

iGEM EPIC

Discovery and Insights

Special Report 2021

Spotlight on Non-Profits

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Preface

The International Genetically Engineered Machine (iGEM) Foundation is an independent, non-profit organization dedicated to the advancement of synthetic biology, education and competition, and the development of an open community and collaboration. In 2020, The Entrepreneurship Program Innovation Community (EPIC) was established with the aim of supporting the development of iGEMs entrepreneurial community.

A key aspect of EPIC is the creation of the Founder Database, where we could measure the development and success of the iGEM startup community. To this day, 157 start-ups have been created that are solving critical problems related to health and environmental challenges. Several companies are also focusing on tackling important social problems by making synthetic biology and open collaboration more accessible to the world. However, little emphasis has been given to non-profits that are aiming to support their local community in entrepreneurship and education, which are in alignment to what iGEM and EPIC is. Therefore, the Discovery & Insights (D&I) Team 2020 wishes to shine light on the roles these non-profits (to name a few), partly inspired by iGEM, play in their local community in supporting people in syn-bio and entrepreneurship.



As of the time of writing, there are 13 non-profit start-ups listed in the Founder Database. Moving forward, EPIC hopes to reach out to more non-profits and enable the acceleration and growth of the iGEM startup ecosystem in various regions through cohesive collaboration. We hope you will enjoy learning about these projects and be inspired by their work.

- **Carolin Schulte and Tony Yeoh Chuin Shung, iGEM D&I 2020**

Biospher'Alpes



BIOSPHER'ALPES

by Mélodie Dupré

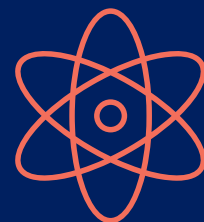
Mélodie was part of the 2019 iGEM team at the Université Grenoble Alpes. Apart from her work for Biospher'Alpes, she is actively involved with the After iGEM community as Head of Industrial Regional Needs (2020/21) and currently as Steering Group Chair of the iGEM Industry Network.

What does BioSpher'Alpes do?

BioSpher'Alpes is a student association that aims at promoting the communication between alumni, students, teachers, and professionals of the Healthcare sector in Grenoble and elsewhere. BioSpher'Alpes was founded in May 2020. We were 13 students currently, now we are only 6 but we are going to hire people as soon as possible.

What is the mission and vision of BioSpher'Alpes?

The mission of BioSpher'Alpes is to allow students to talk to alumni to answer their questions on their academic or professional orientation. We want to put in place a mentorship. We also created a website in order to create a community of alumni and students, so that they are easily in contact. The website allows alumni to post job offers and articles concerning several topics will be posted soon. BioSpher'Alpes also wants to create events to enable alumni



to share their experience with their old colleagues and with new students. We want to help them finding their career path.

How many people in total are involved with BioSpher'Alpes?

We contacted more than 1200 alumni on LinkedIn to make them join our network and more than 400 students. The virtual events for now reach between 50 – 100 people every time.

Why did you decide to found BioSpher'Alpes?

When we were student, we noticed the lack of information given by the university concerning professional advice, testimonies, but also a lack of communication between students inside the university and with alumni. We also noticed that we were not updated on professional events that occurred in Grenoble or in France, so we wanted to create something to change that and help students as best as we can.

Did your iGEM experience influence the work you are doing at BioSpher'Alpes and if so, how?

I think yes. iGEM taught me to be patient and to listen to others. I am somebody with a strong personality and I used to be too much focused on things that I was not even noticing that I was not in the right path. iGEM taught me to stop and to look at a bigger picture regarding my actions and tasks. It also allowed me to work in a team of various personalities and to adapt myself to each person. Finally, I think that iGEM helped me with my oral and communication skills.

““

iGEM taught me to stop and look at a bigger picture regarding my actions and tasks

””

- *Mélodie Dupré*

What do you consider the most impactful/important achievement/impact of BioSpher'Alpes so far?

I think that we are very proud to have been capable to contact more than 1200 alumni and to interest them in our project. Our events are successful, and people tell us that they really needed this kind of network. We are really happy to help them, and we will continue to propose them the best content and advice we can!



