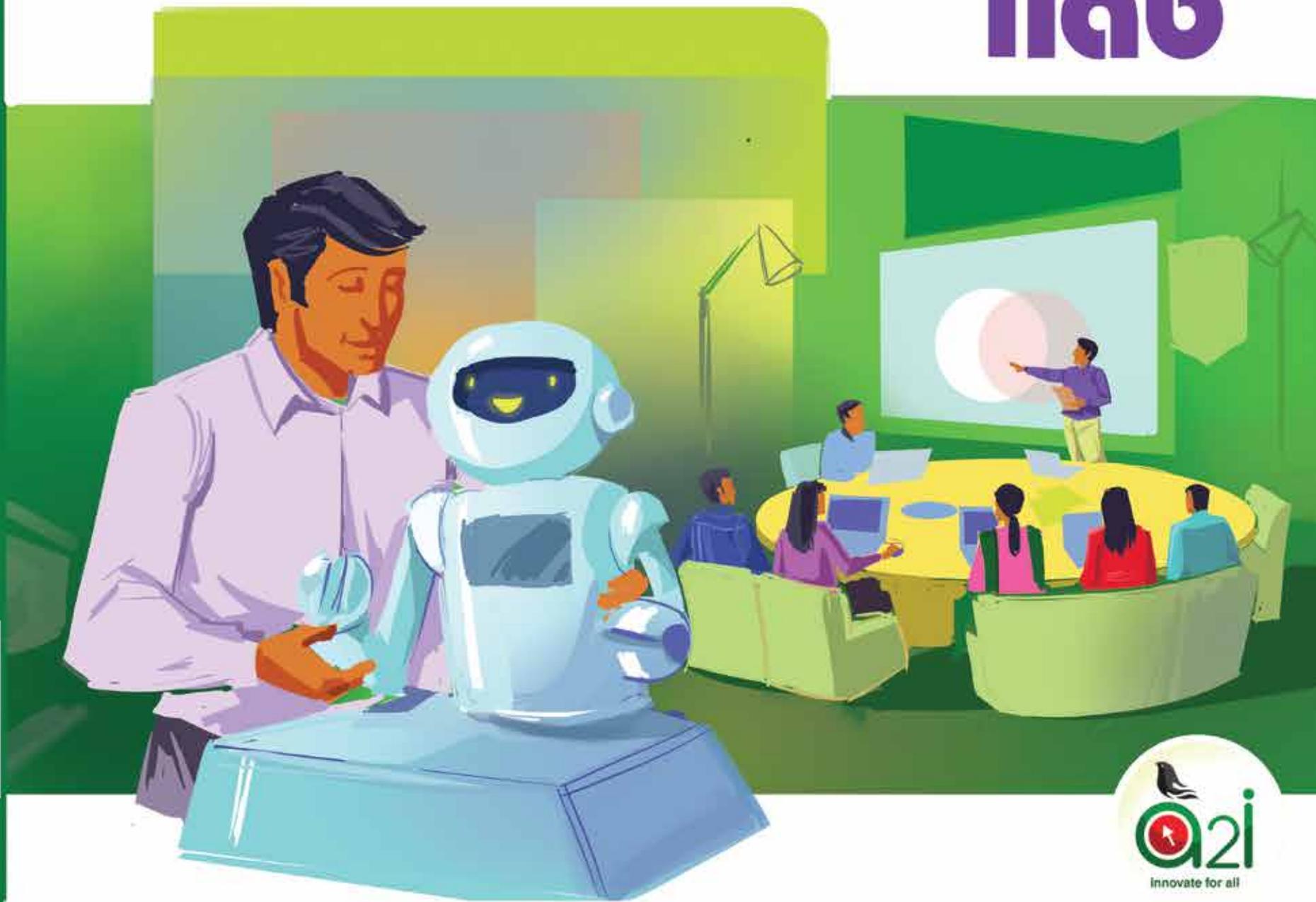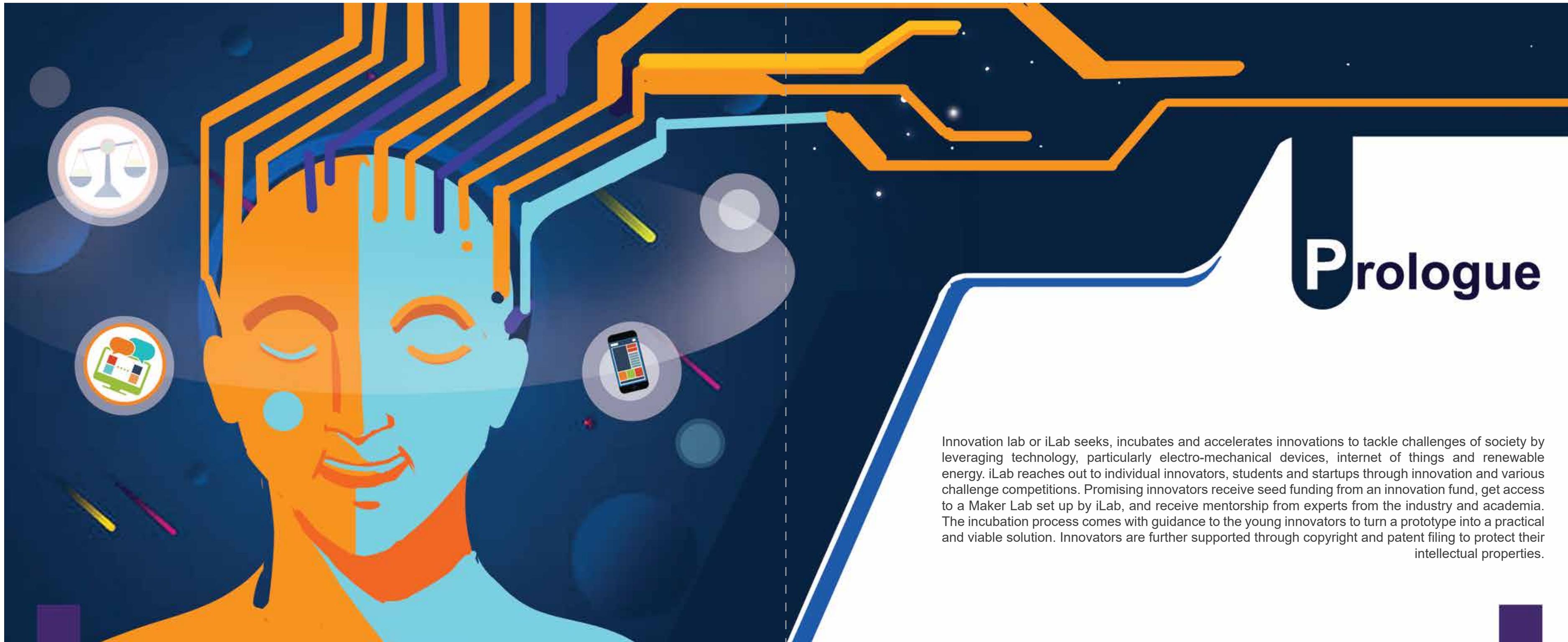# Prologue

