

Event report

Hackathon on Accessible and Inclusive ICTs for Persons with Disabilities

28th-29th April 2018

Kathmandu, Nepal



LIRNEasia

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Introduction

LIRNEasia is a pro-poor, pro-market think tank established in 2004. It has been working on catalyzing policy change through research to improve people's lives in the emerging Asia Pacific by facilitating their use of hard and soft infrastructures through the use of knowledge, information and technology.

With the support of the Ford Foundation, LIRNEasia is conducting a project in Nepal on "Enhancing broadband policy discourse in Nepal, with emphasis on inclusion of the differently abled". Through this project, LIRNEasia seeks to advance the formulation and implementation of broadband policies for Nepal that would be broadly inclusive, especially with respect to the differently abled. The project included a course on "How to engage on broadband policy and regulatory processes", a workshop for leaders of disabled organizations on "Accessible and Inclusive ICTs for PWDs" and a pre-hackathon workshop. The ongoing project activities are a nationally representative study of ICT access and use in Nepal with special focus on the disabled and quality of service excellence testing in Nepal. Once the survey is completed, a dissemination event and an expert forum will be conducted to share the research findings in Nepal among policy makers, civil society, disabled persons organizations (DPOs), academics and the media.

Woman Group for Disability Rights (WGDR) is a non-governmental, non-profit and non-partisan organization led by persons with disability. It uses a twin-track approach. Firstly, it advocates for the rights of persons with disability. Secondly, it provides services to empower persons with disability.

Internet Society [ISOC] Nepal is a non-profit organization registered under Organization Registration Act, 1976 in Nepal. Mission of ISOC Nepal is to promote the use of Internet in every aspect of life.

Center for Law and Technology (CLT) is a research firm dedicated to ICT and Media Technology Law situated in Nepal.

The four entities organized a hackathon on Accessible and Inclusive ICTs for Persons with Disabilities (PWDs) on 28th and 29th April 2018. This report describes the hackathon and the process followed to develop usable apps for the disabled in Nepal.

Context

As more than half of the world's population are now online,¹ policy makers and global leaders are looking at what can be done beyond providing access to internet/laying out infrastructure. Providing employment online, e-commerce, e-government services, cyber security, facilitating independent living of disabled and entertainment (online streaming/gaming) are among the beyond-access themes that are emerging. This event focused on facilitating independent living by the disabled in Nepal by the use of ICTs.

Fifteen percent of world population, more than a billion people, live with some form of disability. This number is predicted to increase due to ageing and a global increase in chronic health conditions

¹ <https://wearesocial.com/blog/2018/01/global-digital-report-2018>

associated to disability.² Women, older people and people from poorest wealth quintile are likely to have a higher incidence of disability. The environment that the PWDs live in plays a major role in facilitating and restricting independent living.

The World Report on Disability³ identifies inadequate policies and standards, negative attitudes, lack of provision of services, problems with service delivery, inadequate funding, lack of accessibility, lack of consultation and involvement by disabled and lack of data and evidence as barriers. This report made nine recommendations to overcome the barriers faced by the disabled. They are to:

- enable access to all mainstream systems and services,
- invest in specific programs and services for people with disabilities,
- adopt a national disability strategy and plan of action,
- involve people with disabilities,
- improve human resource capacity,
- provide adequate funding and improve affordability,
- increase public awareness and understanding,
- improve disability data collection and
- strengthen and support research on disability.

LIRNEasia together with local partners adapted some of the above recommendations to overcome the barriers faced by the disabled in Nepal. Evidence based data collection to inform decisions taken for the disabled is being done in the form of a nationally representative survey on ICT access and use with a special focus on the disabled. Local and international DPO leaders and experts are consulted at every stage of the project, when organizing events as well as conducting the survey.

Hackathon as a process

To involve PWDs on disability inclusive decision-making and to identify how to provide accessible and inclusive ICTs for PWDs we conducted multiple events before the hackathon to develop the capacity of the developers and to educate them on issues faced by the disabled.

The objectives of the hackathon were

1. To understand specific challenges faced by the different disabled groups that are amenable to technology-based solutions, especially those that utilize the potential of smartphones.
2. To identify specific ICT solutions that can be developed to overcome the above challenges faced by the disabled in Nepal.
3. To develop the identified specific ICT solutions (software and hardware) that can be used by disabled to overcome the specific challenges faced by different disabled groups in Nepal.

First, we conducted a workshop on “Accessible and Inclusive ICTs for PWDs” on 16th and 17th March 2018 in Nepal.⁴ This event was the first of three events in Nepal to facilitate the development of software and hardware for disabled. Thirty-nine disability leaders representing 29 DPOs in Nepal

²http://apps.who.int/iris/bitstream/handle/10665/70670/WHO_NMH_VIP_11.01_eng.pdf;jsessionid=FF7D05EEDD88A3FF64D4DB226B99B954?sequence=1

³ http://www.who.int/disabilities/world_report/2011/report.pdf

⁴ <http://lirneasia.net/capacity-building/ford-broadband-policy-course/workshop-accessible-inclusive-icts-persons-disabilities/>

participated at the 2-day workshop.⁵ At the workshop, the disability leaders brainstormed and shared experiences on what type of technologies and assistive devices they need to live their life independently. Access to ICTs as well as analog complements needed for ICTs to succeed in supporting independent living by disabled were highlighted at the presentations by PWDs and follow up brainstorming sessions.

These identified ICTs and analog complements needed to support disabled were then presented to students of 10 leading computer science programs in Nepal at a 2-day pre-hackathon workshop.⁶ These students were selected by their colleges through an open call. The pre-hackathon workshop took place immediately after the workshop for PWDs on 18th and 19th March 2018. The resource persons who participated at the workshop for PWDs participated in the pre-hackathon workshop and shared their local and international experience in the field and the best practices needed to develop successful software and hardware for disabled. Local partners individually visited the Colleges and explained what was expected out of the hackathon process before the pre-hackathon event. As the concept of use of ICTs for independent living by the disabled in Nepal was new for the developer community, the pre-hackathon workshop helped the developers and coders to know the needs of disabled and the process to follow when developing for groups with special needs. Local mentors were assigned to each group so that they could get the guidance on how to develop the software and hardware for the disabled in Nepal.

Table 1: Colleges assigned per mentor

Mentor name	College assigned
Shakti Shestra	Texas College, Prime College
Subhash Dhakal	IOE, Pulchowk, Himalayan College, NCIT
Ashish Gautam	New Summit College, Kantipur City College
Sanjeeb Panday	LBEF, Islington College

After the pre-hackathon workshop, a one-month break was given to the participants to research, interact with PWDs and develop software and hardware. A Whatsapp group was created so that students can ask questions. Relevant research and newspaper articles were shared in the Whatsapp group so that the students know what was expected out of them from this hackathon. Students met with their mentors and developed software and hardware during this month. Students also visited schools for disabled, and selected and studied their friends who were disabled as case studies and developed their products during this month.

⁵ Names of the DPOs: SAMA – Nepal, Karobar Daily, Disability Human Rights Promotion Society, Creative Little People's Association, Nepal Wheelchair Club, NBAD, Nepal disabled woman association, Sunguva, Patan Community Based Rehabilitation (Patan CBR) Organization, NPWDS, Independent living center for persons with disabilities, National Association of the Deaf & Hard of Hearing Nepal, Blind Women Association Nepal, BBA, Women group of disability rights, Bhaktapur Bhaira Association, National Association of the Deaf & Hard of Hearing, National Federation of the Disabled- Nepal, Voice for Equal Rights, Community Based Rehabilitation Bhaktapur, Nepal Disabled Human Rights Center (DHRC-Nepal), Mother's Society of Intellectual Disability, Bhaktapur Association of Blind, Nepal Hemophilia Society, Special School for Disabled and Rehabilitation Center, Blind Youth Association, National mental health self help organization and Save The Life Nepal

⁶ <http://lrneasias.net/capacity-building/ford-broadband-policy-course/pre-hackathon-workshop-accessible-inclusive-icts-persons-disabilities/>

The final hackathon took place on 28th and 29th of April at the Institute of Engineering, Tribhuvan University, Kathmandu.

