

**HUMAN COMPUTER INTERACTION IN EDUCATION AND INDUSTRY:
A PERSPECTIVE IN BANGLADESH**

BY

Nafim Khan
ID: 152-15-5816

Md. Moheuddin
ID: 152-15-6014

Nasir Uddin Khan Shaon
ID: 152-15-5726

This Report Presented in Partial Fulfillment of the Requirements for
The Degree of Bachelor of Science in Computer Science and Engineering

Supervised By

Abdus Sattar

Assistant Professor

Department of CSE

Daffodil International University

Co-Supervised By

Muhammad Muhaiminul Islam

Lecturer

Department of CSE

Daffodil International University



DAFFODIL INTERNATIONAL UNIVERSITY
DHAKA, BANGLADESH
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APPROVAL

This Project titled “**Human Computer Interaction in Education and Industry: A Perspective in Bangladesh**”, submitted by **Nafim Khan**, ID No: **152-15-5816**, **Md. Moheuddin**, ID No: **152-15-6014**, **Nasir Uddin Khan Shaon**, ID No: **152-15-5726** to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 5/02/2019.

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Professor and Head

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Chairman



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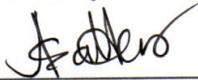
Department of Computer Science and Engineering
United International University

External Examiner

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We hereby declare that, this thesis has been done by us under the supervision of **Abdus Sattar, Assistant Professor, Department of CSE** Daffodil International University. We also declare that neither this thesis nor any part of this thesis has been submitted elsewhere for award of any degree or diploma.

Supervised by:



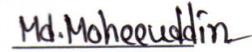
Abdus Sattar
Assistant Professor
Department of CSE
Daffodil International University

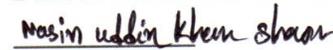
Co-Supervised by:

Muhammad Muhaiminul Islam
Lecturer
Department of CSE
Daffodil International University

Submitted by:


Nafim Khan
ID: 152-15-5816
Department of CSE
Daffodil International University


Md. Moheuddin
ID: 152-15-6014
Department of CSE
Daffodil International University


Nasir Uddin Khan Shaon
ID: 152-15-5726
Department of CSE
Daffodil International University

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ABSTRACT

HCI currently a sonorous regulation which is wholly committed to the design of interactive systems that allow an information flow between human and computer. Implementation and judgment are the other two major concern of Human computer interaction. Now a day's interest of improving communication between Human and computer is an undisputed concern. Nevertheless, Natural or flow less communication between 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 are some country who tries to improve the visibility of HCI community. As opposed to the community of the software industry, still doesn't have much knowledge about HCI. Because of there are no bridge between Industry of Software, and what they taught in undergraduate and postgraduate level. We 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. Our survey was directed to many of the famous public and private universities of Bangladesh. The software companies of Bangladesh still have not much knowledge and activities about Human computer interaction. Because of lacking of HCI they are unable to maintain world class software. HCI will effective for software companies. . In our every ICT sector HCI will be very helpful for developing process.

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CHAPTER 1

INTRODUCTION

1.1 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, 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 reports 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.

Human Computer Interaction 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.

Researchers in the field of HCI both observe the ways in which humans interact with computers and design technologies that let humans interact with computers in fancy ways. It is the study between Human and Computer.

1.2 Motivation

This is a very revolutionary time for Bangladesh. Now a days Bangladesh has been developing a lot in modern information and communication technology (ICT) industry also the ICT sector has been growing very well. This sector has to increase the rate of innovation and the speed of new technology. For increasing the ICT, we 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 information and technology by accessible and usable the wider population. Education is the most important part to build ICT sector and also develop [2]. It is also need to build a bridge between HCI and our education system to develop our country. There is no practice of HCI in education, no research, workshops, seminar, there are no such syllabus for the students of our country. Even no community to discuss about HCI. So, this thesis focuses on the current status and directions of human-computer interaction (HCI) in education sector in Bangladesh to make a revolutionary change in both modern information communication technology sector and our education sector as well.

1.3 Problem Definition

HCI is important to us for developing and increasing ICT sector. It is important to implement a relationship HCI and our education system in Bangladesh 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 and 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 regulations, software industry requirements and courses methodologies to implement HCI in education sector.

1.4 Research Questions

Here are some burning questions those are focuses in this thesis 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?

1.5 Research Methodology

In this chapter we reveal research design, how many universities are prefer this course in their curriculum, some related courses of HCI, Data collection of some universities and the method of data analysis. There is 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.

