

Bridging the Gap in HCI Between Industry and Academia: A Perspective in Bangladesh

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Abstract— HCI currently a sonorous regulation which is wholly committed to the design of interactive systems that allow information flow between human and computer. Implementation and judgment are the other two major concern of HCI. Now a day's interest in improving communication between human and computer is an undisputed concern. Nevertheless, natural or flow less communication between the computer and human using artificial intelligence is also a concern, analogous to human-computer interaction. Notwithstanding there are still some gaps exists between theory and practice. But the castle in the air is there is some country who tries to improve the visibility of the HCI community. As opposed to the community of the software industry, still doesn't have much knowledge about HCI. Because there is no linking between the industry of software, and what they taught in undergraduate and postgraduate level. In this research, discover these phenomena is somewhat true for Bangladesh where we want to analyze what student taught and what software companies requirement when it comes to human-computer interaction. In this paper present some key activities of which are proposed to some directions in HCI for the bridging between industry and academia in Bangladesh.

Keywords—HCI, Education, Academic, HCI Industry.

I. INTRODUCTION

HCI thinking about the design and use of computer technology, focused on the interfaces between user and computer. It is included with many other scientific areas like image processing, computer graphics, artificial intelligence, psychology, motion tracking, and face detection [1]. It will be very effective if the can interact with the user naturally just like human-human interact with each other[2]. Though human interact with each other by speech and body language so HCI can be effective to communicate with computers by using information exchanges via sound and touch. The other importance of development HCI is to let us know how to create an interaction between machine and human [2]. Teaching HCI course for undergraduate of computer scientists are always a difficult because, the criteria which makes HCI different from scientific and computational thinking that focus

mostly the subjective area. Though learning HCI is a set of lectures which is very helpful to learn the basic concepts but it is unable to increase the design skill of a student [4]. So, this paper outcome will be helpful both teachers and learners to process and spread the knowledge of HCI and build up their construction and design on HCI.

HCI is a part for our education system those who are studying in computer science. It is necessary to conjugate HCI course for undergraduate computer science curriculum. In 2013 two major computer scientists has been jointly approved and developed HCI which means HCI has been integrated in computer science curriculum guidelines as certified [3]. Both theoretical and designing knowledge is important this educational curriculum. For this interactive features HCI is becoming very popular some other countries.

II. LITERATURE REVIEW

Though there are still some gaps exists between theory and practice, instead of early solving of HCI design process may replace by new long term solution. Creativity and design technology can contribute to increase innovative and creative work if it is included as a part of HCI curriculum [5]. Human computer interaction is appearing with huge potential. In the early days of education each and every student used to draw scenario which is still a part of early education part in primary and secondary level. After completion those level design schools are the only way to learn and practice design. by doing that one has achieved a very good idea about color and interface.

HCI researchers need to relate those things together. HCI in education institution in India highlights samples of similar research work done in [6]. HCI is not mobilized completely with software engineering models and considered as an additional part of software engineering. So there need a combined approach to teach HCI in undergraduate level. So the explore software engineering

and HCI education through an examination based on current curriculum describe in [7].

Interface design is embryonic requirement for job sector but HCI knowledge is always ignored. So they form an incorporation of HCI studies to the syllabus of bachelor courses explained in [8]. There are also some other country who search the problems faced for less practice of HCI such as South Africa. When South Africa faces the unapproachable revolution in ICT field, then they realize that without HCI education it was quite impossible to achieve their target in the field of ICT. So they find out the status, research and practice of HCI in [9].

Adding to that another country named Romania has also improved a lot in the field of HCI Romania forms a group called CHI based on HCI. It takes part of their direction of HCI in education and the present HCI development to narrate in [10]. By the way, creating Graphical User Interface (GUI) is a complex and hard challenge for those who have not well known about HCI courses. Sometimes HCI courses are optional in so many Universities. So here teaching methodologies of Human-Computer Interaction (HCI) is glorified in [11]. HCI is always a burning issue so for gathering knowledge and there always needs to be a good curriculum, course implementation and improvements. It is also necessary that based on some feedback from students for ensuring better teaching experience of HCI narrate [12]. Topics of HCI is changing over time. So, HCI content and knowledge should be redefined in terms of teaching and the content should be adopted based on these changes.