CSBERG



by Patrick Diep

Patrick has been involved with iGEM since 2015 where he started as a member of the University of Waterloo iGEM Team. He later became a competition judge, and past member of the iGEM Judging Corps Committee and After iGEM Education Committee. He continues to be an active member of the iGEM community as a competition judge and an instructor for the University of Toronto iGEM team.

What does CSBERG do? What is the mission and vision of CSBERG?

The Canadian Synthetic Biology Education Research Group (CSBERG) is a non-profit organization dedicated to the advancement of teaching practices, assessment design, and curriculum development for synthetic biology at the high school and undergraduate level. Our mission is to promote and provide transdisciplinary synthetic biology training, grounded in our values for scientific citizenship, lifelong learning, and collaborative research.

Why did you decide to found CSBERG? When was CSBERG founded, how has the number of employees/members changed over time?

The group was founded by Patrick Diep in August 2019 after supervising the iGEM Toronto team in 2017 and 2018. The impetus for starting CSBERG stemmed from Patrick's development of workshop-style courses for the iGEM Toronto students and his interest in higher education from a pedagogical research lens. After discovering a critical mass of individuals in the Toronto area that were

interested in using the existing literature in modern pedagogy to design better synthetic biology courses, CSBERG was established.

““ *Our mission is to promote and provide transdisciplinary synthetic biology training, grounded in our values for scientific citizenship, lifelong learning, and collaborative research.*

- Patrick Diep

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At the start of the COVID pandemic in Canada in March 2020, a turnover of members led to a re-structuring of the group to expand operations to virtual distant learning. Since then, CSBERG’s personnel has grown to 21 highly involved members (all volunteer). CSBERG applies the design-build-test-learn (DBTL) cycle to its course development, which is driving its need for more highly committed volunteers. Additionally, new pilot projects and CSBERG’s formalization as non-profit organization is driving the growth of the team.

How many people in total are involved with CSBERG/ how many people do you reach with your events?

CSBERG’s 21 members have worked together to deliver two undergraduate non-credit courses called SYNBI – Fundamentals of Synthetic Biology, and SYNBI2 – Synthetic Biology Implementation Sciences. Two iterations of SYNBI



and one iteration of SYNBI2 have been taught so far. We received over 500 enrollment applications and have been able to fully provide the course to roughly 100 students from life sciences, physical sciences, and engineering. The scale of CSBERG’s courses has significant potential as the enrollment applications we have received so far mostly come from the University of Toronto community. CSBERG plans to scale its courses and capacity to accommodate students from several Canadian universities with a focus on Northern Ontario and rural communities.

CSBERG is also executing several pilot projects to provide educational services pertaining to synthetic biology for different audiences. In particular, we are applying DBTL to create an independent study unit for roughly 50 high school students and are testing a biodesign consultation service to provide artists and designers with technical support on their synthetic biology themed projects.

Did your iGEM experience influence the work you are doing at CSBERG and if so, how?

While not every member is from iGEM, several personnel do come from Canadian iGEM teams including iGEM Toronto, iGEM Calgary, McMaster iGEM, McGill iGEM, and Waterloo iGEM. CSBERG also provides several support services to iGEM teams in Canada for technical, leadership, and judging/competition support. Our curriculum for SYNBI and SYNBI2 are based off the canonical sub-teams found in iGEM teams: wet-lab, dry-lab, and human practices.

Without a doubt, CSBERG is influenced by the iGEM competition to serve iGEM students but extends this further by exploring synthetic biology pedagogy more broadly in higher education.



How are you helping to foster your local entrepreneurial ecosystem with your work?

CSBERG uses DBTL cycles to develop courses that introduce students to the field of synthetic biology in its entirety: ranging from genetic circuit design and stochastic modelling to social acceptance and commercial feasibility. Entrepreneurs require a breadth of skills, and those developing start-ups in the synthetic biology/ biotechnology space are required to wear several hats -- particularly the technological and commercial hats. At CSBERG, we value the diversity of practitioners in the field and want to train people for interdisciplinary/ transdisciplinary work environments. Start-ups are exactly this, but most high school/ undergraduate programs do not prepare students for such experiences. CSBERG's courses are designed to enrich students' more traditional education with