Figure 1: Adopted process to develop software and hardware for the disabled in Nepal



The catering firm used in the pre-hackathon workshop ([The Bakery Cafe](#)) and hackathon was entirely staffed by hearing/speech disabled. They inspired and motivated students to develop apps for hearing/ speech impaired.

Participants

39 participants who had been selected by the college administrations from 10 colleges participated in the pre-hackathon workshop. Out of which 20 students participated in the hackathon.

Table 2: Participant list

College	Participant name	Pre-hackathon workshop	Hackathon
Texas College	Munal Dhakal	✓	✓
	Saroj Rana	✓	✓
	Niuson Maskey	✓	✓
	Ananta Sapkota	✓	✓
Prime College	Sichu Shrestha	✓	✓
	Rujen Shrestha	✓	✓
	Prithika Suwal	✓	✓
	Bidhya Rimal	✓	✓
IOE, Pulchowk	Bikram Adhikari	✓	✓
	Ankit Shrestha	✓	✓
	Suyog Shrestha	✓	✓
	Shailendra Mishra	✓	✓
Himalayan College of Engineering	Rojan Dhimal	✓	
	Rekha Bhandari	✓	
	Madan Bhandari	✓	
	Niraj Joshi	✓	
Nepal College of Information and Technology (NCIT)	Anu Katila	✓	

	Krishna Mohan Pandey	✓	
	Rajan Maharjan	✓	
	Arbind Joshi	✓	
Kantipur City College	Utsab Timsina	✓	
	Ashish Bista	✓	
	Bijay Pathak	✓	
	Ashok Kunwar	✓	
New Summit College	Aditya Sapkota	✓	✓
	Francis Gautam	✓	✓
	Rajat Acharya	✓	✓
	Aakash Shrestha	✓	✓
Islington College	Basanta Shah	✓	✓
	Bini Shrestha	✓	✓
	Dipeen Singh Shrestha	✓	✓
	Siddhartha Sapkota	✓	✓
LBEF	Sujan Parajuli	✓	
	Anish Shrestha	✓	
	Suraj Khatri	✓	
	Mahesh Prajapati	✓	
Apex College	Prashish Shrestha	✓	
	Utsav Malik	✓	
	Kshitiz Chaudhary	✓	

Figure 2: Gender

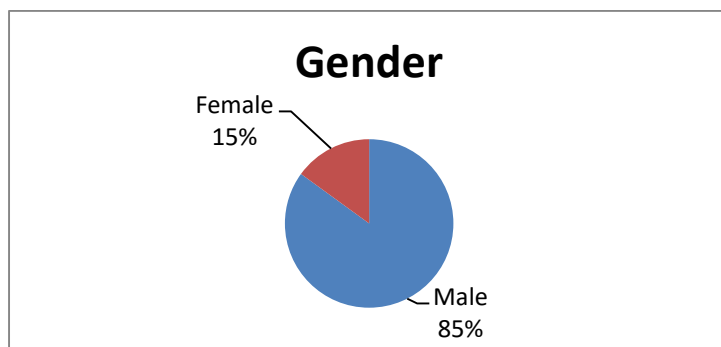
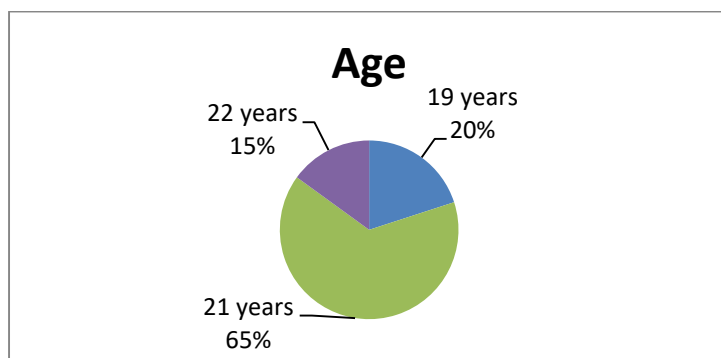


Figure 3: Age



Hackathon agenda

Day 1: April 28, 2018	
7:30 -8:30 AM	Breakfast Registration of Hackathon Participants (10 Group-39 participants from 10 colleges)
8:30 - 9:15 AM	Kick off by Dinesh Kaushal and Rom Kant Pandey Introduction Mentors and Jury Team
9:15AM - 10:00 AM	Ideating the projects, idea pitching on different disabilities applications by participants (each 3 minutes with reference of Pre-Hackathon)
10:00 AM -11:00 AM	Mentor Coaching for Final Pitching of Ideas by Subash Dhakal, Sanjeeb Prasad Pandey, Ashish Gautam and Shakti Shrestha
11:00 AM-11:30 AM	Tea Break
11:00 AM-12:30 PM	Start Hacking
12:30 PM-1:30 PM	Lunch Break
01:30 PM- 3:00 PM	Project Prototyping
03:00 PM- 3:30 PM	Tea Break
03:30 PM- 6.00 PM	Domain Expert Consultation and Hacking
	Continuous Hacking outside of venue.
Day 2: April 29, 2018	
07:30AM -08:30 AM	Breakfast and Refreshment
08:30AM –11:00 AM	Mentor Consultation and finalization of prototype
11:00 AM– 11:30 AM	Tea Break
11:30 AM -12:30 PM	Finalization of prototypes
12:30 PM– 1:30 PM	Lunch Break
1:30 PM– 4:00PM	Project Demonstration (15 minutes for each group)
4:00 PM – 4:30PM	Tea Break
5:00 PM – 6:00PM	Evaluation and Announcement of Winners
6:00 PM- 6:30 PM	Closing Session

Day 1

Dinesh Kaushal and Rom Kant Panday started the hackathon by announcing the expectations of the 2-day hackathon. After the tea break, each team presented what they did during last month to develop mature products and prototypes.

- **Texas College**
- Idea pitched at the pre-hackathon
Safety assistant mobile app
This is an app that assists PWDs. As an example, if a PWD wants help, he can use the mobile app and ask for help and the registered volunteers in the app can help by identifying the location of the PWD asking for help. They also proposed a community to inform the PWDs of events and trainings that takes place.
- Activities during the month
The team from Texas College developed the app with input from the mentor, Shakti Shestra

Figure 4: Texas College students at the hackathon



- **Prime College**

Idea pitched at the pre-hackathon

Mero Sathi: App that speaks to you

This is an app for people with speech and hearing disorder, autism and dyslexia. This app enables people or children with communication disorders to “speak” using pictures in a variety of situations.

Activities during the month

The team from Prime College consulted the local and international experts throughout the month. They met their mentor several times during the month. They also tested their app with the speech and hearing impaired employees of [The Bakery Cafe](#). This team brainstormed their idea many times and consulted the mentors of the other groups and international resource persons as well.

Figure 5: Prime College students pitching the idea



Figure 6: Testing the app with an employee of “The bakery cafe”



- **IOE, Pulchowk**

- Idea pitched at the pre-hackathon

- Home Automation Enhancement with EEG Based Headset (Orpheus)*

- This product uses software and hardware interface to automate day-to-day activities (switching on and off lights, fan, etc.) using brain waves.

- Activities during the month

- IOE, Pulchowk team tested their prototype with a student from their batch. She suffered from Dyspraxia. Even though she performed well in her academics and was active in extra curricular activities, she was mobility impaired. So this team tested their product with their friend. The system was at early stages of development and was able to switch on/ off lights using brain waves.

Figure 7: IOE, Pulchowk students showing their product prototype to the panel of judges



- **New Summit College**

Idea pitched at the pre-hackathon

Bahasa Buddy

This app is for hearing impaired. It will help hearing impaired learn Nepali.