Trend and topics taught HCI is described largely [13] that define HCI is different from other scientific courses. HCI teaching is organized with useful lectures and concepts. Sometimes different methodologies and workshops define what to do for better results. Taking feedback from users is an important part to know the requirements and a very good chance to find out the best possible solution and if there need some further improvements.

The result of educational experience where both learners and teachers actively involved narrate [14] communication between learners and lecturer's and their behavior is so very important to implement a new technique. The technique may provide a very good result of HCI. Such a technique the persona technique is designated [15].

For Bangladesh perspective connection between software industry, education, and other ICT based work done by ICT ministry of Bangladesh, which was found in 2002, in the name changed from Science and information technology to ministry of science and information technology. Then again it changed or upgrade to ministry of ICT to give more thrust for this sector. The vision and mission of this ministry is to provide reliable and secure information and provide the modern technology towards sustainable development. They are provide also a support attainment of overall socio economic development of Bangladesh by ensuring universal access to ICT for all through research, development and digital management of ICT described in [18]. The ministry of ICT introduced Top-up IT training for 10,000 graduates, which is run by UK-based organization named Ernst and Young. A workshop

was organized with the help of UGC (University Grants commission) in UGC where more than 150 teachers were present. The main focusing point was to teach and training ICT briefly described in [16]. Also Bangladesh government and ministry of ICT introduced Bangladesh Hi-Tech park to ensure momentous contribution to build a world class environment and industry to enter into the international market to earn remittance by exporting technology related products shortly described in [16] Government provide short courses to 16100 students in iOS, android, Game animator, UX-Design [18].

In form of sustainable development today we can't think it without the help of powerful technologies and internet based devices. In [16] Bangladesh government aim to build Hi-tech Park in every divisional level and focuses on private technology park also most importantly Development of Human Resources by providing midlevel training, skill enhancement training etc. The Government of Bangladesh ensure digital safety, by catching criminals through their internet activity by settling Digital ICT act 2017-2018 [16] also Digital ecommerce act 2018. Before that in 2016 a cyber-safety act was confirmed by the government of Bangladesh [17].

Now a days Bangladesh has been developing a lot in modern ICT industry and growing very well. This sector has to increase the rate of innovation and the speed of new technology. For increasing the ICT need to utilize human ability. Human Computer Interaction (HCI) can be a great solution for this purpose [1]. HCI could be a great contribute to society to make a successful impact of ICT by reachable and operational where living more people. Education is the most important part to build ICT sector and also develop [2]. It is also need to find the gap in HCI between education and software industry to develop our country. So that we can understand the necessity of HCI and how to implement it in every sector to develop our country so well. To find out the gap between academia and software industry, it is need to survey on professors and developers to formulate the problems those are related to HCI education. It is also need to know the government policy and limitations, requirements of the software company and which courses methodologies are applying to implement HCI in education sector.

Here are some burning questions those are focuses in this research are given below:

- What is the current situation of HCI in education, software industry and research activities in Bangladesh?
- What are the limitations to work with collaboration with education and software industry to do for research collaboration?

In this research tried to find how many universities are prefer this course in their curriculum and some related courses of HCI. There are another concept is on software industry, how much they know about HCI. Using ability of HCI of software industries and also the implementation of HCI in software industry for reducing the cost and efficiency of software. To finding the significant response connected to the importance of HCI in the development of software process, we used survey method at several public

and private universities and software industries in Bangladesh. Our main focusing part is to know the HCI course methodologies, what are the requirements of the software industry and finally know the issue which is related the government regulations.

However, the government of Bangladesh slowly establish a way to secure safe cyber space and create more employment in this sector and obviously is currently an open challenge.

III. MATERIALS AND METHOD

In Bangladesh, it is really difficult to identify HCI expert. Because most of the HCI researchers have never received any academic course or trained in this field. However, it is really expected that HCI community is growing in Bangladesh. Based on the feedback of our survey, we present the current status not only for academic scenarios but also software development companies.