Innovation lab or iLab seeks, incubates and accelerates innovations to tackle challenges of society by leveraging technology, particularly electro-mechanical devices, internet of things and renewable energy. iLab reaches out to individual innovators, students and startups through innovation and various challenge competitions. Promising innovators receive seed funding from an innovation fund, get access to a Maker Lab set up by iLab, and receive mentorship from experts from the industry and academia. The incubation process comes with guidance to the young innovators to turn a prototype into a practical and viable solution. Innovators are further supported through copyright and patent filing to protect their intellectual properties.
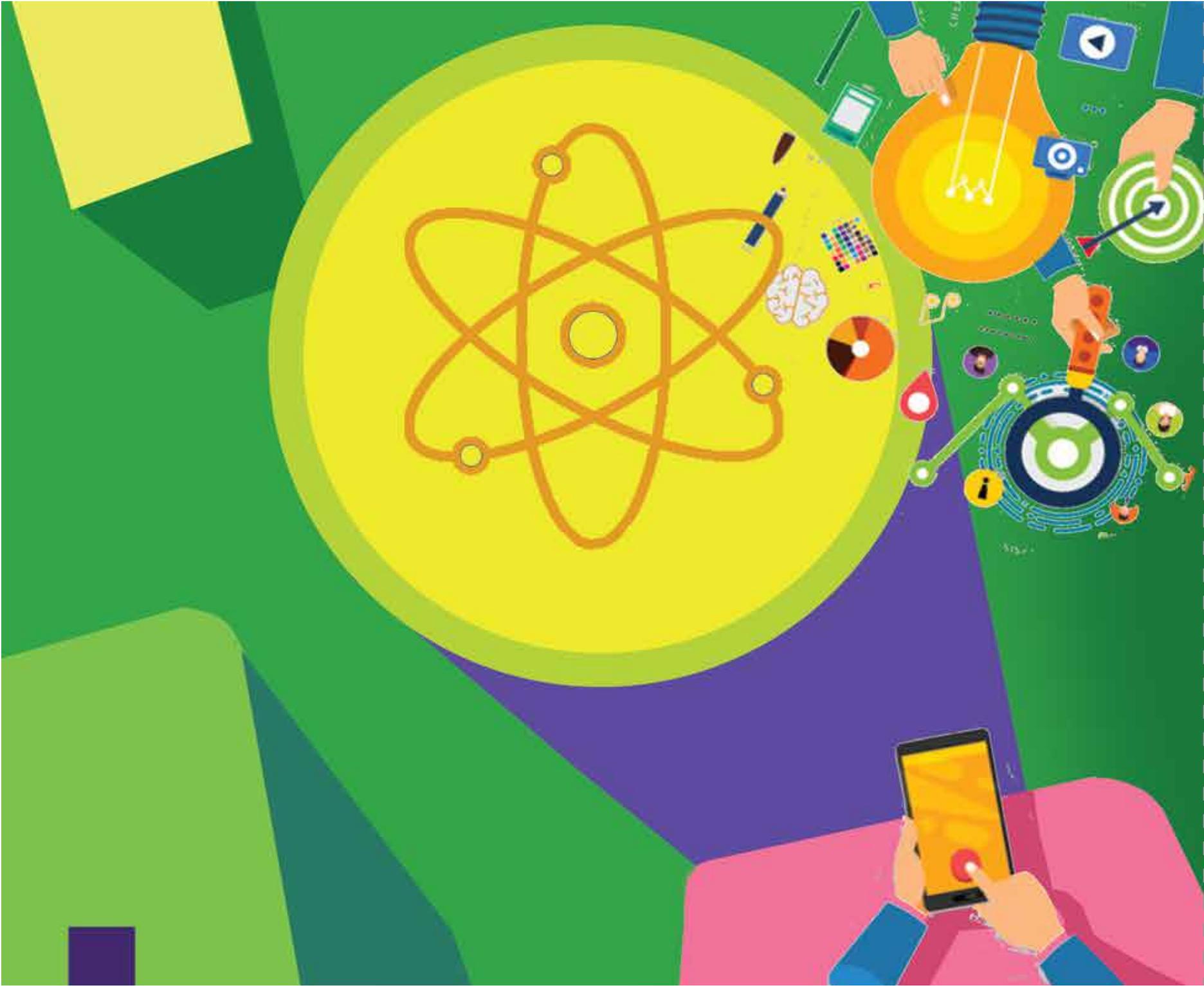
2030 Sustainable Goals