Money recognizer

Second proposal was a money recognizer for visually impaired, an app to scan and identify Nepali currency.

Activities during the month

New Summit College students selected Bahasa Buddy app to further develop. They visited Swabalambi Primary School for Deaf Children located in Murali Banjyang, Dhading District, about a 3-hour drive from Kathmandu. They tested the App with deaf children in the school. Even though it was school holidays, children came to school to help the college students test the App.

Figure 8: Google map showing the distance to Murali Banjyang, Dhading District from Kathmandu

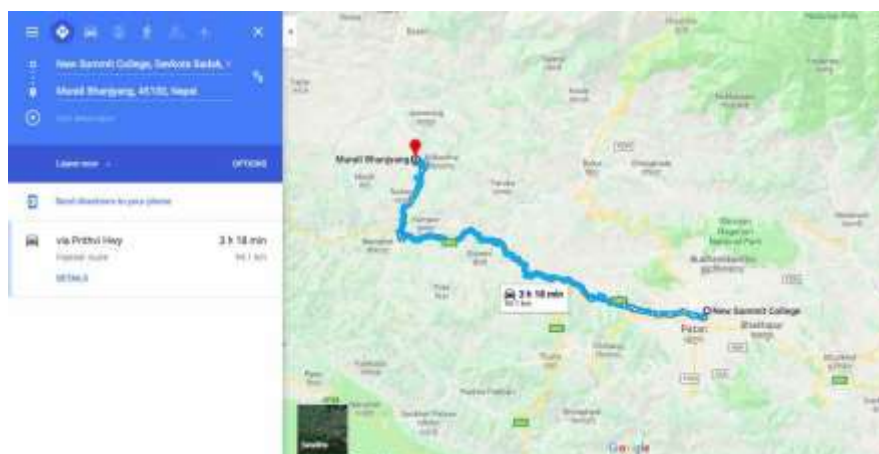


Figure 9: New Summit College students testing their app with the students of Swabalambi Primary School for Deaf Children



The College students found that there are only 33 schools for the hearing and speech impaired and that they are only concentrated in and around Kathmandu. The schools only taught 1,000 hearing and speech-impaired students in Nepal even though there are 79,305⁷ hearing impaired in Nepal. Most hearing impaired in Nepal never gets formal education and never learn sign language in their

⁷ <https://rcrdnepa.files.wordpress.com/2008/05/population-of-persons-with-disabilities-in-nepal.pdf>

life. The goal of the New Summit College students was to have a school per district in Nepal, which are 75 schools.

Figure 10: Goal of New Summit College group

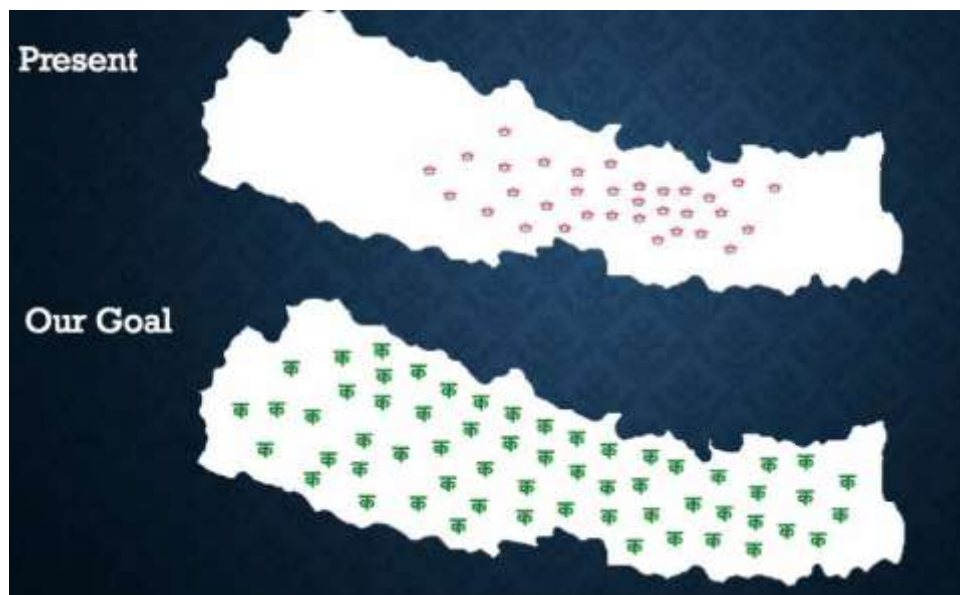


Figure 11: New Summit College Students with their mentor, Ashish Gautam



- **Islington College**

Idea pitched at the pre-hackathon

Eyeball tracking

This is an alternative to mouse, an app developed using a technology called eyeball tracking. This app is for physical impaired that find it difficult to use laptops and computers. They can use their eye positioning and movement instead of a mouse to use laptops and computers.

Communicator app

This is for visual impaired. This consists of hardware and software to help the visual impaired in typing, reading and navigation.

Activities during the month

Dribya Dristi

Islington College visited Gwahali, Jamal (an organization that help visually impaired people to learn braille in Nepal) two days and asked them their needs. Based on that they developed their product within the month. It was a combination of software and hardware.

Figure 12: Prototype testing by Islington College students



Figure 13: Islington college students pitching their idea



Day 2

The 5 groups demonstrated their apps to a panel consisting of 3 judges. The criteria used to select the best 3 teams are attached as annex 1. Final prototypes presented at the hackathon by the teams are below:

- **Texas College “Community app”**

The App developed by Texas College consisted of 2 key features. They are:

1. Community forum

Community forum is a platform that brings disabled people and others together to share ideas and views. This includes the information exchange between users regarding the events related to disabled to be held in Nepal.

2. Situation Alert

This feature is available and is accessible to users of the App. In an emergency alert, one can let his/her pre-registered family members know that he/she is in emergency situation where no one is around. When emergency button is pressed, a text message is automatically sent to the registered on one tap along with the location. The emergency text message is predefined. Registration in the App can be done as a volunteer, organization or a disabled individual.

Figure 14: Texas College students presenting their prototype



- Prime College “Mero Sathi”

Prime College students developed an App for hearing and speech impaired. This App was the most mature and ready-to-use App developed by the competing groups at the hackathon. Once opened, the app has a feature to select an environment where the disabled person is. It can be school, home or a public place.

The App consists of 30 different play cards to choose from. These playcards are localized in Nepali. Also, the user can request for customized play cards if needed. The App can be customized in different languages, and the users can request customized icons according to their need.

Figure 15: Interface to select the environment disabled person is



Figure 16: App has 30 play cards to choose from



Figure 17: Using the app to say “I’m thirsty”



Figure 18: Phases of App development



The next steps of the product are user customization, playcard recommendation features, global platform with multiple language support and finally an independent platform.

- IOE, Pulchowk “EEG Based Home Automation”

IOE Pulchowk developed the App for mainly mobility impaired persons. As traditional wheelchairs cannot satisfy everyone’s needs, inconvenient for senior users, impossible for people with some disabled categories to use, the need of assistance required to operate the wheelchair for some and unaffordability of high-tech wheelchair for the average household were highlighted as the main issues by the students.

The solution presented by IOE students were electroencephalography. This is a physiological method recording electrical activity generated by the brain via electrodes placed on the scalp surface. This measures electrical activity generated by the synchronized activity of thousands of

neurons (in voltage) and provides excellent time resolution, allowing to analyze which brain areas are active at a certain time – even at sub-second timescales.

This can be applied in simple home automation, mouse/ keyboard Control and motor speed control (Wheelchair). The proposed future enhancement of the developed product was to provide a mobile link and further develop it as an independent system.