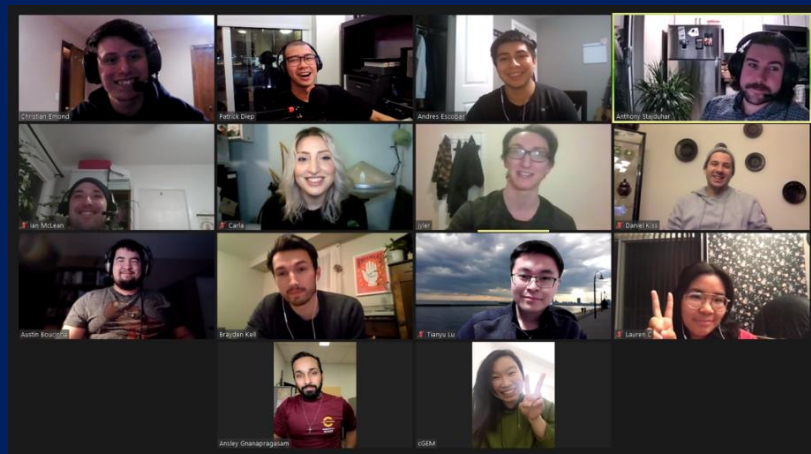
pedagogy designed for synthetic biology to drive further innovation in these challenging and exciting settings.

What do you consider the most important/impactful achievement of CSBERG so far?

CSBERG is interested in data-driven, literature-informed, research-backed practices for synthetic biology pedagogy. We surveyed and interviewed 17/19 Canadian iGEM teams in 2019 to paint the landscape for synthetic biology education in Canada from the iGEM student perspective. The peer-reviewed manuscript for this study has been accepted by the Canadian Journal of Microbiology and lays the theoretical foundations for CSBERG's application of DBTL for transdisciplinary synthetic biology course development at the undergraduate level. This qualitative paper was a massive year-long effort and one of the first in the literature to explicitly connect synthetic biology education with modern pedagogy and organizational psychology. CSBERG delivered a presentation for the Canadian Engineering Education Associations' conference in July 2021 to share its findings from the two iterations of SYNBI and SYNBI2.



CSBERG now plans to prepare its second manuscript that dives into the analysis of SYNBI and SYNBI2 data more deeply, which will allow us to continually improve these courses and create new course offerings in September 2021 and next year in 2022.



Community Lab Alliance

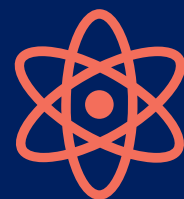


by Ana Victoria, Dana Gomez & Jose Medina

Ana, Dana, and Jose are the founding members of Community Lab Alliance. Both Ana and Dana were members of the iGEM-Tec Chihuahua team in 2016 and 2017 for Jose.

What does Community Lab Alliance (CLA) do?

In the Chihuahua region of Mexico, there are not many laboratory spaces that are accessible to potential bio-entrepreneurs. Therefore, CLA hopes to provide more open space laboratory for everyone in the community. Currently, CLA provides 3D printing services while also focusing on public engagement, in an effort to communicate the science to people. However, due to the COVID-19 pandemic, much public engagement efforts have been shifted to online platforms. In addition to the 3D printing services, we are now helping people and businesses with experimental design, while also providing business-related consulting services.



What is the mission and vision of CLA?

In general terms, the mission of CLA is to turn science and theory into reality but doing so requires talent and early educational resource. Through actively engaging with people in physical events and on social media, we hope to speak science in the language people can better understand, while also inspire the youths in our community and further to involve themselves in science.

In light of this, we aim to be the main player within this space, starting from our community. The ultimate goal would be to set up open lab spaces that can be used by people who are interested or in need of such resources.

When was CLA founded, how has the size (number of employees/members) changed over time? How many people do you reach with your events?

CLA begun in 2018 with eight founding members. However, CLA is currently managed by six of its original founders, three of whom are biotechnology majors, two skilled in mechatronic engineering & 3D printing, and one business major.

We have held in-person events in the past, predominantly in local high school and colleges. However due to the pandemic, reaching out has been mainly confined to the use social media. A rough estimation of the people we have reached would be around 500 people via different sources as of this interview.

Why did you decide to found CLA?

Our motivation for starting CLA stems from the fact that science is not very developed in the region we are based. More often than not, our friends from university would leave the province in search for related job vacancies or better education, while some would even leave Mexico entirely for such opportunities. Therefore, we want to encourage more research and development to take place within the region by offering open-source lab spaces down the line. Currently, we



are focused on raising awareness in the region through social media and other means once the pandemic is over. In general, our moto is to allow “easier access to science”.

