Public Invention Q2 Report, 2021

-- Robert L. Read,7/25//2021

This the Q2 quarterly report of Public Invention for 2021.

Executive Summary

- Dr. Ferguson resigned as Invention Coach
- Rachel resigned as Outreach Coordinator, but Megan Cadena has replaced her.
- Received a $25,000 anonymous donation.
- Successfully hosted Respicon: 115 unique attendees, many connections made.
- "Freespireco" articulated and letter of inquiry sent to Sloan Foundation, they said no but referred us to CZI.
- Taurus Medical in India is testing our VentMon/Raspi combination and has designed an enclosure
- Polyvent project is now driven by VentOS software, a first for both teams!
- Completed mentoring of two Rice summer teams: BVM building a Bag Valve Mask Monitor, and Moonrat
- Significant progress on the Moonrat portable incubator (not done by Rice team by spurred on by them)
- Geotagtext project completed with publication of a tutorial invite for publication by "Nerd for Tech".
- EcoPot project got exciting result of 42% boil time reduction; work continues slowly.
- Completely out of VentMons, "short run production" planned.
- Paper rejected by Respiratory Care by we are sending to another journal.

Financial Position

Please see the last three sections at the end of this report.

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

We have now given away all of our VentMons, as planned by our grants. One went to Prof. Joshua Pearce of the MOST, who seems to be enjoying using it. The VentMon is a critical part

of the Freespireco proposal. We are planning to make another 20 in a “short-run” production strategy with a redesigned case.

Additionally, the PolyVent interaction has prioritized the need for analysis of long-term data; we have a logger for this but have not yet produced an analysis program. This will allow “burn-in” and long-duration testing of PolyVent (or any other ventilator.)

We are now completely out of VentMon T0.4s, and have a waiting list of about 5 who want the T0.5 model. We are designing the T0.5 model with Ben Coombs, which will feature a small number of improvements. We intend to make a short run of 20 of these devices, which we will give to needy researchers, at a suggested donation of USD$500, which is approximately the fabrication cost.

The Ox: Public Invention Oxygen Concentrator

The RespiCon conference coincided with a tragic lack of oxygen in India. In fact, there is a global oxygen shortage. Public Invention has “the Ox”, a functional O2 concentrator, but it needs major design improvements before it is close to ready. This project is coached by Mr. Ben Coombs, and the physical prototype is in New Zealand currently. Unfortunately, progress on this project has been slow due to Ben also working on VentOS and the VentMon projects.

PolyVent

On July 9th, Rob went to Montreal, Canada, to work with Nathaniel Bechard of the PolyVent project. We made tremendous progress, and got PolyVent working with the VentOS software for the first time. VentOS is a software project of Helpful Engineering co-led by Rob. This was a major milestone for both projects. We created a tentative plan to make a “short run” production of 5 machines to be used for research purposes. We hope with further COVID easing, additional collaborative progress may be made on this project.

Moonrat: A Portable Incubator

We created a promotional video that highlights this work. A freshman design team at Rice University took on this project, which was carried forward by a SEED 6-week summer intern program, which Rob coached directly and visited once. That team took an insulated box approach instead of a “thermos” style approach. In an attempt to accelerate that team, Rob took a lot of work that Halimat had started and finished it, making a functional prototype. This allowed for precise energy usage measurement. This showed that vacuum-bottles are slightly superior, at about 2 Watts at an ambient temperature of 25C. The Rice team created a GUI design that is better than what we had.

The overall impact of this is that with modest additional work, the Moonrat should be fully testable soon and ready for short-run production by the end of the year. Managing volunteers on

this project remains a problem, especially with the departure of Dr. Ferguson for personal reasons.

Harshit Kumar continues to provide fast turn-around of 3D printed designs for this project.

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. They required a great deal of software assistance. This work is about 2/3rds of the way to publishable quality. However, it is unclear if we will be able to continue investing in this. It requires significant software improvement and considerable additional GUI research.

Oxygen Concentrator Maintenance/Repair Project

The RespiCon conference and the therapeutic oxygen crisis in India instigate the idea that we could help best by collecting information. Led by Christina Cole of OSMS, we began documenting maintenance practices for oxygen concentrators. We expect to pay for some graphic art and turn this into a “guide”.

REc - Rapid E. coli detection

The REc project has been suspended until our volunteer Alana returns in August. This is a very advanced biohacking project. For now, however, we intend to focus on completing the Moonrat.