The 2030 Agenda for Sustainable Development Goal sets ambitious global goals demanding unprecedented actions and efforts across multiple interconnected social, economic and environmental issues. The process of creative innovation initiated by technological progress can help to transform economies and improve living standards by increasing productivity, reducing time, visit and costs, and helping to raise real wages.

The task of achieving the Sustainable Development Goals is complicated due to multiple interconnected issues involving poverty, food security, nutrition, health, water and sanitation, energy access and access to ICTs. The depth and complexity of these interconnections require new forms of development in innovation.

Innovation Lab (iLab), combined with action to address persistent gaps in access and use of existing technologies, can help develop innovations which could be transformative in achieving the Sustainable Development Goals and producing more prosperous, sustainable, healthy and inclusive societies. iLab offer the prospect of solutions and opportunities for sustainable development that are better, cheaper, faster, scalable and easy to use.

iLab is a joint initiative of the Access to Information (a2i) programme under the ICT Division and Cabinet Division, supported by UNDP and USAID.
After the establishment of iLab in 2016, it has led 64 projects in its first three years focusing on a wide range of service and policy challenges.

What is i-lab?

Innovation Lab was established in 2016, focusing on science, technology and innovation related idea implementationto address the 2030 agenda of sustainable goals. It has led 64 projects in its first three years focusing on a wide range of service and policy challenges.iLabbelieves an innovative idea can change the fate of millions of people of a society. Therefore,itnurtures ideas that can modernize the traditional system, speed up services, and reduce service costs and time. Innovation lab or i-Lab seeks, incubates and accelerates innovations to tackle large problems of society by leveraging technology, particularly electro-mechanical devices, internet of things and renewable energy.It also aims to improve public service and policy by creating a safe space to co-create ideas, test prototypes and refine concepts with citizens, civil servants and stakeholders.

