our own electromagnetic coils and powering them in a controlled rhythm. Veronica has provided Rob a 3D-printed valve model that she produced, and Rob paid for soft-iron D-rings to be formed from a rod.

Regulatory Sunlight

Marc Jones and Rob made considerable progress drafting "Regulatory Device Approval Sunlight License Legal Text", however we made little progress this semester.

EcoPot

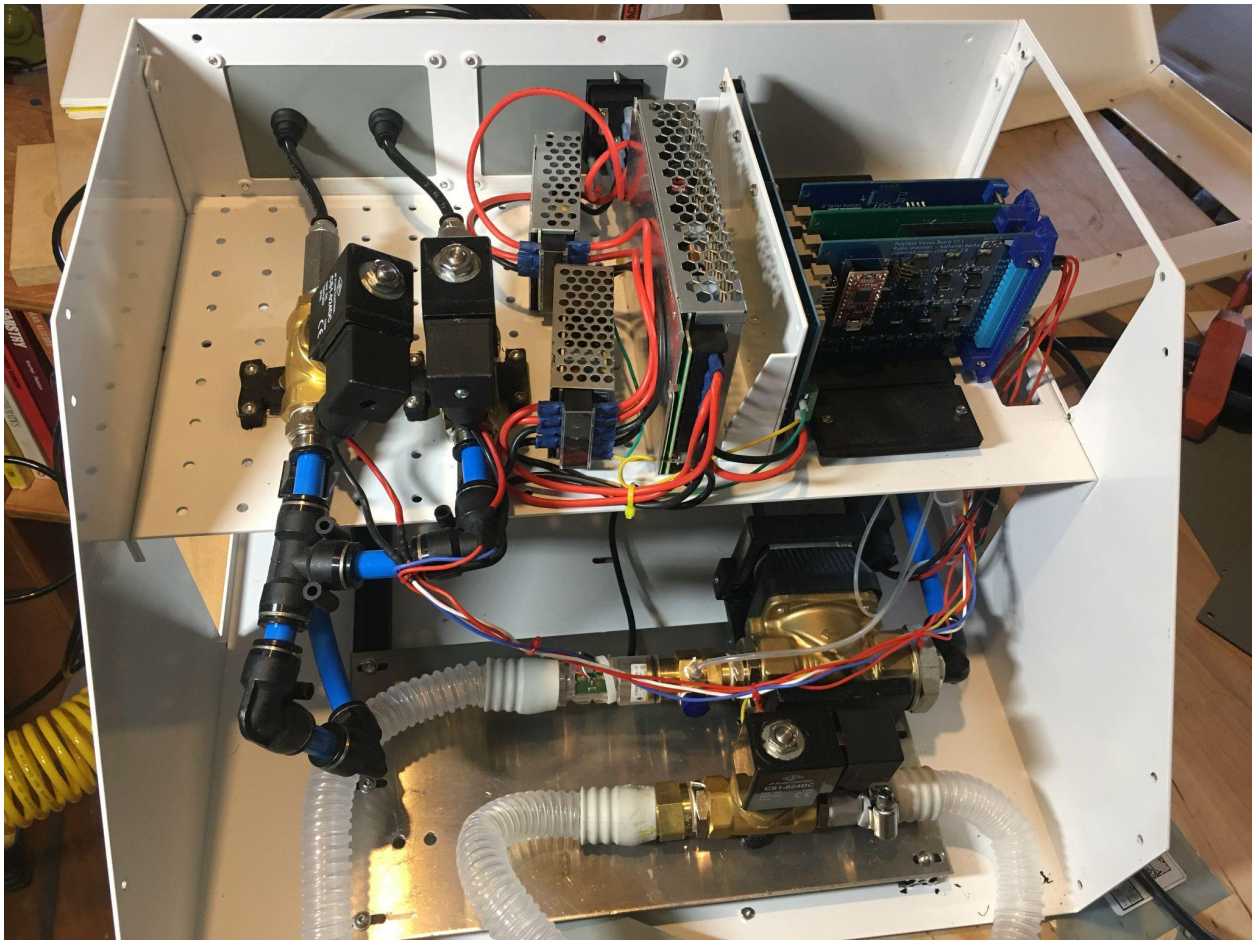
Mr. Harshit Kumar is considering assisting on the EcoPot project. We have not heard from the students in Tanzania who are working on this using the ANSYS/FLUENT simulation.

Freespireco Projects

Freespireco is our largest project, with many components. We had previously written a grant, but are now retargeting it for the NSF opportunity. The projects below are all part of the Freespireco over-project.

PolyVent Educational Platform

Nathaniel Bechard completed the PolyVent functional prototype and shipped it to Rob before taking a hiatus from Public Invention to attend college. It is functional, but lightly tested. We intend to redesign the case so that it is transparent and can be removed while the machine is operating to allow easy repair and teaching.