A. Research Subject and Information:

Day by day Bangladesh is developing with technology in both hardware and software part. HCI can be effective for this developing perspective. This research is mainly focused on our educational curriculum. It is really important to conjugate HCI course with our education sector. It will be very helpful to spread basic knowledge of HCI in every sector. In this paper it also requires to increase HCI research in industry and education sector so that Bangladeshi people can be addressed with this emerging topic. The result will reflect in ICT sector of Bangladesh. In this paper all the information covered from Bangladeshi private and public universities and some well renowned software industry.

No.	University	Department	HCI Course
1.	University of Dhaka	Computer Science and Engineering	Yes (Optional)
2.	North South University	Computer Science and Engineering	No
3.	BRAC University	Computer Science and Engineering	Yes (Optional)
4.	Independent University of Bangladesh	Computer Science and Engineering	No
5.	American International University of Bangladesh	Computer Science and Engineering	No
6.	Daffodil International University	Computer Science and Engineering	Yes (Optional)
7.	Bangladesh University Engineering of Engineering and Technology	Computer Science and Engineering	No
8.	Ahsanullah University of Science and Technology	Computer Science and Engineering	No
9.	United International University	Computer Science and Engineering	Yes (Optional)
10.	East West University	Computer Science and Engineering	Yes (Optional)

Table 1. Top 10 Universities in Bangladesh versus the HCI course offered

To conclude it is clear that HCI has a wide angle of software developing area which is very effective to develop our ICT sector. We all Bangladeshi people will be benefited. So it is important to implement HCI topic in education sector. Table-1. shows that most of our universities are covered the HCI related topic but that is very few. Most of them offered HCI as optional. To improve this education curriculum should to be careful. They should bring HCI in education curriculum as a main topic. Software industry should also focus on HCI like other countries are working on it. They should research on HCI and know the proper way to implementation of HCI in their software developing process. By using it software industry will be benefited and their cost will reduce. We should follow on our research site and need to establish more conference on HCI that how other countries are working on it. Because of this emerging topic we need to more study on it.

B. Courses practicing in Bangladeshi Universities:

Most of HCI courses in Bangladeshi universities are offered as optional for the undergraduate program. The topics most of the universities covered Artificial Intelligence, Image Processing, Computer Vision, Computer Graphics as depicted shows in figure 1. In table 1 show top list universities those are offered HCI courses for undergraduate program. It is also noted that HCI course is also optional as a research category. It is clear that academic lacking when it comes to the HCI curriculum.

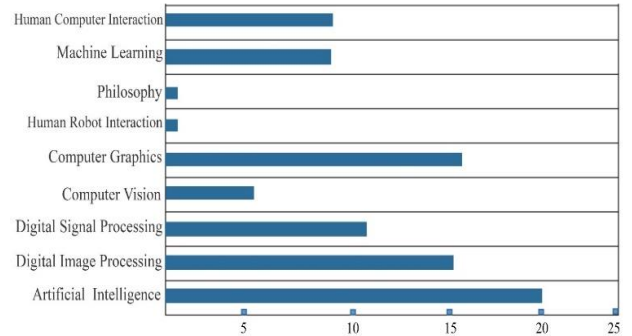


Figure 1. HCI and related courses taught in universities in Bangladesh

There are a lot of standards curriculum, training and references are available in ACM for computer science [19]. Though HCI is included in both graduate and undergraduate programs but it is not also popular for general Level of study program because there are no direct offered HCI course for undergraduate students in Bangladesh.

C. Software Industry Requirements:

In recent years, Bangladesh has been developing in ICT sector and software industry has been growing rapidly. In recent years governments has been raising their thinking and establishment of the software industry from side to side the ministry of information communication and technology. Government focusing IT sector to develop and spread the basic knowledge about it. So that they can make a digital country. Government also working to promote the use of it in the society. There are a lot of programs based

on it and also hardware which is hosted by Bangladeshi Government.

