

iGEM Indian League

White Paper 2022

Status quo

Indian iGEM alumni are one of the most active cohorts in After iGEM events and initiatives. However, in contrast, the number of Indian teams dropping out of the competition due to difficulty with registration is very high. For instance, in 2019, we had 12 teams participating from India in iGEM, which was merely 3% of the total number of teams that had participated in 2019. If we consider the last decade, the number has not crossed 12 despite huge potential from our region considering the infrastructure we possess *vis-a-vis* life sciences. Adding on, we have never had a high school or postgraduate team from India due to certain barriers.

This suggests that there is a lot of interest for iGEM and SynBio in the region but an inability to participate in the iGEM competition, which definitely needs to be addressed. Currently, iGEM sees a yearly participation of around ~15 collegiate teams and no highschool or postgraduate team from India due to the potential barriers that we hope to overcome.

Need for an iGEM Indian League

Over the last two decades nearly, thousands of projects have been presented at the [iGEM Competition](#), with the motto of "*solving local problems with local solutions*". Over 60,000 iGEMers have participated so far, revolutionizing their realities and assembling the bricks of the "biological revolution". In this context, iGEM has come up with a new initiative called the iGEM Leagues, envisaged to expand the impact of iGEM and synthetic biology even further.

More so, with focus on the Indian region, there exists several pain points, as tabulated in Fig. 1 taking into account the three important strata in the Indian educational system. Considering the high school stratum, SynBio is an uncharted territory for both the learners and the trainers, which could be explained by related lack of funding and awareness. If we are to consider the undergraduate section, despite undergraduate teams being the ones participating in iGEM from India every year, reasons like clash of their academic calendar with that of iGEM, limited funding from their management due to high \$ to ₹ conversion and dearth of enough PIs/mentors, clearly explains the status quo.

Moving onto the educator realm, notwithstanding the current SynBio awareness and prowess of graduates from Tier 1 Indian educational institutions, the translation of such skills to potential bio-entrepreneurial ventures face a bottleneck in the form of limited opportunities, lack of streamlined training or requisite infrastructure.

Hence, the iGEM Indian League will strive to address these major issues existent in these individual stratum and endeavour to build a vibrant SynBio network across India, which not only will establish a sustainable approach to increase participation in iGEM from our country but allow for increased SynBio participation, involvement and opportunities from our region.

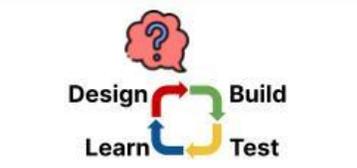
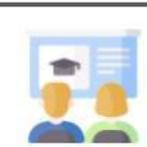
High School	Undergraduate	Educator
 <p>Design Build Learn Test</p>	 <p>Limited funding</p>	 <p>Limited opportunities</p>
 <p>Lack of educators</p>	 <p>Clash of academic calendars</p>	 <p>Lack of streamlined training</p>
 <p>Lack of funding</p>	 <p>Dearth of PI's and mentors</p>	 <p>Lack of bio-entrepreneurship</p>
	 <p>Lack of awareness</p>	

Fig. 1 - Common hurdles associated with limited SynBio involvement in the Indian region from the three strata of high school, undergraduate and educators

Vision

To improve the reach of iGEM in India, and develop Synthetic Biology **Infrastructure** and **Education** in the region

Objectives

- Growth of SynBio Education and Synbio Infrastructure in India
- Increase awareness of iGEM and improve synthetic biology opportunities in the region
- Increase accessibility and address problems of resource crunch to empower “Local people to solve Local problems through SynBio”
- Promote Institutionalized/Long term participation of Indian educational institutions (highschool, college, community teams) in iGEM

Structure

To achieve our objectives, we understood the need of a self-sustaining system (as shown in Fig. 2) which targets the following strata and correspondingly designed customized approaches for each one of them:

1. **Highschool** - Encourage more students to take up a degree, project and career in SynBio
2. **Undergraduate** - Encourage and support students to solve local problems using SynBio solutions and develop accessible synthetic biology tools
3. **Postgraduate** - Provide training to develop instructors and thereby expand the mentor pool that supports students interested in SynBio projects