Standards and VentOS

VentOS is a project of Helpful Engineering. However, it utilizes data standards and software created by Public Invention for the VentMon, including VentDisplay, PIRDS and PIRCS. We recently expanded PIRCS based on input from Erich Schulz, MD. These standards continue to evolve.

VentOS remains a very active project, and is now closely tied to PolyVent. Furthermore, Helpful volunteer Alicia Maydeline has made considerable progress under the tutelage of Dr. Schulz on a complete simulator/trainer browser-based graphics user interface that will complement the PolyVent system.

General Purpose Alarm Module

A new volunteer, Mr. Chad Estill, has taken over from Pranav Srinivasan on the General Purpose Alarm Module, and has created a simple prototype. Rob expects rapid progress on this. Rob and Chad meet weekly.

VentMon

Mr. Ben Coombs is designing the VentMon T0.5. We plan to produce a run of 15 by June, when it will become an integral part of the PolyVent Educational Platform.

The Ox: Public Invention Oxygen Concentrator

The Ox remains an active project in New Zealand but little progress has been made due to Ben Coombs having a full-time job and a new child.

Projects Mentored at Universities

BVM Monitor

A second team from Rice, Team Breathe Easy, made considerable progress on making a small, robust Bag Valve Monitor that could improve first aid and emergency medical care. This work is now continued by the Rice InhaleEZ Rice Senior Capstone team. The team is doing extraordinarily well and is aiming for a peer-reviewed publication by the end of the semester. Rob will assist them in whatever way possible with this.

A Cooling Jacket

A second freshman team is working on this project.

Partnerships

Public Invention continues to support other teams wherever possible. Rob is an active board member of Helpful Engineering. We have encouraged a network of non-profits, including EBCC, GOSH, Helpful, FieldReady, OSMS, OSHWA to apply (separately) to the NSF POSE grant and are advising them.

Along with JOGL and Helpful, we have plans to attempt to write a grant to create a “Giant Distributed Testing Lab” for open source equipment. This is a universally acknowledged need among the non-profits listed above.

Outreach

Miriam Castillo continues to recruit volunteers. She has asked for Rob’s assistance in redesigning the way we present our most active projects. Rob’s time is a precious resource that has prevented him assisting her as he should have.

Megan Cadena, our paid contract assistant, has taken a full time job, which caused an interruption in her work, but she continues to work 5/hours per week.

Events

The RespiraCon II event was a great success. The videos of all talks have been posted to YouTube in our channel. We had 37 speakers, 18 of whom were women. We had researchers, clinicians, philanthropists, engineers, businesspersons, and representatives from most regions of the world with several presentations from Africa. There were 400 registrants and 115 unique attendees of two days, with about 40 people staying for hours to chat after the physical demos.

As part of this work we wrote the Open Medical Technology Manifesto, which has been signed by 185 signatories.

Peer-reviewed Publications

"Great Ventilator Rush of 2020" has been published "Blue Book", the Australian Journal of Respiratory Care/Anesthetics.

Other Publications

A preprint of our work on the passive ferrofluid check valve has been published. Rob and Larry Kiliszewki wrote an important thought piece: How Research Institutions Can Bring Innovative Proof-of-Concepts Medical Devices to Market and Benefit Patients, which will be featured by the Open Source Hardware Association in coming weeks.

Talks

Beyond speaking at the Auburn club and RespiracCon, Rob will be speaking on April 22nd at the Open Hardware Summit. Also, he spoke at a GOSH community call along with Thomas Landrain of JOGL.

Partnerships and Cooperation

Public Invention continues to actively cooperate with Rice University, Helpful Engineering, OSMS, JOGL, and the Every Breath Counts Coalition. In particular, all of these organizations are helping with RespiraCon II.