To find out HCI capabilities in software industry we surveyed on top 10 software industry in Bangladesh. There are very few companies are practicing on HCI areas. Some others are interested in HCI related areas but they are not working on it due to lack of usability and lack of proper knowledge they are unable to use HCI areas. HCI can be blessing for software firms but due to lack of the connection between HCI researchers and software developers they are losing their benefit. It is very necessary to build a connection between HCI researchers and software developers. Combination of these, it will be very helpful for a software industry and also the country.

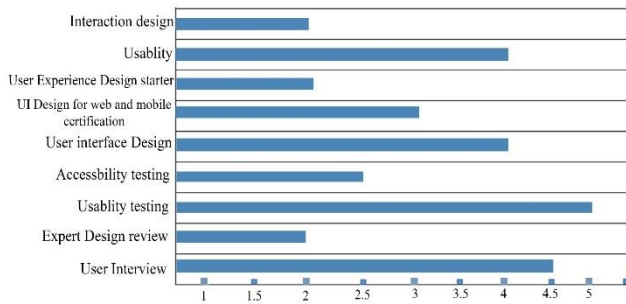


Figure 2. Research areas related HCI in software industry in Bangladesh.

Unfortunately there are not much research areas based on HCI. There can be another good impact to use HCI which is the most promising research on usability non classic software e.g. mobile platforms or interactive digital television. Interaction scenario is another important area in social networks a growing segment of society [5].

IV. HCI STATUS IN BANGLADESH

It is very really very hard to find HCI expert in our country. Because, HCI is not so common in our academic curricula. Mostly some of the students rarely received any HCI course in their educational formation and some of others are got some training or course from many training institute. But the field of HCI is increasing. Our survey mainly focused on how to bring HCI in academic curricula, in research and in industry like other countries such as Argentina, Brazil, Guatemala, Costa Rica, Spain, Mexico, Colombia, Panama, Chile, Paraguay, Uruguay and Peru are already started to bring HCI in every sector [20].

A. Main problem in HCI Academia

There are a lot of problem in HCI academia. With regards to the academia aspects survey respondents mentioned "Lack of knowledge of the area" is the main important problem. Lack of the proper knowledge people do not know how to start and what is the basic part of HCI. So some of think HCI should focus more on programming knowledge rather than aesthetic aspects. Lack of well-trained teacher is one of the biggest problem in this scenario and lack of standardized curriculum in HCI is ambiguous. HCI include a lot of topics but all of them are not possible to described or research in details. There is no good relationship between academia and industry which is the major problem of HCI practice.

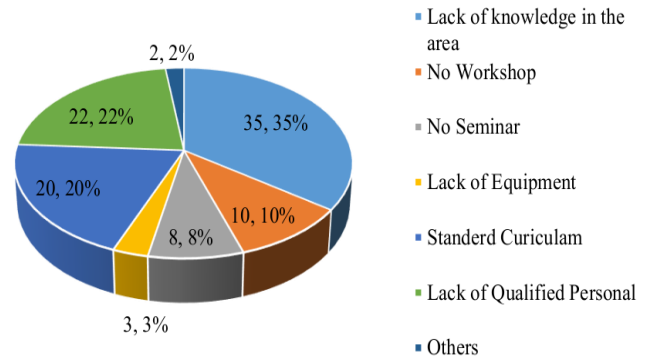


Figure 3. Problems in HCI.

B. Research status in HCI

There are no good research is happening in HCI. Some of the academic research are happening but the number of the research is very few. Most of them are working on HCI relevant courses. Most of the research and conferences are covered HCI related course but not that is also very few. But the main topics of HCI is still not clear which is really problem for us. Some of the countries are growing in this field rapidly. But to increase the usability of HCI, first we need to know about HCI. We need more research on HCI to spread the knowledge and how to utilize HCI in ICT sector to develop our country as well.

To collaborate HCI researchers, practitioners and educators around the world or our country because many of our country people has excellent HCI skill those who lives in different country. They are kind of blessing for us and hey can teach us in different disciplinary. It will be great for us to know the implementation and usability of HCI. It can be useful for our next generation of Bangladeshi researchers, designers and also will be helpful for industry for their development process.