☐　iLab reaches out to individual innovators, students and startups through innovation and challenge competitions.

☐　Promising innovators receive seed funding from an innovation fund, access to a Maker Lab set up by iLab, and mentorship by experts from the industry and academia.

☐　The incubation process comes with guidance to the young innovators to turn a prototype in to a practical and viable solution. Innovators are further supported through copyright and patent filling to protect intellectual property of the innovators

☐　iLab has established partnerships with all 137 public and private universities in Bangladesh and is gradually engaging the brightest minds in solving difficult problems faced by society.

☐　It is expanding its pool of industry researchers who can act as mentors and innovators. iLab has recently reached out to non-resident Bangladeshi experts who are acting as mentors to several projects
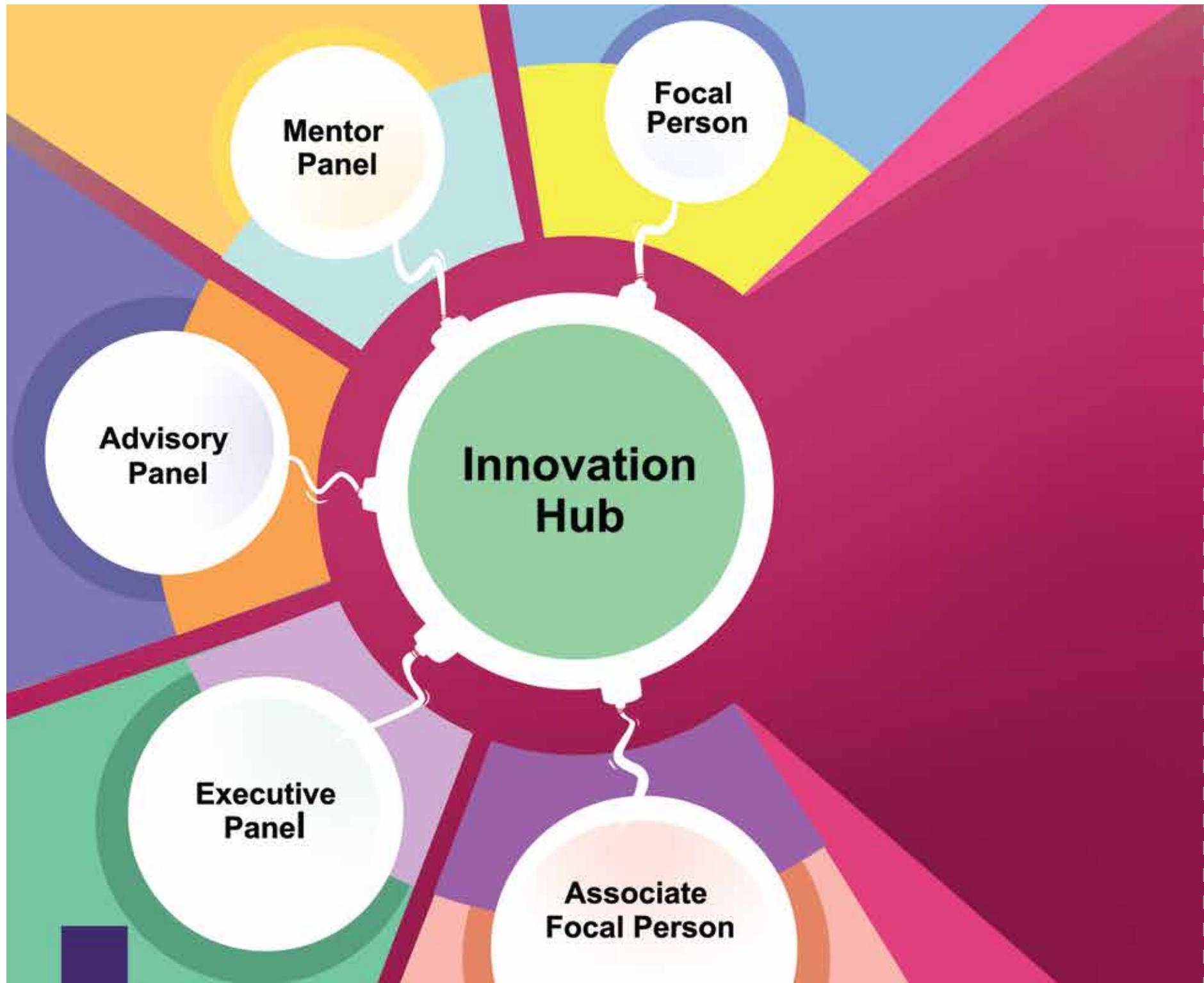
University Innovation Hub