“

The feasibility of a project is sensitive to reality.

”

- Ana Victoria

Did your iGEM experience influence the work you are doing at CLA and if so, how?

Definitely. I really fell in love with science during my iGEM experience in 2017, and the public engagement work, talking to children about science, was especially enjoyable for me. Fast forward those years, CLA is also focusing a lot on public engagement as we want to reach out and inspire the younger generations to enter science. – Jose

I concur. Our iGEM project was my first time seeing a project from start to end, while allowing me the chance to taste what working in science is like. My conclusion was collaboration between disciplines is necessary for a project to work, which really extends itself to the current work we are doing in CLA, collaborating with friends with different backgrounds and perspectives, similar to what the iGEM competition provides. Furthermore, iGEM exposed me to the world of entrepreneurship, where we had looked for ways to bring our project into reality. A project is more than just a research, it also encompasses the business aspect. – Dana



I believe I do feel the same as both of them. While I was working on my iGEM project as part of human practice, I was heavily involved in social and entrepreneurship, working with or talked to people “far from scientific labs”. Having a discussion with them often requires the use of layman terms to explain a

scientific concept, which has conveniently been brought over to what we are doing now at CLA, where we do provide some consulting services. – Ana

What do you consider the most important/impactful achievement of CLA so far?

For me, it has to be the incubation program we organized for our community. It was a memorable experience where I was able to learn and teach more about the business side of a scientific project to our participants. Most importantly the feedback we got was great. – Ana

Though I do resonate with Victoria, I would like to mention that since the pandemic hit, it has affected our country a lot, let alone our operations. I am definitely proud that we were able to consolidate our business and cut cost in order to keep CLA going. Mapping out the process for consolidation was certainly hard, but it felt great we managed to pull it off. – Dana

How are you helping to foster your local entrepreneurial ecosystem with your work?

In CLA we are starting to have success with the business model of "Consulting", we offer services to companies to help them establish themselves in the entrepreneurial ecosystem. Nowadays we have completed about 17 projects with different companies, from small start-ups that are starting in the entrepreneur ecosystem to big companies that are already fully established in the province. We offer services like business analysis, organizational plan, marketing plan, scientific analysis, specialized research, among others.



In our consulting services, we can transmit our knowledge as scientists, engineers, and graduates, and we have successfully helped companies to maximize their scope. For instance, we have helped to research in specialized sources to back up claims of products like nutraceuticals, food supplements, and cosmetics (Using this information in a marketing plan); we have helped in

researching the legal considerations to sell products based on CBD, we have designed several internal wikis for the companies and online stores, we have constructed different executive summaries. Now we are currently in negotiation to start a new project with a novel start-up company that is working on the innovation



of irrigation systems using drones, and the future of CLA as a consulting company looks exciting and promising in helping other entrepreneurs to fully consolidate as a company.

We are a diverse team, consequently, we can work on different projects at the same time, some of them are beyond the consulting services. We have designed courses of scientific communication, line up sessions for organizations to help them to achieve specific goals (Like identifying the values and visions of the group), and we have started internships for future scientists and entrepreneurs.

GASB



by Hendrik Cooper

Hendrik was a member of the 2017 iGEM team Cologne-Duesseldorf. He joined GASB in 2017 and was responsible for public relations & outreach. Currently, he is the Head of Steering at GASB.

“ *If you are missing something essential and no one is willing to provide it - create it!* ”

- Hendrik Cooper ”

What does GASB do?

The main intensive of GASB, as an NPO, is to establish Synthetic Biology as a key scientific discipline in Germany - that is equally strong in research and economics. For that we try to be a moderator between academia, industry, the public and its elected officials. We foster the SynBio network and create new connections and focus points for intellectual exchange and economic unions.

For academia we stay in close contact with universities, schools, and institutes, promote their research and forward requests for collaborations to the right people. To connect with representatives from industry we organize socializing events, like our “SynBio World Cafe” to bring together interested and motivated minds and we also try to help people transition from one side of the spectrum to

the other. GASB also reaches out to public figures, reporters, and elected officials to help educate them and subsequently the general public on the field of Synthetic Biology.