C. Academic and Industry Gap

Companies are always looking for skilled people. In HCI aspects UX and user centered design (UCD) is the most important part in a software industry. So companies are always looking for the people those who has the integrating ability of UX and UCD in software development process. There are few example of success which is happened for creating a relationship between academia and industry. It will be helpful for a software industry if they can integrate some responsible and hardworking people those who has the HCI knowledge.

HCI concepts is very important to development process of a software industry. It is necessary that software developers in industry have a basic knowledge, including HCI literature, cognitive process, experimental design, rapid prototyping, quantitative methods, task analysis, usability testing, user interfaces, observation all techniques and HCI standard and guidelines.[20]

V. DISCUSSION AND RESULTS

Bangladesh has an emerging community in technology field where quite a few public universities and private universities, none of which offers any HCI or design related academic program. There are probably 100 small and medium sized software companies exist but emphasis

is placed on the functionality/UI/Visuals of things at the expense of the human factor/usability. For that reason, it is essential to start a very hard effort in this field such as HCI education practice and research.

In next few years, Bangladesh software industries have a significant part to work in HCI field and this impression could be changes dramatically. HCI discipline are promising, in some countries it is still considered a software engineering topic. It is important to define some strategies that might carry on the importance of HCI to academia and industry. Some aspects to consider are as follows:

- a) *HCI consensus*: HCI consensus is very important for developing HCI. We want to establish HCI community like other countries. Other countries have CHI group. Such as India CHI, China CHI group. We want establish Bangla CHI group that's collaborate to other HCI community and these are related to the promoting of HCI, including of HCI education in Bangladesh.
- b) *HCI curriculum*: It is important to define a common, basic understanding about HCI. We want establish basic HCI curriculum in Bangladesh.
- c) *Collaboration network*: The creation of network will promote HCI. This collaboration networks of people who involved in HCI would promote the discipline. This will be the center place for research in Bangladesh, and this network collaborating foreign universities and software companies.
- d) *Academia and industry relationship*: Companies are looking for skilled people. In HCI aspect UX and UCD is the most development part in a software industry. So companies always looking for people who has the ability of UX and UCD in software development process. There are example of success which is happened for creating relationship between academia and industry. It will helpful for a software industry. To get a better concept of HCI by student industry people it can be possible to get a better software.
- e) *Associative work*: It is true that, those who are professionals they must able to do work in anywhere, anyplace and also any platform. Now a day it is very necessary to have this kind of ability for every professionals and they can do it.
- f) *HCI community*: It is really important to spread HCI knowledge all over the country it requires a community. In the community people will spread knowledge by establish seminar and many different activities. It will be very helpful for establishing HCI in our country perspective. They will able to promote this course and details about it in every sector.

Though it is not easy to establish HCI in our country our neighbor countries are trying to do so we should focus on it to develop our country in both the education and ICT sector. It is really true that HCI is a growing hot research field for our country. So it is needs to bring HCI course in our education curriculum. The journey will be not so easy

but it is possible and once we can do it then our country will definitely benefit. After the analysis of the research, it is mentioned that standardize the course curriculum of HCI is most important. These are also suggested to create an open learning concept and create collaboration network for sharing the materials. Next few years HCI will play the most significant role in the Bangladeshis software industries. The impact of HCI on the industry itself could changes dramatically.

VI. CONCLUSION AND LIMITATIONS

The result of our research shows that HCI is unindustrialized and experience level is not vast in this region especially in Bangladesh as in other countries. So that we want to develop HCI to our country. We need to establish an HCI community in Bangladesh. We hope that our incentives would directly impact on technology usage for marginal community, community with lower educational skills and community with special requirements. We hope to explore and expand our research horizon by reaching out to a larger community. Moreover, we hope that if we consider the strategies (such as enhance HCI research, practice and work area) that could be contribute to overall economic growth in Bangladesh for the IT sector. Finally, some challenges with this study is that sample size of our survey information which was more challenges. This survey also narrowed the research area.

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