Figure 19: IOE concept, system block diagram

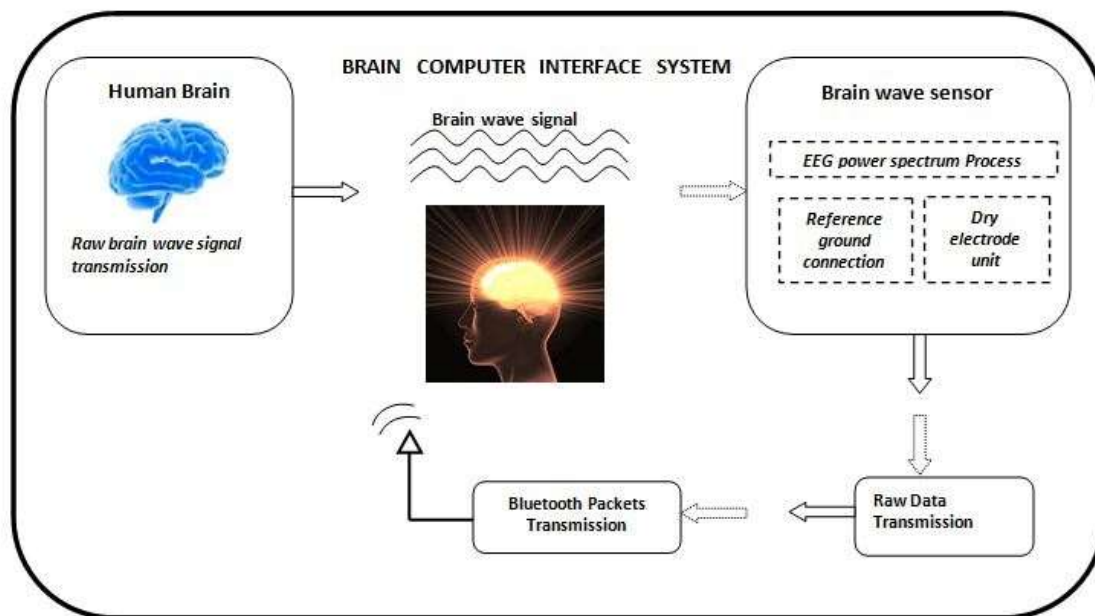


Figure 20: Device turned off

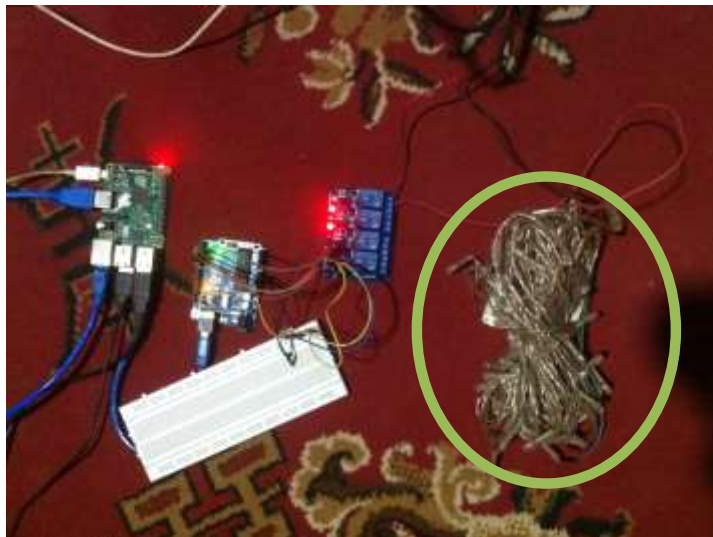


Figure 21: Device turned on



New Summit College

New Summit College students developed an app that can be used by not only disabled but also by the illiterate in Nepal. As the adult literacy rate in Nepal is 57.4%⁸ the app can be used by the illiterate and children in Nepal to learn to read and write.

Figure 22: App to learn Nepali language

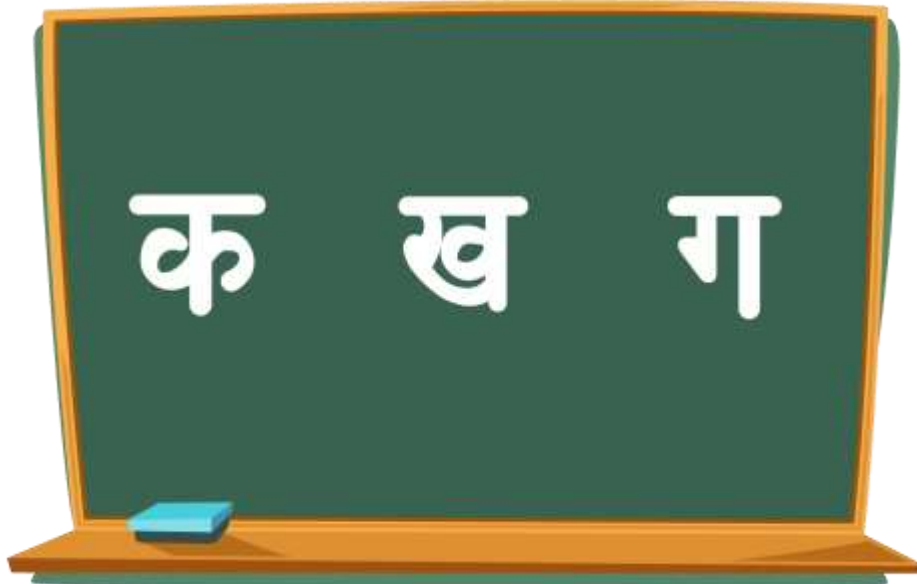


Figure 23: App with the letter and the relevant sign for the letter

⁸ https://www.unicef.org/infobycountry/nepal_nepal_statistics.html

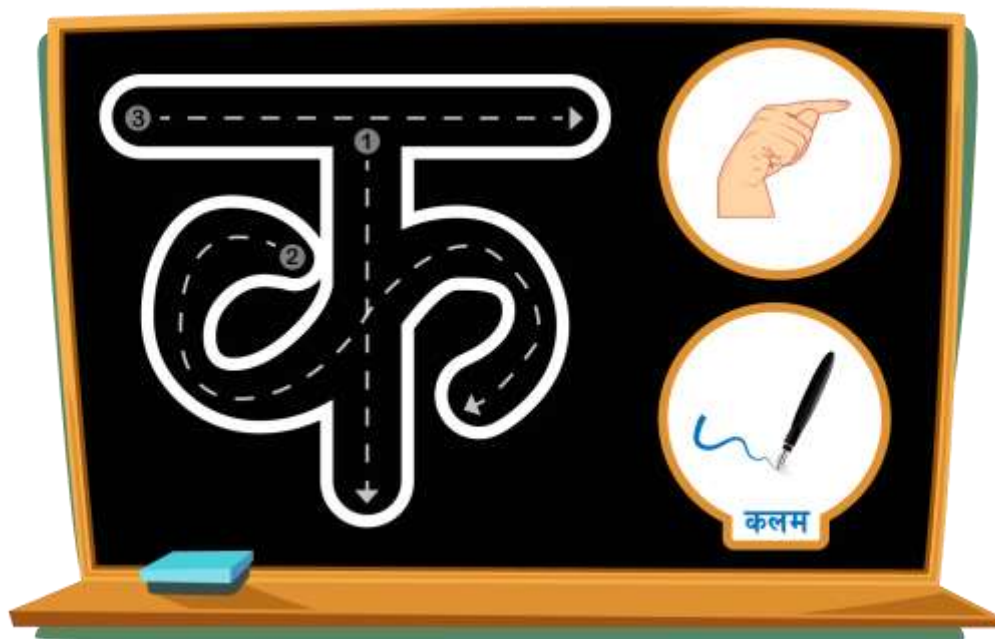


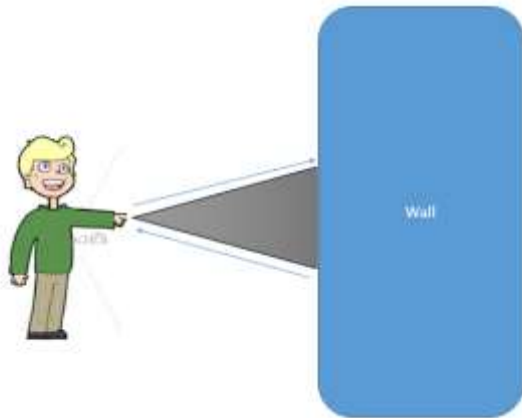
Figure 24: Scaling of the App- Bahasa buddy