Innovation Hub (iHub) is a platform for students, faculties and researchers from colleges, universities and equivalent educational institutions. This iHub is designed to expand technology researches and innovative activities to the students, teachers and researchers.

Currently, there are 137 universities in Bangladesh which are regulated by the University Grant Commission (UGC). In every university, Innovation Hub has been created with the cooperation of UGC and a2i Innovation Lab (iLab) where different faculties, students and young and dynamic teachers are actively involved with the various types of innovative works, projects and research. The internal activities of iHub are carried out through the mentor panel, the advisory panel, and the executive panel. A Focal Person and an Assistant Focal Person operate all types of communications with a2i Innovation Lab on behalf of the iHub platform. In the iLab portal (http://ilab.gov.bd), students and teachers can register as an Innovation Hub member which is open for all. iHub members can participate in a multitude of competitions, workshops, seminars and conferences which are organized by a2i Innovation Lab (iLab).

Beside various activities, one of iLab's prominent activities is to solve society's big problems through cost-effective innovative solutions. Each year, a number of students and teachers participate in competitions to share their innovations. If they are elected to participate in these competitions, they get both financial and technical support to implement their project from iLab. These funds are given from different source funds such as the "Challenge Fund", "Service Innovation Fund", "Innov-A-Thon", and "Undergraduate Project Funding". All the above mentioned funds are given for implementing innovative projects and later on, iLab ensures the "Intellectual Property Rights" of the innovative projects.

It can be said this is the right platform where grassroots level innovators, students, and teachers are able to achieve their dreams with the help of a mentor's care & concern.

Innovation for development and to address social challenges

To address modern day problems with modern solutions, a2i has laid a solid foundation for some of the brightest youths of the brightest youths of the country to come together and collaborate to devise innovative solutions to tackle some of the biggest challenges faced by society and people such as employment, disability rights and agriculture. iLab has also started to sell their innovative products by channeling with the industries and others stakeholders like different government agencies.

Fledgling innovators in Bangladesh face common challenges:

- Lack of funds to develop complete prototypes
- Testing the efficacy of the prototypes with real users or beneficiaries

a2i's Service Innovation Fund (SIF) was designed to address these challenges. It provides seed funds and incubates cost-effective, user-centric, home-grown innovations to solve some of the most important problems affecting undeserved communities.

SIF also sets itself apart from other 'innovation funds' by:

- Co-investing with the innovators in bringing their ideas to life.
- Providing mentorship support and access to citizen-beneficiaries to refine the prototypes and make them more user-centric.
- Supporting innovators through liaising with relevant partners from both the public and private sectors for effective project implementation, successful scale up and sustainability.