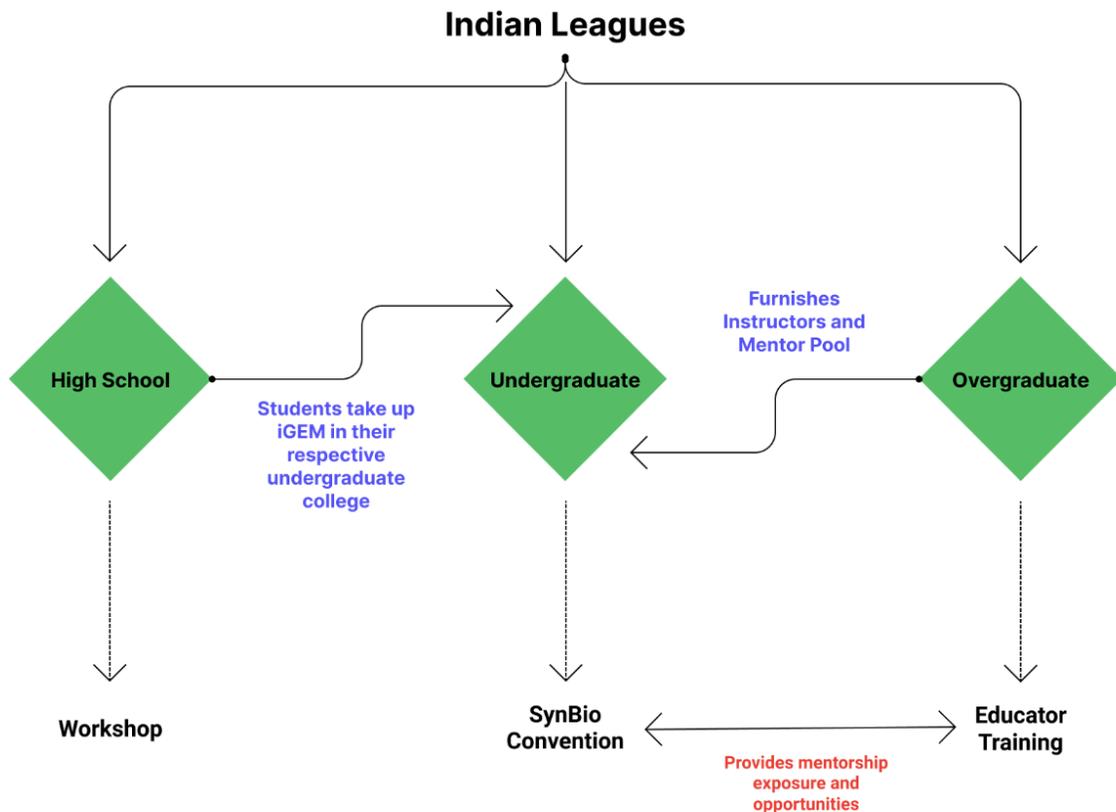


Fig. 2 - Envisaged structure for the iGEM Indian League

With this context, a brief discussion on the plans for each stratum under the Indian League would be provided here:

High School:

The main focus here would be on giving Indian highschool students (8th grade - 12th grade) a flavor of SynBio. We aim to start a dialogue about solving local problems that would eventually inspire them to take up a career in synthetic biology and address regional challenges. Using the format of a summer camp*, students will get training and an introduction to synthetic biology, which would culminate in a hackathon event to give them hands-on experience in solving synbio problems.

As a pilot project for this, the After iGEM Ambassadors to Asia organized the [ATGC Indian High School Workshop](#) in July 2021 where an overwhelming response of 401 registrations were received for a 4-day long event. The workshop was designed with a hackathon component in the form of a SynBio Auction. The broad goal of this workshop was to be the starting step in creating long-standing relationships with this demographic and nurture their participation in the Indian League, and eventually the iGEM Competition.

