Public Invention Q3 Report, 2021

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

This the Q3 quarterly report of Public Invention for 2021.

Executive Summary

Public Invention is pioneering open-source medical devices. This is a fraught, complicated, long-term goal, but tremendously impactful. PolyVent is making progress.

Veronica Stuckey made a breakthrough on the Ferrofluid Check Valve project!

This has been a challenging quarter. Many of our volunteers have decreased their involvement for completely unrelated reasons. The slogan “The whole planet is short-handed” seems to be affecting us as well.

Our technical projects are making progress, but far more slowly than we would like.

We have more volunteers working on volunteer recruitment and social media outreach now.

Public Invention has over 60 potential projects, but we have focused on completing old projects this quarter rather than starting new ones.

Financial Position

We have slightly more than $28,000.

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:

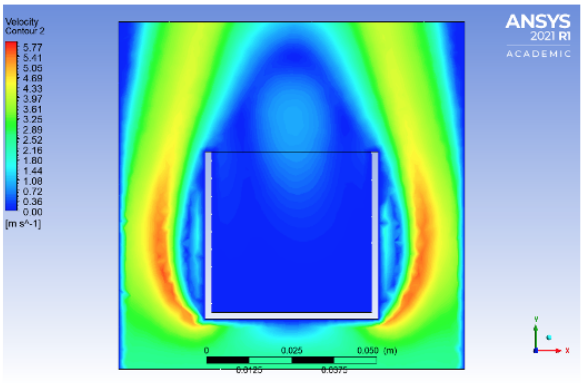
Regulatory Sunlight

Marc Jones and Rob made considerable progress in September drafting “Regulatory Device Approval Sunlight License Legal Text.” We are perhaps one month away from giving this to other intellectual property experts for feedback.

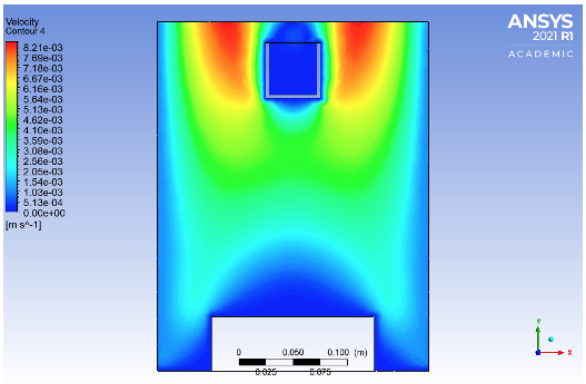
EcoPot

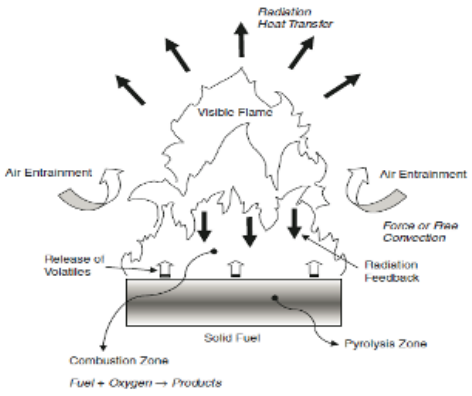
Last semester, the Rice EcoPot team showed a very exciting 40% reduction in boil time based on our more efficient cooking pot design. A new graduate student of Dar-as-salaam, Tanzania with Rice 360 Global Health, Mr. Abdulmujahid Mustafa, has taken over the initial work done last semester by the Rice team. He has excellent knowledge of ANSYS/FLUENT for computational fluid dynamics. Rob will provide guidance for this project. Our goal is to design a functional pot that requires 50% less fuel on an open wood fire, to significantly reduce poverty and labor of the one billion people who still cook on open fires.