To date, SIF has attracted 3,835+ innovative proposals using an online platform called 'Idea Bank' and has granted over a quarter million dollars to government agencies, development
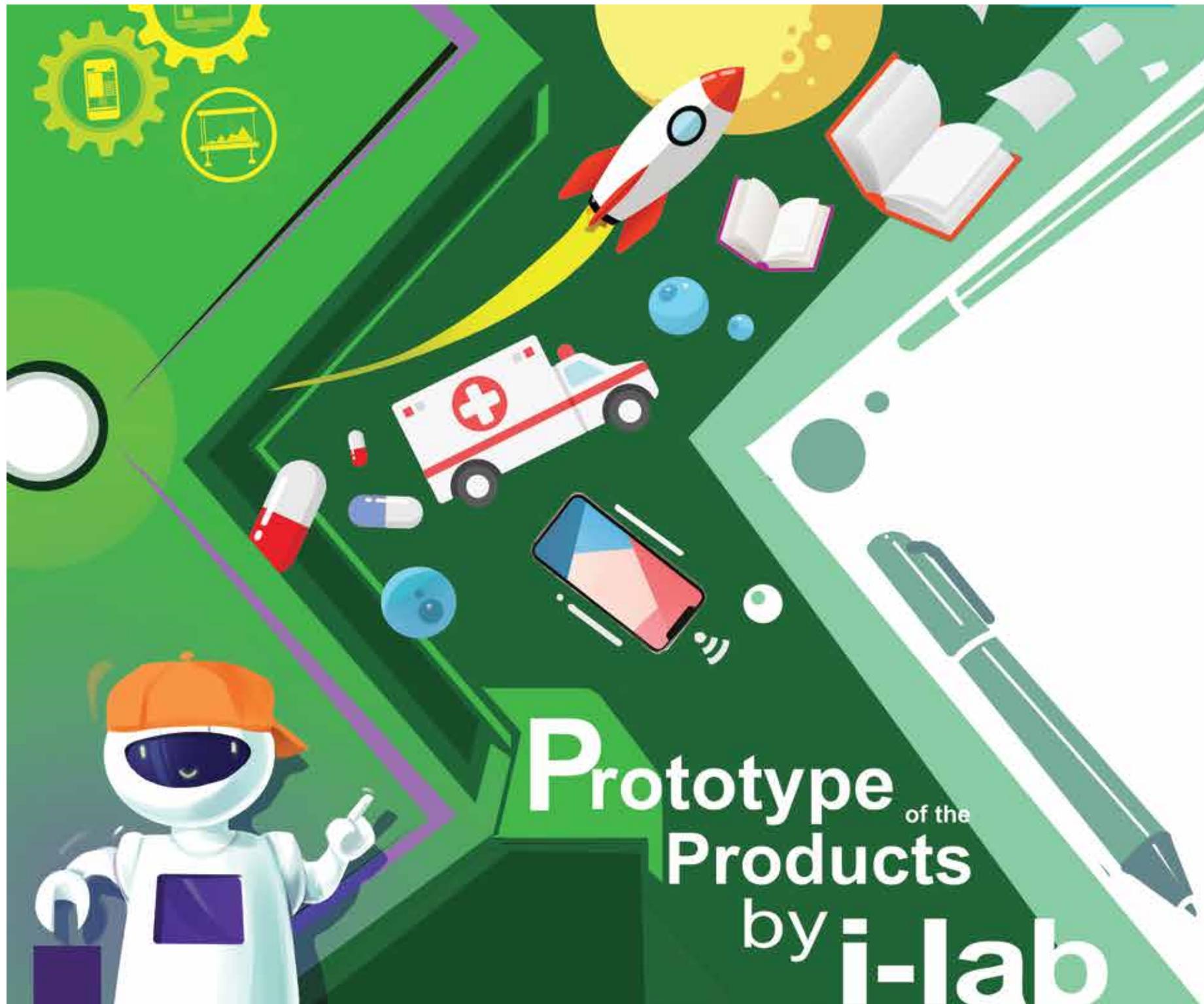
Innovator: Md. Anwar Hossain

Centralized Nebulizer System

"Centralized Nebulizer System" is a centrally controlled nebulizing system to serve multiple patients simultaneously using a single cylinder. Each nebulizer can have up to 30 nebulizing pipes attached with different hospital beds and the doses will be centrally controlled by the device. Such technological innovation also helps the hospitals to have a single machine running for the nebulizer process rather than looking after several machines. The centralized nebulizer also helps the patients to be treated simultaneously, thus, an emergency patient does not have to wait for their turn to take the medical services. It can also provide its services for a certain period of time without electricity. It has a reserve chamber which can provide nebulization until the reserve is emptied and power supply is back on. Such methods are immensely helpful in rural areas where electricity supply is not in abundance and emergency patients can be served even in case of power failure. The input for the nebulizer to be supplied is also environment friendly as it requires filtering natural air, which in turn is also cost effective than buying nebulizer machine individually. This device has been implemented in National Institute of Diseases of the Chest and Hospital. More than 20,000 patients have been treated so far, after the inclusion of "Central nebulizer" in the health industry. DR. AzizulShaheed has mentioned that 58% of the patients who received were children, aged between 0 to 6 years old.

Prototype of the Products by i-lab

Hand Carrying Infant Incubator:

The Hand Carrying Infant Incubatortransports sick neonates from rural areas to better hospitals for better medical services, especially in a medical emergency case. The air flowing in is heated by heat sink and can be inhaled by the infant. The exhaled air is vented out. This allows the incubator to have a constant flow of air within the incubator chamber and the temperature to be regulated. It has own backup power supply to avoidfailure of its operations when there is an electrical supply breakdown, which unfortunately is a frequent hazard in our country.