We also organize a big annual conference to bring together the German Synbio community to exchange experiences, scientific insights and foster the formation of new collaborations.

What is the mission and vision of GASB?

We understand Synthetic Biology as an independent discipline within the larger field of life sciences. Synthetic Biology is applying engineering principles to biological systems. As a modern science, there are countless points of contact with other biological sciences like biotechnology, systems biology, molecular biology, or biochemistry. Besides these interactions Synthetic Biology as an interdisciplinary science closely works together with all STEM fields. All Synthetic Biologists are sharing similar visions of making biology easier to engineer and standardize the construction of biological systems, unrelated to the model organism, the scientific question, or the final product.



To achieve this goal, GASB sees itself as a platform for the community of synthetic biologists in Germany. Together we want to foster collaboration and to represent our interests. Therefore, GASB is organizing events like conferences and workshops, is providing a platform for dialogue within the scientific community as well as with the society and is taking position for Synthetic Biology in Germany. Our vision at GASB is to establish Germany as a pioneer in the field of Synthetic Biology at the international level and particularly in Europe. We aim at fostering responsible research and applications in Synthetic Biology as well as the dialogue in a social as well as a political context.

When was GASB founded, how has the size (number of employees/members) changed over time?

GASB was founded in 2017. At that point the steering committee consisted of only 6 people. As of today, the Steering Committee of GASB counts 15 different positions, held by 10 people.

With the ongoing support of people from all over Germany that shared our vision, GASB quickly grew and as of today has about 200 paying members and numerous followers and sympathizers with various backgrounds. As time goes on, more and more people are turning to Synthetic Biology and subsequently GASB and we are always happy to connect, help, and collaborate.



How many people in total are involved with GASB/ how many people do you reach with your events?

Beside the Steering Committee, GASB also has active members involved in various projects. As of now about 30 people actively participate in GASB and the formation of Germany's SynBio Network through our association.

With its events and projects, GASB reaches far over thousand people each year - with our flagship event having over 600 registrations in 2020. Of course, we also stay in close contact with iGEM and its participants, by supporting the annual German meetups and award outstanding performances during the competition. As a final mention, we curated a mailing list of over 2000 Synbio enthusiasts and are active on social media platforms like Twitter, where we also reach short of 2000 people.

Why did you decide to found GASB?



Up until 2017, no organization/association exclusively committed themselves to the task of promoting SynBio and building/fostering its community. GASB was founded to fill the vacuum that many people in the field were experiencing and complaining about. This vacuum was

especially felt among young scientists and entrepreneurs, looking to connect with likeminded people. So GASB was simply founded on the principle: “If you are missing something essential and no one is willing to provide it - create it!”

Did your iGEM experience influence the work you are doing at GASB and if so, how?

In short, yes. Almost all members of the GASB steering committee and GASBs “active” members are iGEM alumni. Many discovered their passion for extracurricular activities through the competition and the various side arms an iGEM Project and the management of its team have. Things like organizing events, sponsoring, leading a team and many aspects more are overlapping when it comes to iGEM teams and associations. As alumni, we all benefit from our time with iGEM and that's why GASB is always happy to engage and interact with iGEM and its participants.



How are you helping to foster your local entrepreneurial ecosystem with your work?

GASB is aware of the need for a better infrastructure when it comes to industry side of Germany’s SynBio landscape. Especially the interaction between industry and academia, a vital junction in the process from research to application is where we focus our efforts. For that organises an event format called the “SynBio World Café” where we invite key players from both sides of the field to establish contact, share insights, and discuss ways to improve our current position.

What do you consider the most important/impactful achievement of GASB so far?

Over the years GASB organized many successful events and was part of various initiatives and impact papers. The biggest accomplishment however is still ongoing, the formation of a community. We are very proud of what we accomplished so far but we are eagerly looking towards the future and the projects we have in store for the upcoming years - so stay tuned.

Synbio Africa



by Otim Geoffrey



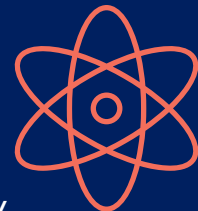
Geoffrey was one of the founding members of iGEM Makerere University team in 2018, being the first iGEM team from East Africa to participate and represent at the iGEM Giant Jamboree in Boston. Later on, he founded Synbio Africa as an After iGEM initiative to promote and spread the gospel of synthetic biology across Africa.