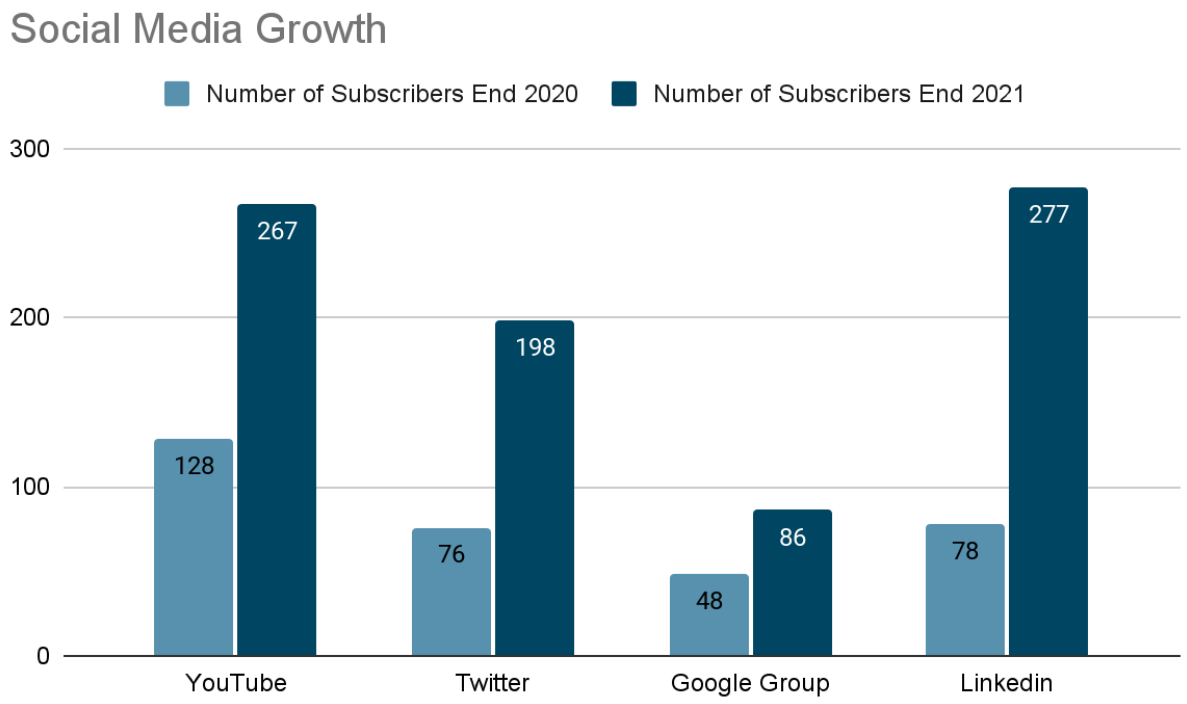
VentOS and Helpful Engineering

Rob continues to devote significant time and energy to the VentOS project and Project Data projects of Helpful Engineering. Additionally, Rob is on the board of directors of Helpful Engineering. This is a fruitful collaboration and has been insightful in a number of ways.

Social Media Growth

Because of our Social Media Coordinator and Admin Staffs' efforts, our social media presence has grown by the following amounts in 2021:

1. Our YouTube channel now has 267 subscribers.
2. Our Twitter handle now has 198 followers.
3. Our Google Group now has 86 members.
4. Our LinkedIn page now has 277 followers.



Compared to our prior year, our **YouTube** has increased in subscribers by ~108.6% (i.e., **added 139 subscribers**), our **Twitter** has increased in followers by ~160.5% (i.e., **added 122 followers**), our **Google Group** membership has grown by ~79.1% (i.e., **added 38 members**), and our **Linkedin** followers have increased by ~255.1% (i.e., **added 199 followers**) by the end of the 2021 year.

Strategy for the Coming Year

Winning the NSF grant is the number one priority right now. However, even if we do not win the grant, we will execute the strategy that grant outlines, though with far fewer resources, and use the expected high-quality grant to apply for other opportunities.

If we do not win the grant, we will have to have a fund-raising drive to raise money from a large number of donors each giving less than $2000 to maintain our public charity status.

The fundamental problem facing us in terms of growth has been the failure to recruit new Invention Coaches, beyond Dr. Victor Suturin. Anyone who can be an invention coach is highly in demand right now due to the job market. Nonetheless, we cannot grow if we can broaden to new invention coaches.

The PolyVent Educational Platform will be a major thrust which is new territory for us. It is imperative that we make this a success without abandoning our mission principles by becoming an educational organization rather than an invention organization.

A long-term goal is to raise enough money to hire an executive director so that Rob can focus on being head invention coach.

Annual Awards 2021

Nathaniel Bechard
Best Public Inventor, 2021
For the PolyVent

Victor Suturin
Best Invention Coach, 2021
For the PolyVent

Sabia Abidi
Most Active Board Member, 2021

For RespiraCon II and Mentoring Opportunities
Veronica Stuckey

Best New Public Inventor, 2021
For the Passive Ferrofluid Check Valve

Leith Greenslade
Special Recognition, 2021
For RespiraCon II and Organizing Demand

Marc T. Jones
Honorable Mention Board Member, 2021
For the Sunlight Regulatory License

Lauria Clarke
Best Addition to a Research Paper, 2021

For “VentMon: An open source inline ventilator tester and monitor.”

Ben Coombs
H.M. Addition to a Research Paper, 2021
For “Open-source hardware and the great ventilator rush of 2020”

Megan Cadena
Best Staff Contribution, 2021
For Outreach Coordination

Miriam Castillo
Best Volunteer Staff Contribution, 2021
For Volunteer Recruitment

Audrey Rushing
H.M. Volunteer Staff Contribution, 2021
For Social Media

Ben Coombs
Greatest Contribution, 2021
For “the Ox”, VentMon, and VentOS

Christina Cole
Most Impactful Writing, 2021
For the Oxygen Concentrator Maintenance
Diego Aspinwall
Best Student Writing, 2021
For Geotagtext, A Tutorial: A Free Geotagging Web Application Composed of Free Tools
(No Plaque for this group award:)

Christopher J Fang, Kaitlyn Wang, Stephanie A. Ponce, Concepcion C Appio-Riley, Sana A. Mohamed, and Samuel Robedee
Best University Team, 2021
For EcoPot