The portable incubator is currently on the stage of piloting and the price is estimated to be at around $600. According to market research, this innovation will be the lowest possible priced incubator available at the market. The Mother Kangaroo has achieved an ITEX award Malaysia in 2018 in the 'Special care and Child care' category.

Innovator: Md. Anwar Hossain

Innovator: Mizanur Rahman

Low Cost Ambulances to speed into service in rural Bangladesh

Bangladesh has been steadily progressing towards reducing maternal mortality. Still now in this era of the twenty-first century, Bangladesh faces severe problems due to a lack of access to primary treatment at the right time. This is due to poor infrastructure and an absence of emergency transportation services in rural areas.Because of these issues, the Innovation Lab (iLab) of a2i decided to build a low cost local tech ambulance in the first place despite of knowing that there is no automobile industry in Bangladesh. iLab supported the innovator to develop a prototype of the low cost ambulance with a motorbike engine. After vigorous R&D of the first version of ambulance, iLab initiated the second version of ambulance which is better in terms of efficiency and effectiveness. In the year 2019, iLab with the initiative of UNFPA has made sure of the availability of low cost ambulance at theUkhiya camp in Cox's Bazaar which has been housing the Rohingya refugees. Concerning the miserable conditions and lifestyles of the people at the Ukhiya camp, the low cost ambulance has made a significant impact in transporting emergency patient from the camp to the nearest hospital when needed.

Fuel from Poly/Plastic:t

Fuel from Plastic is a process to transform plastic and polythene into fuel that can be used for household use, transportation purpose and capital intensive use. The innovator, TawhidulHaque, is the producer of the reactor and the manufacturer of the whole technology. The process takes twelve hours time to transform the plastic into oil. There is a frequently asked question: what are we doing to mitigate harmful gas that is produced by burning plastic? Taking this thought seriously, in order attenuate the harmful effect, the innovator used lime water solution to convert the harmful air into gaseous material that is reused in the manufacturing process.

Innovator: HM Tawhid
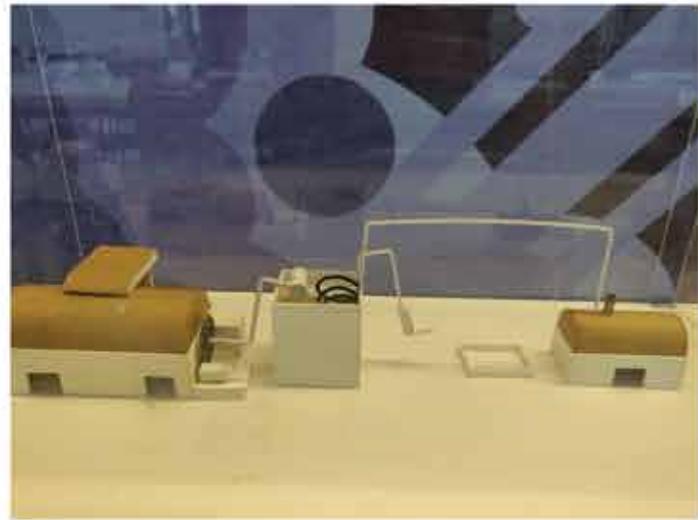
Innovator:Abdullah Al Hamid

Used Cooking oil:

In our country, hotels and restaurants use the same vegetable oil for long periods of time for cooking. As a result, the oil loses its value and becomes toxic for our health. Hotel and restaurant owners also use this oil for a longer time because, they have no alternative than to use or sell this used oil.

Abdullah Al Hamid, a 28 year old young man from the United International University, has developed a solution for this problem. His innovation will enable small hotels, restaurants and even households to convert their daily cooking oil waste into bio diesel within a few minutes.

The average price of the used cooking oil is 30 taka per liter. From a survey it was found out that every day we could obtain around 2 to 10 liters of used cooking oil on average from each restaurant depending on sales and food quality. Recycling is important to both the natural environment and us. Dumping the used oil into drains can cause serious water pollution and clogging of drains, sewers and even rivers.

Pumping Water from Downhill Source to Uphill

The Chittagong Hill tracts account for over 1,377,000 hectares or 9.33% of Bangladesh's land area. About 1.5 million people live there. There are very few water supply systems established there. As a result, people have to climb hills to collect water from river streams. Adding to their misery, they don't have access to electricity to pump water to uphill sources.