What does Synbio Africa do (general description)?

Synbio Africa is a forum for researchers, students, citizen scientists, policy makers and the public at large to convene and develop successful pathways for the propagation of synthetic biology technologies, products, and services throughout Africa.

What is the mission and vision of Synbio Africa?

The mission is to become the leading Synbio innovators for sustainable solutions to great challenges in health, agriculture, and environment in Africa. The vision is to be a center of excellence in synthetic biology research, education, and biosecurity in Africa.



How many people in total are involved with Synbio Africa?

SynBio Africa was founded as an After iGEM initiative in early 2018, originally as SynBio Uganda. SynBio Africa has been growing steadily over the

years and currently has over Sixty (60) members and Ambassadors from over Ten (10) African nations, with a wider geographical reach. It is governed by a steering committee which consist of the Executive committee members headed by the Chief Executive Officer, and advisory team consisting of thought leaders in synthetic biology across the globe.

How are you helping to foster your local entrepreneurial ecosystem with your work?

The ecosystem contains, among other factors, cultural, social, and material attributes that provide benefits and resources to entrepreneurs. Synbio Africa argues that entrepreneurship flourishes through an integrated coordination of resources and actors. Currently, Synbio Africa is running projects that have aided the members involved to attend several entrepreneurial trainings and have chance to network with entrepreneurial mentors. We plan to host annual conferences that will involve innovators and entrepreneurs pitching their ideas to potential and angel investors as a source of financing for the projects. Synbio Africa is collaborating with Makerere University to foster entrepreneurship and innovation. Synbio Africa is also planning to foster entrepreneurial infrastructure by establishing a Centre of Excellence that will feature a research and innovation hub aimed at accelerating and incubating innovations, providing opportunity to young entrepreneurs and link them to potential funders and stakeholders.



Synbio Africa innovation hub will include:

- Training courses and workshops
- Mentoring and coaching
- Advisory services
- Networking with other ecosystem players
- Peer learning and support › Office space
- Corporate connections
- Back-office support (accounting, business registration, legal support, etc.)

- International connections.
- Finance mobilization and provision of micro grants to innovators and entrepreneurs.

What do you consider the most impactful/important achievement/impact of Synbio Africa so far?

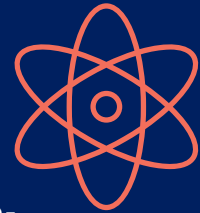
Founded as an After IGEM initiative, Synbio Africa is building a network of synthetic biology enthusiasts and after iGEMers in Africa through the Ambassador's program, creating awareness, providing knowledge, and conducting research in the field of synthetic biology aimed at solving grand challenges in African communities using synthetic biology tools, technologies, and applications.



Conclusion

In this report, we have taken a deep dive into what has motivated these founders to take on the mantle of entrepreneurship with the aim of not building personal wealth but to inspire the young and support their peers in their respective regions. To quote the former U.S. President Ronald Reagan who once said: “We can’t help everyone, but everyone can help someone.” The bioeconomy is expected to grow for years to come and synthetic biology represents a technology that has the potential to ride along this wave. Sharing some similarities with iGEM foundation, these non-profits are playing an important role in inspiring and supporting those who wish to be solve global problems by harnessing the power of synthetic biology.

In a nutshell, bio-founders and their start-ups are unquestionably generating wealth, making new jobs, and constantly innovating to push the boundaries of science. Nonetheless, we should also keep in mind that non-profits such as these mentioned in the report are essential to the continuous growth and flourishing of the bioeconomy, and deserve equal, if not more support and recognition as all our bio-founders.



Attributions

We would like to convey our utmost gratitude to Mélodie Dupré, Patrick Diep, Ana Victoria, Dana Gomez, Jose Medina, Hendrik Cooper and Otim Geoffrey for their help in putting together this report. We would also like to thank the Chair of iGEM EPIC 2021, Cheng Kai Lim for his help in editing and commenting on the report. This report is put together by **Carolyn Schulte** and **Tony Yeoh Chuin Shung**, the leads for EPIC Discovery and Insights EMEA and APAC 2020.

~ The information in this report is accurate as of time of writing. ~