Previous Velocity distribution



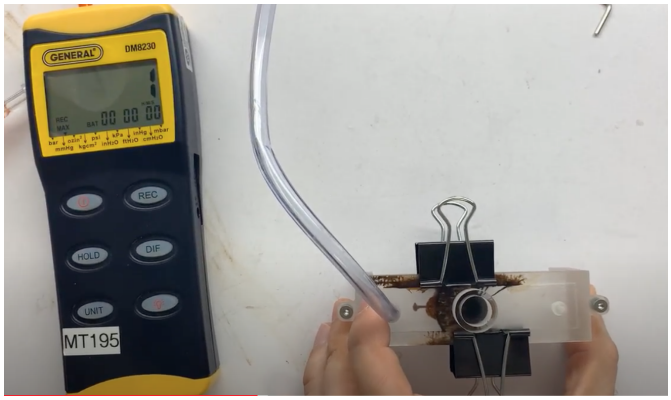
Improved Velocity distribution





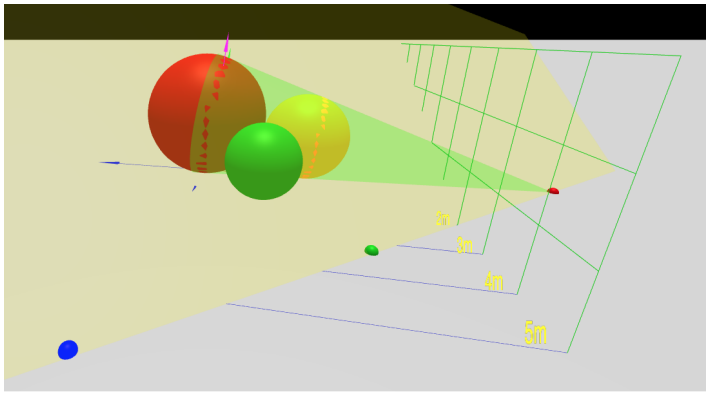
Passive Ferrofluid Check Valve

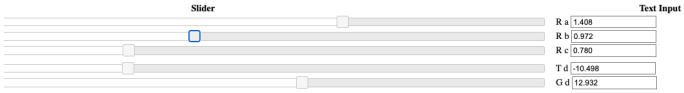
Veronica Stuckey, a new public inventor, has made tremendous rapid progress on our idea of creating a passive ferrofluid check (one-way) valve. This is a core invention which is the heart of making a pump-on-chip or a lab-on-a-chip. She has produced a working prototype based on Rob's idea already! Publishing this quickly is a high priority. Here's a link to the video.



Softrobot Math

Rob has made significant improvements to “Softrobotmath”, a project begun before the pandemic with Megan Cadena. We aspire to submit it to a mechanical engineering journal no later than November. However, the value of this work remains questionable, with one more breakthrough required for maximum value.





Moonrat: A Portable Incubator

Harshit Kumar made some valuable improvements, but little additional work has been done. We have another volunteer, but he is extremely ill right now.

Math Tablet / Euler Notebook

David Jeschke had to re-take the Executive Directorship for his non-profit XtraMath, which has temporarily put that work on hold.

Freespireco Projects

We are in light conversations with funding agencies around the Freespireco grant we have written, which is asking for $400,000. The projects below are all part of the Freespireco over-project.

PolyVent

The PolyVent Ventilator is now our most active project. We are paying Nathaniel Bechard $20CAD/hour to develop the next hardware version. He is making good progress. The PolyVent project runs the VentOS open source software. We plan to make 6 units to give to research hospitals and universities by January.

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.

VentOS remains a very active project, and is now closely tied to PolyVent.

VentMon

We are designing the VentMon T0.5. This is going a little slow, but we will likely make more in January.

The Ox: Public Invention Oxygen Concentrator

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. Also, he and his wife are expecting their first child in December. Ben has a prestigious job at RocketLabs which limits his time.

Oxygen Concentrator Maintenance/Repair Project

The RespiCon conference and the therapeutic oxygen crisis in India instigated the idea that we could help best by collecting and distributing information. Led by Christina Cole of OSMS, we began documenting maintenance practices for oxygen concentrators. OSMS has had success with "Guides" before. We intend to ask the Every Breath Counts Coalition run by Leith Greenslade to help publicize this when it is done.

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.

A Cooling Jacket

To address the likely increase in heat waves and the possible increase of catastrophic wet-bulb temperature rise, we proposed the "cooling jacket" idea --- the idea of electrically powered apparel to keep you cool. Such apparel exists for some purposes in the $3000 price range, cut cannot be deployed to a village suffering a devastating heat wave. A Freshman design team at Rice University is undertaking an initial design of this. Rob is going to visit them next weekend.