Undergraduate:

We want to approach this stratum by encouraging participants (freshmen, sophomore and juniors) to develop tools to make science accessible and empower them to address local problems with SynBio tools. The following pointers enlists the features of the initiative for this stratum:

1. **Regional competition***: All the projects would focus on designing an integral SynBio project to solve a local problem with low resource

requirements and constant guidance/educational resources

2. Experiments in the lab would be completely optional but teams have to show a Minimum Viable Product (MVP)
3. The main focus of this mode is understanding a local problem and designing a solution that could help address the issue, with a heavy focus on human practices, biosafety, biosecurity and entrepreneurship
4. The competition would be complemented with industry-certified workshops to build capacities and skills for design and modelling
5. Winning teams would also be eligible for internship opportunities through partnerships with labs and industries in India

Educators:

Primary focus at the postgraduate level would be to train them to be SynBio educators. We would offer industry-certified training modules and workshops* for pre-final, final year undergraduates and graduate students. The participants of the training program would gain technical skills related to SynBio and iGEM, which they can use to host workshops in their communities, and mentor teams for future programs, furnishing them with additional experience in an advisory role.

**Keeping in mind the need to provide high quality, accessible-to-all activities, integrated with the values and visions of the iGEM Foundation, each cohort will have a nominal registration fee for participation.*

Also note that previous iGEM Experience is not a requirement for participation!

Timeline of our initiatives

Initiative name	May	June	July	Aug	Sept	Oct	Nov	Dec
HS workshop								
Undergraduate competition			Training	Competition			Culmination event	
Educator Training	Run throughout the year in different batches							

For the undergraduate section, a detailed timeline is given below:

1. July to August - **Training period**

- a. iGEM Academy and training - During these two months, registered teams will be given access to training modules and a lab training course to equip them with the knowledge about synthetic biology
- b. They will also be in touch with their assigned mentors throughout the process
- c. The deliverable after the training period would be to submit an abstract of the project

2. August to December - **Competition period**

The major competition criteria would be:

- **Accessible science** - In this criteria, teams can elect, for instance, to build an app or even redesign equipment for their project to make SynBio tools more accessible within the constraints of a low and inexpensive resources setting
- **Integrated Human Practises**
- **Entrepreneurship quotient**
- **SynBio Promotion** - This would be key in creating awareness about iGEM and synthetic biology at a grassroot level.

- The final deliverables would include:
 - Live/Video presentation
 - Minimal website/repository
 - Proof of MVP

3. December - **Culmination event**

Possible Partnerships with us

If you are interested to become a partner of the iGEM Indian League, you could associate with us *vis-a-vis* one or more of the following roles:

1. Certifying training programs/workshops for High School, Undergraduate and Educator cohorts
2. Access to Community Labs for teams during the initiatives and for winning teams in the hackathon/undergraduate competition
3. Sponsorship for participating teams (undergraduate competition)
4. Sponsorship for Culmination Event
5. Members of Advisory Board
6. Partners in the following context:
 - a. Venue for culmination event
 - b. Initiative Title Partner (HS workshop/undergraduate competition/educator training)
 - c. Technical Partner
 - d. Community Partner

How to get involved?

- **Freshmen, sophomore and junior undergraduate students:**

Interested in learning more about Synthetic Biology? Excited to participate in a National Competition with international resources and mentors for you to access?

Start your own Indian League team!

- **Pre-final, final year undergraduates and graduates:**

Volunteer* with us for this new exciting initiative!

Join our SynBio certificate training programs for next generation mentors and educators in the field. The program will run for 15 days and is open for interested participants from any background.

- **iGEM Alumni/After iGEM**

Join our Synbio certificate training program and *become a mentor/PI for an Indian League team*

- **Professors**

Join our Advisory councils for any one or more of the following roles:

- Judging Committee member for the Undergraduate Synthetic Biology Competition
- Curriculum design of our training programs for the High-school, Undergraduates and Educator cohorts
- Competition Initiative Guideline committee for the Undergraduate Synthetic Biology Competition

Fill out this [form](#) here to register and begin your journey with the iGEM Indian League!