Islington College

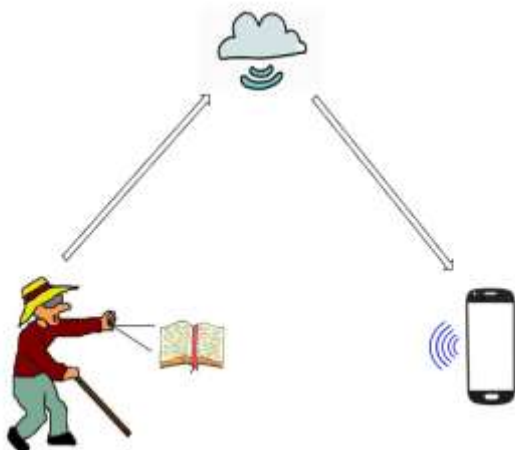
This Project “Dribya Dristi” developed by Islington College considered the three basic problems of a visually impaired person. They are, navigation, typing and reading. The team had developed a glove with sensors. For navigation, the sensor calculates the distance to the obstacle and provides the user with audio feedback. For typing, a combination of multiple IR Sensor on each finger is attached to create a virtual keyboard configured to braille by default. Finally, for reading, a camera that is attached to the palm of the glove captures a picture on real time and converts it into speech.

Figure 25: Navigation using the glove



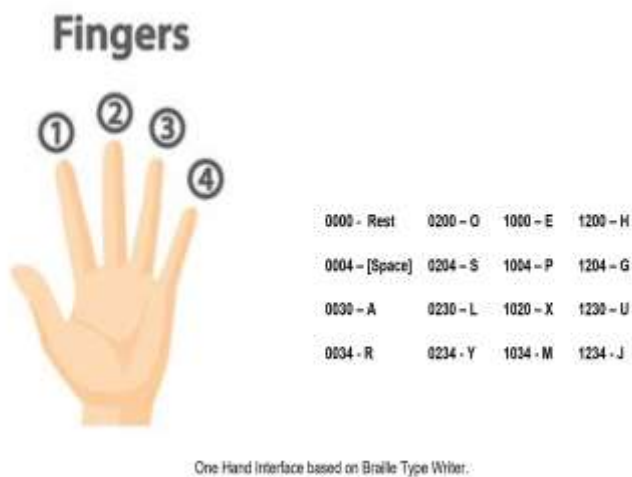
A sensor calculates the distance between obstacle and palm, and reads it aloud. Since the distance is calculated in centimeters, a user could understand and act next move accordingly.

Figure 26: Reading Using the glove



A camera on the palm of our gloves helps visually impaired people to read any text. The disabled person has to point the palm toward the text and camera captures the image and sends it to the phone. Then, the phone converts the image into text and reads it out aloud.

Figure 27: Typing using the glove



Four fingers of the glove are mapped to type different letters according to the finger movement, acting as a virtual keyboard. This can be used in any surface for typing purpose.

Figure 28: The glove developed by Islington College students



Selection of the winning teams

Following the presentations, judges discussed different prototypes developed by the students and ranked them according to the uniqueness/innovation, impact (does it solve a difficult problem), feasibility (is it easy/possible to execute), reach (how many people will this help?), maturity (is the solution ready to be used) and affordability. Based on these criteria the ranks of the Colleges were as below:

1. Prime College (Mero Sathi): This College presented the most mature, simple product. As this App is ready to use now, judges declared the App as the winner.

2. New Summit College (Bahasa Buddy): Even though the product is not fully developed yet, this product was the most impactful product. If properly developed, app can help the hearing and speech impaired to learn Nepali and will help the illiterate to learn Nepali. So, this College was selected as first runner up.
3. IOE, Pulchowk (EEG Based Home Automation): This product was at early stages of development. As it was innovative, unique and promising, this was declared the second runner up. The product needed further research and development.
4. Islington College: This was a sophisticated product, but less user friendly. In order to type letters using the product, the fingers have to be raised up, which was a strain on the fingers. Reading using the glove was not innovative as the same thing could be done with the phone. Adding another camera on the glove was adding an extra step for an already existing process. Measuring the distance using walking stick is currently available, and it's in the form of buzzing. When the walking stick is closer to a surface/ obstacle the sound of the buzz will increase in existing products. Therefore, Islington College was declared the 3rd runner up.
5. Texas College: In terms of uniqueness and innovation, this App was lagging behind. Impact of the App was also low.

For presentations, photos and videos of the prototypes follow the link: <http://lirneasia.net/capacity-building/ford-broadband-policy-course/hackathon-accessible-inclusive-icts-persons-disabilities/>

Next steps

Nepal Telecommunication Authority (NTA) agreed to fund “Mero Sathi” and “Bahasa Buddy” for further development. Mr. Ananda Raj Khanal requested the schools to submit proposals with budget and proposed enhancements for the products. For “Bahasa Buddy” NTA was interested in providing mobile phones for the pilot school, Swabalambi Primary School for Deaf Children.

LIRNEasia is currently following up with Prime College (Mero Sathi) and New Summit College “Bahasa Buddy” on the proposal submission to NTA.

Resource persons for Pre-hackathon workshop, follow up and final hackathon

- **Nirmita Narasimhan is a Senior Fellow and Policy Director at G3ict** working in the areas of policy research and advocacy related to IP reform and technology access for persons with disabilities. She is involved in drafting the Indian National Policy for Electronic Accessibility and also works closely with different departments of the Government of India to bring accessibility into their policies and programs. She has authored several reports on accessibility, which are being used by policymakers worldwide. She has also presented papers on ICT and Accessibility at international fora like the IGF. She has also participated in the World Blind Union Treaty negotiations at WIPO. Nirmita has won several awards for her work, one of which was the National Award for Empowerment of Persons with Disabilities, which she received from the President of India in December 2010. Her educational background includes degrees in Law, German and Music. She has prepared research reports in the capacity of ITU accessibility expert, on making mobile phones and services accessible for persons with disabilities in Nepal and Afghanistan. These reports study the existing legal and policy framework for e- accessibility in these countries and makes specific policy recommendations.
- **Rohan Samarajiva is the founding Chair of LIRNEasia**, an ICT policy and regulation think tank active across emerging Asia and the Pacific. He was CEO from 2004 to 2012. His most recent

co-authored book (2013) is entitled “Information Lives of the Poor,” and was published in English, French, Spanish and Burmese. Samarajiva was Team Leader at the Sri Lanka Ministry for Economic Reform, Science and Technology (2002-04) responsible for infrastructure reforms, including participation in the design of the USD 83 million e Sri Lanka Initiative. He was Director General of Telecommunications in Sri Lanka (1998-99), a founder director of the ICT Agency of Sri Lanka (2003-05), Honorary Professor at the University of Moratuwa in Sri Lanka (2003-04), Visiting Professor of Economics of Infrastructures at the Delft University of Technology in the Netherlands (2000-03) and Associate Professor of Communication and Public Policy at the Ohio State University in the US (1987-2000). Samarajiva was Policy Advisor to the Ministry of Post and Telecom in Bangladesh (2006-09).