Observations

The last quarter has been harder to sustain energy by all volunteers, everywhere, than previously.

Partnerships

Public Invention continues to support other teams wherever possible. We hope to contribute a variant of our VentDisplay software for use by the Respiraworks team in the coming quarter.

Outreach

Audrey Rushing has joined Public Invention as a social media coordinator, a difficult job that we definitely need. Miriam Castillo has joined as a volunteer coordinator and will also try to create Public Invention and Humanitarian Engineering clubs world-wide.

Events

By (small) popular demand, Public Invention is planning to host RespiCon II in January. This will likely be co-hosting with Rice Universtiy's OEDK. Dr. Sabia Abidi and I have begun collecting speakers. The last conference had 115 participants.

Leith Greenslade may be a keynote speaker. This will likely be an all-virtual event. It will take the place of the annual Public Invention conference, which will be held in June.

Peer-reviewed Publications

Rob presented an important work at the 2nd IMA Robotics and Mathematics conference.

A paper describing the "Great Ventilator Rush of 2020" has been accepted by the "Blue Book", the Australian Journal of Respiratory Care/Anesthetics.

Partnerships and Cooperation

Public Invention continues to actively cooperate with Rice University, Helpful Engineering, and the Every Breath Counts Coalition.

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 5% quarterly growth, a slow down from last quarter:

1. Our YouTube channel has 191 (from 182) subscribers.
2. Our Twitter handle has 138 (from 128) followers.
3. Our LinkedIn page has 150 (from 139) followers.

Strategy for the Coming Year

Our strategy for the coming year is centered around the Freespireco Project. Making progress on PolyVent, VentOS, Regulatory Sunlight, and other projects in Freespireco to position us to get a grant is the highest priority.

Freesprieco is proposing something that has never been done before: building free-libre open source medical devices. This is technically, legally, and regulatorily complicated, but the payoff for the world will be huge.

Additionally, we need to improve our ability to use social media effectively. Hopefully Audrey Rushing will assist us with this. Our web presence and stature is growing, but not as quickly as it should be for the high-quality work we are doing.

Balance Sheet

Public Invention

Statement of Financial Position

As of October 8, 2021

	TOTAL
ASSETS	
Current Assets	
Bank Accounts	
PayPal	552.95
PolyVentPayPal	-70.85
Wells Fargo Simple Business Checking (7066)	28,653.55
Total Bank Accounts	**$29,135.65**
Other Current Assets	
Petty Cash	-0.90
Total Other Current Assets	**$ -0.90**
Total Current Assets	**$29,134.75**
TOTAL ASSETS	**$29,134.75**
LIABILITIES AND EQUITY	
Liabilities	
Current Liabilities	
Other Current Liabilities	
Robs personal contributions	0.00
Total Other Current Liabilities	**$0.00**
Total Current Liabilities	**$0.00**
Total Liabilities	**$0.00**
Equity	
Retained Earnings	44,519.28
Net Revenue	-15,384.53
Total Equity	**$29,134.75**
TOTAL LIABILITIES AND EQUITY	**$29,134.75**

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

January 1 - October 7, 2021

	TOTAL
Revenue	
Donation	28,275.40
Total Revenue	**$28,275.40**
GROSS PROFIT	**$28,275.40**
Expenditures	
Advertising & Marketing	4,299.95
Awards	70.36
Total Advertising & Marketing	**4,370.31**
Bank Charges & Fees	45.00
Books	340.92
Charitable Contributions	3,065.00
EcoPot	933.54
Equipment	0.00
Euler Notebook	1,436.47
Moonrat	362.26
OxygenConcentrator	793.76
Total Equipment	**2,592.49**
Ferrofluid Check Valve	54.82
Moonrat	1,456.25
Office Supplies & Software	1,051.63
Other Business Expenses	213.20
PolyVent	9,325.74
Publication Fees	1,395.89
Research	206.41
Shipping	1,033.17
Taxes & Licenses	60.85
TheOx-O2 Concentrator	0.00
Travel	789.50
VentMon	16,725.21
Total Expenditures	**$43,659.93**
NET OPERATING REVENUE	**$ -15,384.53**
NET REVENUE	**$ -15,384.53**