Soumic Ahmed, a student from the Department of Civil and Environmental Engineering ofShahjalal University of Science and Technology, Sylhet created the "Hydraulic Ram Pump".

The hydraulic ram pump does not require any external energy supply other than the gravitational energy or kinetic energy flowing through the source of water. It uses water hammer effect to develop pressure that allows a portion of the input water that provides the pressure for the pump to be lifted to a point higher than from where the water flow originally started.

Innovator: Soumic Ahmed

Innovator: Md. Rezaur Rahman

Multimedia class room device:

Many rural schools, like entire communities are devoid of electricity and are therefore beyond the reach of conventional multimedia classroom facilities. The government has already established multimedia classroom setups in more than 23,500 primary and secondary schools. But the challenge remains when expanding this solution into areas with frequent load shedding and/or areas off grid electricity like Thanchi.

To address this state, the innovators of the Innovation lab (iLab) came up with a high-tech solar-powered "Low Cost Off-grid Multimedia Classroom". It consist of a single board computer (capable of storing any type of digital content) and a high-resolution monitor (allowing teachers to project any content to a class). Given the low-power consumption feature, the system, when fully charged, can run classes for 3 hours each day for at least 7 days.

The initiative has so far been implemented in Thanchi of Bandarban, Itna in Kishoreganj, Batiaghata of Khulna and Tetulia Pilot of Panchagarh. Gradually it is possible to spread this across the country.

Smart White Cane

A blind stick equipped with a developed system which provides hepatic feedback whenever there are obstacles nearby. Therefore, blind people will get alert easily about the obstacles ahead of them. There is an adjustable object detection capability on the cane, as well as a light sensor to inform users of their surroundings. The Smart white cane has functionalities to direct a user to their destination through vibrations and audio feedback.

Innovator: Ahsan Habib

Creating Inclusive Society

'Leaving no one behind' is the motto of building inclusive and sustainable society. The SDG 2030 Agenda, which Bangladesh has signed up to, calls for the promotion of peaceful, just and inclusive societies to be one of five development priorities. Goal 16, in particular, includes targets to promote inclusive and representative decision-making whereas goal 5 targets to empower women and children to have access to equal rights and facilities besides contributing to national development. However, government's vision 2021 also puts emphasis on ensuring participation of under-served or deprived community in national development that includes women and persons with disabilities.

As the Government of Bangladesh approaches Digital Bangladesh, all manual systems are gradually being converted into digital ones. One of the most primary steps of digitalization is having a web portal. Currently in Bangladesh all the 57 Ministries, 353 Departments, 8 Divisions, 64 Districts, 491 Upazillas and 4554 Unions have active web portals integrated through the National Web Portal of Bangladesh which is also the largest government web portal in the world.

a2i has taken several initiatives to ensure inclusion of women and persons with disabilities in national problem solving along with finding solutions to problems faced particularly by them. It has facilitated several projects that focus on solving women, children, and persons with disabilities centric problems. a2i will continue to carry on these projects until sustainable solutions are established in the country to solve their problems.

Solar powered tri-cycle

It is an innovative tri-cycle developed for underprivileged persons with physical disability. This locally manu-factured tri-cycle is very affordable and it can be run by both solar and grid electricity. Its mechanism has been specially designed for muddy paths of rural areas.

Innovator: Yousuf Sarder

Innovator: KaziBazlur Rahman

BakBondhu: Low Cost Communication Device for Speech Disabled persons

Bakbondhu is a locally developed cost-effective device that will help persons with speech disability to commu-nicate with other by simply pressing the buttons on the device. Each button will have a distinct message that will be played upon pressing, allowing the speech impaired person to convey their thoughts or requirements in a comprehensive way.

- Distinct audio messages for assistive service
- Sound and picture can be customized
- Device will be able to sense sounds (i.e. horns, whistles etc.)
- Emergency button in case of quicker communication

Accessible Dictionary

An online and offline dictionary that is accessible by everyone including persons with disabilities. It allows everyone to search for meanings of words in both English and Bangla from trusted reference.

Innovator: Young Power in Social Action (YPSA)

Vashkar Bhattachearjee

a2i innovation lab

Accessible Book Reader

It is a locally developed DAISY player that will support digital audio books, periodicals and computerized text. It has been designed as a complete audio substitute for print materials and is specifically designed to be used by people with "print disabilities," including blindness, impaired vision, and dyslexia.