- **Htaike Htaike Aung is the Executive Director at Myanmar ICT for Development Organization (MIDO).** MIDO is one of the few ICT-focused non-governmental organizations in Myanmar/Burma. MIDO focuses on ICTs for development, Internet freedom and Internet policy advocacy. Htaike has been involved in Myanmar’s Internet propagation events since the introduction of the Internet to the public in Myanmar. She is also a digital security trainer for human rights defenders in Myanmar, and is currently a DeBoer fellow. Her engagement with MIDO stems from her involvement with the Myanmar Blogger Society which was co-founded by her in April 2007. She is the Project Leader on the “Towards an Inclusive Information Society in Myanmar” work. The project is meant to increase the adoption and use of ICTs in the country. Htaike has a Bachelor of Arts (BA) in English Language and Literature/Letters from Yangon University.
- **Dinesh Kaushal is working with Publicis.Sapient as a Manager Technology where he is leading NVDA development for India.** NVDA is an open source screen reader that lets persons with blindness to read and write independently. Dinesh has also lead more than 100 projects for making various enterprise applications accessible for persons with disabilities. Dinesh along with Nirmita Narasimhan has led the Mobile Accessibility Practices group which formulated best practices for developers of accessible mobile apps. They are now part of Government of India guidelines for mobile accessibility.
- **Birendra Raj Sharma Pokharel is a visually impaired rights activist.** He contributed to the Establishment of the Asia Pacific framework of "make the Rights Real". He participated in the Creating New Futures for All research symposium at the Sidney University, School of Law in December 2012. He has been engaged as Local Expert of Abilis Foundation, Finland since 2011 and facilitates the Abilis Grant making mechanism. He was recognized for pushing the ratification of Convention on the Rights of Persons with Disabilities (CRPD). He was an expert in the drafting committee to amend the disabled protection and welfare act to make it consistent with the CRPD. He conducted the "DRPI Disability Rights Country Holistic Monitoring in Nepal" applying tools and method of York University, Canada comprising the twin-track approach of human rights monitoring. He is to participate in the capacity building training for legal defense and access to justice at the grassroots level in Nepal.
- **Ananda Raj Khanal is a Director at Nepal Telecommunications Authority.** Before joining NTA in April 2006, he was with the Department of Electrical and Electronics Engineering at Kathmandu University in Nepal in the capacity of Assistant Professor and Department In-Charge. He continues to be a visiting faculty at different universities in Nepal and teaches subjects related to Telecommunications and ICTs. He holds a Bachelor of Engineering degree in Electronics and Communication and a Master of Engineering degree in Optical Communication. He is a gold medalist in Bachelors of Law (LLB). Mr Khanal has taken a number of training courses related to policy, regulation and management of

Telecommunications/ICTs conducted by different international institutes of repute including ITU, ACMA, PURC, APT, TEMIC, USTTI and others. He has also participated in a number of seminars, workshops, meetings, and symposia dealing with Telecommunications/ICTs/Broadband. He is very active in the ITU plenipotentiary conferences, WRCs, WTDCs and ITU-D study groups, GSRs, WSIS and APT and SATRC activities.

- **Romkant Panday is the Vice-President, Federation of Computer Association Nepal** and General Secretary, Internet Society Nepal Chapter. He is working on ICT in Education and ITES for the past 18 years. He is also a consultant for the World Bank and ADB and works on municipal governance systems, e-procurement and IFMIS systems in Nepal.

Hackathon Mentors

- **Subhash Dhakal is a Director of Department of Information Technology, Government of Nepal.** He has a Masters in Computer Engineering and 10 years of experience on e-government, government cloud, ICT law and policies.
- **Sanjib Pandey, PhD is an Assistant Professor, Institute of Engineering, Tribhuvan University.** He has a Ph.D in Engineering from the Faculty of Engineering, Osaka Sangyo University.
- **Ashish Gautam is a Project Manager at Fonepay Pvt Ltd. (eSewa), Kathmandu, Nepal.** He is responsible for establishing development goals and objectives including commitment to project timelines and key development milestones.
- **Shakti Shrestha is Chief Technical Officer, Shangri-La Micro System Private Limited.** He is a graduate in Information technology and is involved in the design, development, maintenance of software and database, currently involved in leading multiple teams of programmers & multiple projects and prepares the technical specification & the schedule and manage the project.

Jury

- **Ananda Raj Khanal is a Director at Nepal Telecommunications Authority.** Before joining NTA in April 2006, he was with the Department of Electrical and Electronics Engineering at Kathmandu University in Nepal in the capacity of Assistant Professor and Department In-Charge. He continues to be a visiting faculty at different universities in Nepal and teaches subjects related to Telecommunications and ICTs. He holds a Bachelor of Engineering degree in Electronics and Communication and a Master of Engineering degree in Optical Communication. He is a gold medalist in Bachelors of Law (LLB). Mr Khanal has taken a number of training courses related to policy, regulation and management of Telecommunications/ICTs conducted by different international institutes of repute including ITU, ACMA, PURC, APT, TEMIC, USTTI and others. He has also participated in a number of seminars, workshops, meetings, and symposia dealing with Telecommunications/ICTs/Broadband. He is very active in the ITU plenipotentiary conferences, WRCs, WTDCs and ITU-D study groups, GSRs, WSIS and APT and SATRC activities.
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- **Manohar Bhattarai** is a Manohar Bhattarai is a leading ICT and information economy expert from Nepal. He has served as the Vice-Chair of High Level Commission for Information Technology, Chaired by the Prime Minister of Nepal. Mr. Bhattarai has been involved in a number of policy initiatives in information and communication technology domain having played a lead role in drafting Nepal's first IT Policy and National Broadband Policy & National Broadband Master plan for the Government of Nepal. He also played a key role in formulating e-Government master plan, which is currently being executed by Office of the Prime Minister. He is also involved in Asia-Pacific Information Superhighway initiative being led by United Nations Economic and Social Commission (UN-ESCAP) as an expert member of the working group formed by the Commission.

Colleges represented (Pre-hackathon workshop, follow up and final hackathon)

- **Texas International College, Tribhuvan University is conducting well-designed curriculum** for students to enhance their knowledge to reach the path of Medical Science, Engineering, Environmental Science, Forestry, Agriculture and Pharmacy for science students.
- **Prime College, Tribhuvan University is a Renowned IT, Management and Science College.** This College is currently offering courses for management and science. Prime College offers a challenging environment for its students when compared to the traditional computing degrees.
- **Institute of Engineering, Pulchowk, Tribhuvan University was established in 1972** as a constituent campus of the Institute of Engineering.
- **Himalayan College of Engineering, Tribhuvan University was established in 2000.** The college offers various engineering courses relating to Civil Engineering, Electronics & Communication Engineering, Computer Engineering, and Bachelors in Architecture. The college also has a B.Sc. CSIT (Bachelor of Science in Computer Science And Information Technology) course affiliated with Tribhuvan University, which provides different facilities such as laboratories and spaces to hack on robotics.
- **Kantipur City College, Purbanchal University is renowned for education in IT, Engineering, Management and Mass Communication,** which offers on multi-disciplinary areas aims at improving the potentiality of students besides developing their capacity to tackle real-life problems.
- **New Summit College was established in 1999** at Old Baneshwor, Kathmandu with higher secondary programs in Science, Management and Humanities. Since then, the college has been marching ahead in collaboration with KMC Education Network. Besides +2 level programs, the college also runs Bachelors Level Programs which is affiliated to Tribhuvan University

- **Islington College, London Metropolitan University** is an educational institution that is **established in 1997** as a regular franchisee of Singapore main-board listed Informatics Education Limited. The college directly partners with London Metropolitan University (LondonMet) to deliver their bachelor's degrees in Computing; Computer Networking & IT Security and Multimedia Technologies programs for in-country provision
- **Nepal College of Information and Technology (NCIT)** was founded in 2001 with a commitment to provide high-end state of the art IT related education in the country. Today, the college has evolved into a renowned and highly respected education center with a strong commitment on providing quality education
- **Lord Buddha Education Foundation (LBEF)** was founded in 1998 as a Non-Profit, Non-Government Organization has a well-established tradition of excellence across a broad range of academic disciplines.
- **Apex College** was established in 2000 and affiliated to Pokhara University. This is a modern dynamic institution that blends rigorous academic pursuits with highly relevant, focused and skill-based courses to suit to the demand of various stakeholders in the job market.