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.

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. However, little progress has been made on this project. We may need to recruit an additional attorney to work on this project.

EcoPot

Last semester, the Rice EcoPot team showed a very exciting 40% reduction in boil time based on our more efficient cooking pot design. This is not an absolute proof that will transfer to decrease fuel usage, but is good evidence. Additional work has continued using the

ANSYS/FLUENT computation dynamics modeling software over the summer, but work has been quite slow. Rice University in conjunction with partnership with several African Universities may begin working on this project. Public Invention may continue to provide some guidance on this if they want it.

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.

Events

In May we held RespiCon, which had 115 participants. It was a very high-quality conference for its nature, and resulted in several important teams becoming aware of each other for the first time, and other important connections between engineers and those with needs and potentially those with funding. In particular, it established a connection to Every Breath Counts and Joshua Pearce's MOST lab at Michigan Tech. The MOST lab requested and made good use of a VentMon T0.4

Peer-reviewed Publications

A paper on lung mechanics sent to Respiratory Care was rejected.

Rob will (finally, after a year long COVID delay) present his work on the mathematics of helices at a virtual conference in September.

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. We have presented to Leith Greenslades Every Breath Counts coalition, one of the best drivers of need tracking across the world.

VentOS and Helpful Engineering

Rob continues to devote significant time and energy to the VentOS project 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.

Slow Social Media Growth

Despite our efforts, our social media presence has seen about 25% quarterly growth::

1. Our YouTube channel has 182 (from 145) subscribers.
2. Our Twitter handle has 128 (from 109) followers.
3. Our LinkedIn page has 139 (from 105) 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:

- Shifting to more visibility to Quarterly Goals for each project, to be placed and tracked on the website.
- Creating more high-quality videos
- More volunteer recruitment with the “6 hours a week for 6 months” principle
- Rob intends to write a book entitled “How to be a Public Inventor” or “Public Invention 101”. The outline of this book is complete.

Fundamentally, we plan to persist, write more grants, and try to build a more assertive volunteer base.

Balance Sheet

Public Invention

Statement of Financial Position

As of July 25, 2021

	TOTAL
ASSETS	
Current Assets	
Bank Accounts	
PayPal	1,276.65
PolyVentPayPal	-70.85
Wells Fargo Simple Business Checking (7066)	32,351.25
Total Bank Accounts	**$33,557.05**
Other Current Assets	
Petty Cash	-0.90
Total Other Current Assets	**$ -0.90**
Total Current Assets	**$33,556.15**
TOTAL ASSETS	**$33,556.15**
LIABILITIES AND EQUITY	
Liabilities	
Current Liabilities	
Other Current Liabilities	
Robs personal contributions	-643.65
Total Other Current Liabilities	**$ -643.65**
Total Current Liabilities	**$ -643.65**
Total Liabilities	**$ -643.65**
Equity	
Retained Earnings	44,519.28
Net Revenue	-10,319.48
Total Equity	**$34,199.80**
TOTAL LIABILITIES AND EQUITY	**$33,556.15**

Donations from 2021:

1. $395 from "Network for Good"
2. $25,000 anonymous donation
3. $1000 from Phillip Schmaezel
4. $500 from Andrew Lamb (head of FieldReady)
5. $100 from R.R. Desai

6. $1000 from Rui Coto (on PolyVent team)
7. $50 from Stephanie Liu
8. $54 from my Nancy Reed
9. ... and $10/month from Marc Jones.

Expenses this Quarter:

Public Invention

Statement of Activity
March 31 - July 25, 2021

	TOTAL
▾ Revenue	
Donation	26,395.00
Total Revenue	**$26,395.00**
GROSS PROFIT	**$26,395.00**
▾ Expenditures	
Advertising & Marketing	1,573.00
Books	340.92
▾ Equipment	0.00
Moonrat	46.31
OxygenConcentrator	784.58
Total Equipment	**830.89**
Moonrat	950.30
Office Supplies & Software	199.29
Other Business Expenses	106.60
PolyVent	4,489.21
Publication Fees	695.89
Shipping	924.63
TheOx-O2 Concentrator	0.00
Travel	789.50
VentMon	1,155.33
Total Expenditures	**$12,055.56**
NET OPERATING REVENUE	**$14,339.44**
NET REVENUE	**$14,339.44**

Cash basis Sunday, July 25, 2021 05:58 PM GMT-05:00