Out of the above 10 Colleges, 5 Colleges participated at the final hackathon. The names of these Colleges are Texas International College, Prime College, Institute of Engineering, Pulchowk, Tribhuvan University, Islington College and New Summit College.

Photos of the event

Figure 29: Students developing their products during the hackathon



Figure 30: Winning team, Prime College with Babu ram Aryal (CLT), Bikram Shestra (ISOC Nepal), Ananda Raj Khanel (NTA), Rom Kant Panday (Tribhuvan University) and Manohar Bhattarai (Former Vice-Chair of High Level Commission for Information Technology), Disability expert Dinesh Kaushal is seated



Figure 31: First runners up, New Summit College with the judges



Figure 32: Second runners up, IOE, Pulchowk Campus with the judges



Media Coverage

Broadcast				
	Publicatio	Headline	Date	Link
Pre-hacka	Citizen Fm	Pre-Hackatho	March	https://www.facebook.com/fmcitizen/videos/1068651
	News24	Communicatio Persons with	March	http://www.news24nepal.tv/2018/03/17/278114

Print Coverage						
	Publication	Headline	Edition	National coverage count	Date	Link
Hackathon	Kantipur Daily	"My Friend (Mero Sathi)" is an excellent app	26/29	10 million	April 30, 2018	
	Living with ICT				April/ May 2018	http://shop.livingwithict.com/product/ict-baishak-2075/
Course for PWDs	Kantipur Reporter	Workshop about access to Information Technology	26/27	10 Million	March 19, 2018	https://www.kantipurdaily.com/Business/2018/03/19/152142934699454967.html
	The Kathmandu Post	Disabled persons call for inclusive info technology			March 19, 2018	http://kathmandupost.ekantipur.com/news/2018-03-19/disabled-persons-call-for-inclusive-info-technology.html

Online Coverage				
	Publication	Headline	Date	Link
Hackathon	Living with ICT	Hackathon completed for the disabled, the students of the Prime College won the first prize	April 30, 2018	https://www.livingwithict.com/news-details/512/2018-04-30
	Lokaantar	Mobile apps were created for disabled, prime college won the competition	April 30, 2018	http://lokaantar.com/samachar/41989
	Facebook, LIRNEasia page	Hackathon on Accessible and Inclusive ICTs for Persons with Disabilities #LIRNEasia #InternetSociety #Nepal #CLT	April 29, 2018	https://www.facebook.com/lirneasia/videos/10155708947121748/ https://www.facebook.com/lirneasia/videos/10155708938146748/ https://www.facebook.com/lirneasia/videos/10155708910546748/ https://www.facebook.com/lirneasia/videos/10155708893256748/ https://www.facebook.com/lirneasia/videos/10155708876756748/
	Twitter #NPtech4PWD	@PrithikaSuwal The First achievement for this year our application 'Mero Saathi'. @shady_no_slim @sichushrestha @rujenshrestha #NPtech4PWD	April 30, 2018	https://twitter.com/PrithikaSuwal/status/990801365201899520
		@razzatreigns96 BhasaBuddy app demonstration! The prototype that won us the runners up position at #NPtech4PWD Hackathon yesterday. The app teaches sign language and helps hearing-impaired children to read and write. We envision a brighter future and a literate Nepal #Educationforall #BhasaBuddy	April 30, 2018	https://twitter.com/razzatreigns96/status/990815819415289856
		@razzatreigns96 BhasaBuddy gets the Runner Up Position in the #NPtech4PWD Hackathon!	April 30, 2018	https://twitter.com/razzatreigns96/status/990814506753363968
		@Lalee_Boo #NPtech4PWD #merosathi #myfriend app developed by @priti @shady_no_slim @primeclg on #katipurdaily today @LIRNEasia @samarajiva	April 30, 2018	https://twitter.com/search?q=%23NPtech4PWD&src=typd&lang=en
		@dineshkaushal Really promising solutions are being developed at #NPtech4PWD hackathon in Nepal @LIRNEasia @Lalee_Boo @samarajiva	April 29, 2018	https://twitter.com/dineshkaushal/status/990442380464566272

		@Lalee_Boo @dineshkaushal interacting with hackathon participants #NPtech4PWD @LIRNEasia @isocnepal @merobabu	April 29, 2018	https://twitter.com/Lalee_Boo/status/990476964522840064
		@Lalee_Boo Teams presenting their products to the panel @LIRNEasia @isocnepal @dineshkaushal #NPtech4PWD	April 29, 2018	https://twitter.com/Lalee_Boo/status/990518000913600512
		@Lalee_Boo #NPtech4PWD @LIRNEasia @isocnepal finalizing the prototype @merobabu @dineshkaushal @samarajiva	April 29, 2018	https://twitter.com/Lalee_Boo/status/990446973294710784
		@Lalee_Boo #NPtech4PWD @primeclg has a mature product already. Communication app for hearing and speech impaired. @LIRNEasia @isocnepal @merobabu @clt	April 29, 2018	https://twitter.com/Lalee_Boo/status/990448634998280193
		@shady_no_slim happening right now! #NPtech4PWD @PrithikaSuwal @sichushrestha	April 29, 2018	https://twitter.com/shady_no_slim/status/990448371285483520
		@adibit101 #NPtech4PWD #BhasaBuddy Thanks to @LIRNEasia & all the organizers for providing this platform to work on this domain.	May 4, 2018	https://twitter.com/adibit101/status/992350953947856896
		@Lalee_Boo #NPtech4PWD hackathon is taking place today and tomorrow in Nepal @LIRNEasia @dineshkaushal students are finalizing their products	April 28, 2018	https://twitter.com/Lalee_Boo/status/990091273842364416
Pre-hackathon event	CitizenFM	Pre-Hackathon Event	March 19, 2018	https://www.facebook.com/fmcitizen/videos/1068651886608719/
	LIVING with ICT	Complex access to the disabled person and inclusive ICT 'Pre-Hacking program	March 19, 2018	https://livingwithict.com/news-details/335/LivingICT
	LIRNEasia Blog	Further reflections from the ICTs and disabilities events in Kathmandu	March 20, 2018	http://lirneasia.net/2018/03/reflections-icts-disabilities-events-kathmandu/
	LIRNEasia Blog	Reflections from the disability workshop in Kathmandu	March 18, 2018	http://lirneasia.net/2018/03/reflections-disability-workshop-kathmandu/
	Twitter #NPtech4PWD	@LIRNEasia	March 20, 2018	https://twitter.com/LIRNEasia/status/976054458391126017

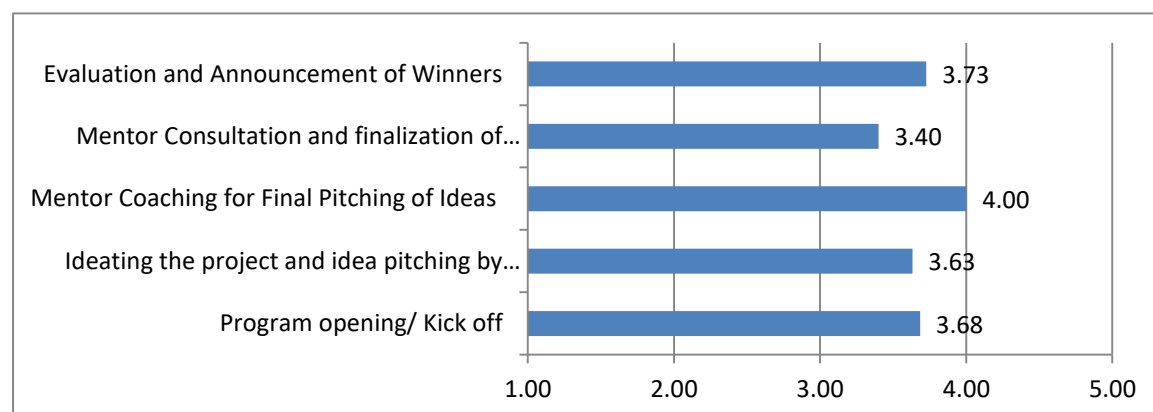
		#NPtech4PWD report in the @kathmandupost today. #LAdisability - @FordFoundation funded regional work with @isocnepal @nirmita_n @dineshkaushal and @barnyar on using #ICT to enhance the lives of #PWD in #Nepal. #Asia #disability @Lalee_Boo @samarajiva		
		@Lalee_Boo @dineshkaushal sharing experience with students at the #NPtech4PWD @LIRNEasia @isocnepal @CLTNEPAL	March 18, 2018	https://twitter.com/Lalee_Boo/status/975235997402267649
		@Lalee_Boo #NPtech4PWD Mr. ANAND RAJ OF NTA talking at the pre hackathon event @LIRNEasia @isocnepal @CLTNEPAL	March 18, 2018	https://twitter.com/Lalee_Boo/status/975232110494732288
		@Lalee_Boo #NPtech4PWD we are starting the pre hackathon event to develop accessible and inclusive ICTs now @samarajiva @dineshkaushal @isocnepal @babu	March 18, 2018	https://twitter.com/Lalee_Boo/status/975231450193723397
Course for PWDs	LIVING with ICT	Accessible and Inclusive Information and Communication Technology	March 19, 2018	https://www.livingwithict.com/news-details/334/2018-03-17
	Clickmandu	Develop the technology in the participation of persons with disabilities	March 19, 2018	https://www.clickmandu.com/2018/03/45342.html
	Mobileskhabar	Concerning the need to create disabled friendship Information Technology	March 18, 2018	https://mobileskhabar.com/2018/03/18/15057/
	Enepalese.com	Communication Technology Workshop for Persons with Disability	March 17, 2018	http://enepalese.com/2018/03/17/1769.html
	Durbinnepal.com	Communication Technology Workshop for Persons with Disability	March 17, 2018	http://www.durbinnepal.com/archives/9687
	Khabarkhurak.com	Communication Technology Workshop for Persons with Disability	March 17, 2018	http://www.khabarkhurak.com/2018/03/2379.html
	Nepalhalkhabar.com	Communication Technology Workshop for Persons with Disability	March 17, 2018	http://www.nepalhalkhabar.com/2018/03/17/28012
	Mahila Swasthya	Communication Technology Workshop for Persons with Disability	March 17, 2018	http://www.mahilaswasthya.com/news/1543
	News Abhiyan	Accessible and Inclusive Information and Communication Technology	March 17, 2018	http://www.newsabhiyan.com/news-details.php?nid=122350

	Twitter #NPtech4PWD	@LIRNEasia #LAdisability work funded by @FordFoundation. Follow us to stay updated on how we're exploring the potential of #ICT to enhance life for #PWD in #Asia. Following up on #Myanmar with #Nepal through #NPtech4PWD. #disability #text2speech	March 16, 2018	https://twitter.com/LIRNEasia/status/974555722611490817
		@LIRNEasia #NPtech4PWD #hackathon next! #LAdisability work with support from @FordFoundation Follow to stay updated on how #ICT can help enhance the lives of #PWD in #Nepal and the rest of #Asia . #disability #NPtech2PWD	March 16, 2018	https://twitter.com/LIRNEasia/status/974538326186143745

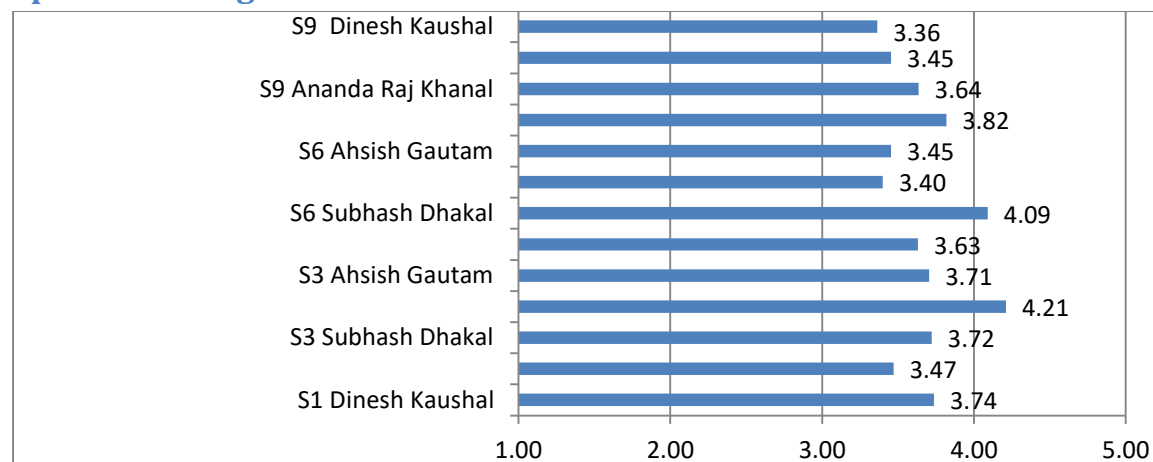
Evaluations

The course evaluations can be seen from the figures below. The rating was based on a five point scale ranging from 1-abysmal to 5-excellent. All the topics, speakers and logistical arrangements were rated as being satisfactory.

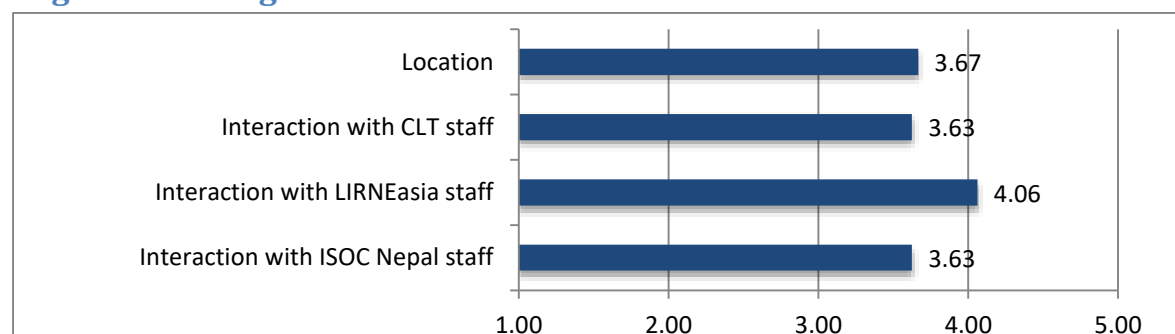
Session Ratings



Speaker Ratings



Logistical Ratings



Annex 1

Team	Problem statement	Uniqueness/ Innovation	Impact (Does it solve a difficult problem)	Feasibility (Is it easy/ possible to execute)	Reach (How many people will this help?)	Maturity (is the solution ready to be used)	Affordability	Additional comments
Islington College	Lack of one stop solution for reading, typing and navigation for blind people							
IOE, Pulchowk Campus	Accessibility issues faced by people with poor motor functionality							
Prime College	Expand the concept of accessibility to include communications and make that a part of ICT community							
Texas International College	Lack of awareness about new technologies and events primarily for disabled people, lack of awareness about opportunities, participation for disabled people, lack of assistance during an uninvited emergency situation primarily for disabled people							
New Summit College	Lack of adequate schools and teachers for the hearing impaired children in Nepal to learn to read and write.							