1.6 Research Objectives

These are also outline the benefits of applying HCI techniques. There are some academic objectives and the others are effective for software industry.

Some of the educational objectives are given below:

- Mainly focused on necessity of HCI in both industry and academy curriculum for our country.
- To integrate HCI in education sector,
- To spread the knowledge about HCI.
- To build a communication industry and academy by HCI.
- To increase HCI research in our country.

Some of the objectives for software industries are given below:

- Reduce the production costs.
- Reduce the support and maintenance costs.
- Reduce usage costs.
- Less customer support.
- Reduce training costs.

However, it is the techniques to apply HCI to realize these benefits remain an open challenge.

1.7 Research Layout

Chapter 1: we will discuss about introduction, motivation, Problem Definition, Research Question, Research Methodology and the expected outcome of our project.

Chapter 2: we will discuss about background of this research and the related work and current status based on Bangladesh perspective and government goals and regulations.

Chapter 3: we will describe situation of HCI in Bangladesh.

Chapter 4: we will discuss about development perspective for the HCI in education.

Chapter 5: it is focus to the result and benefit of HCI.

Chapter 6: It describes the conclusion of this research.

Chapter 7: here all the references we used for this research.

CHAPTER 2

BACKGROUND

2.1 Introduction

In the recent past there are no such work or research was done in Bangladesh on human computer interaction. so the background was just the syllabus and courses of the Bangladeshi public and private universities.

2.2 Related Works

Here are some related papers published by different countries, flow less communication between 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. 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 is 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 Human computer interaction knowledge is always ignored. So they form an incorporation of Human computer interaction 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 Human Computer Interaction such as South Africa.

When South Africa faces the unapproachable revolution in ICT field, then they realize that without Human Computer Interaction (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 Human Computer Interaction (HCI) in [9].

Adding to that another Country named Romania has also improved a lot in the field of Human Computer interaction (HCI) Romania forms a group called CHI based on HCI (Human Computer Interaction) which takes part of their direction of Human Computer Interaction(HCI) in education and the present Human Computer Interaction(HCI) development 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 Human Computer Interaction(HCI) courses. Sometimes Human Computer Interaction(HCI) courses are optional in so many Universities, so here teaching methodologies of Human Computer Interaction(HCI) is glorify in [11]. Human Computer Interaction(HCI) is always a burning issue so for gathering knowledge Human Computer Interaction(HCI) there always needs to be a good curriculum, course implementation and improvements based on some feedback from students for ensuring better teaching experience of Human Computer Interaction(HCI) narrate in [12]. Topics of HCI is changing over the time. So Human Computer Interaction (HCI) content and knowledge should be redefined so in terms of teaching the content should be adopted based on these changes.

Trend and topics taught in Human Computer Interaction (HCI) is described largely in [13] to personify the problems between software industry and academic syllabus there needs to be a bridge between these. So a survey was performed in Colombian educational institutions and industry to identify the benefit of Human Computer Interaction(HCI) in [1]. Skills that define HCI is different from other scientific courses. Human Computer Interaction(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 in [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 Human Computer Interaction (HCI). Such a technique the persona technique is designated in [15].

2.3 Bangladesh Perspective:

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 on 4/12/2014. The vision and mission of this ministry is to ensure reliable and secure Information and communication technology towards sustainable development and 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 which was ends in 30/11/2018 [18].

2.4 Government Goals and Regulation:

In form of sustainable development today we can't think it without the help of powerful technologies and internet based devices. According to [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 in [16] also Digital ecommerce act 2018. Before that in 2016 a cyber-safety act was confirmed by the government of Bangladesh briefly described in [17]

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.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Our research community is in challenged. Research should be focused on short term and then find out a solution very quickly. In this paper it requires a result that is how Bangladeshi people interact with computers easily. To communicate with computers in more natural and easy ways and the methods which will be developing by HCI and it will improve the quality of the system and it will reduce the cost.

3.1.1 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.

3.1.2 Analysis

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. Though 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.

3.2 Courses and Methodologies

Most of HCI courses in Bangladesh 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. In figure-1. However, our survey revealed that the used teaching methodology is to ask students to apply concepts taught in the class to a particular case study. In table-1, there top 10 universities. Only 9 of them offered HCI courses for undergraduate program but that is also optional as a research category. Clearly it is academic lacking when it comes to the HCI curriculum.

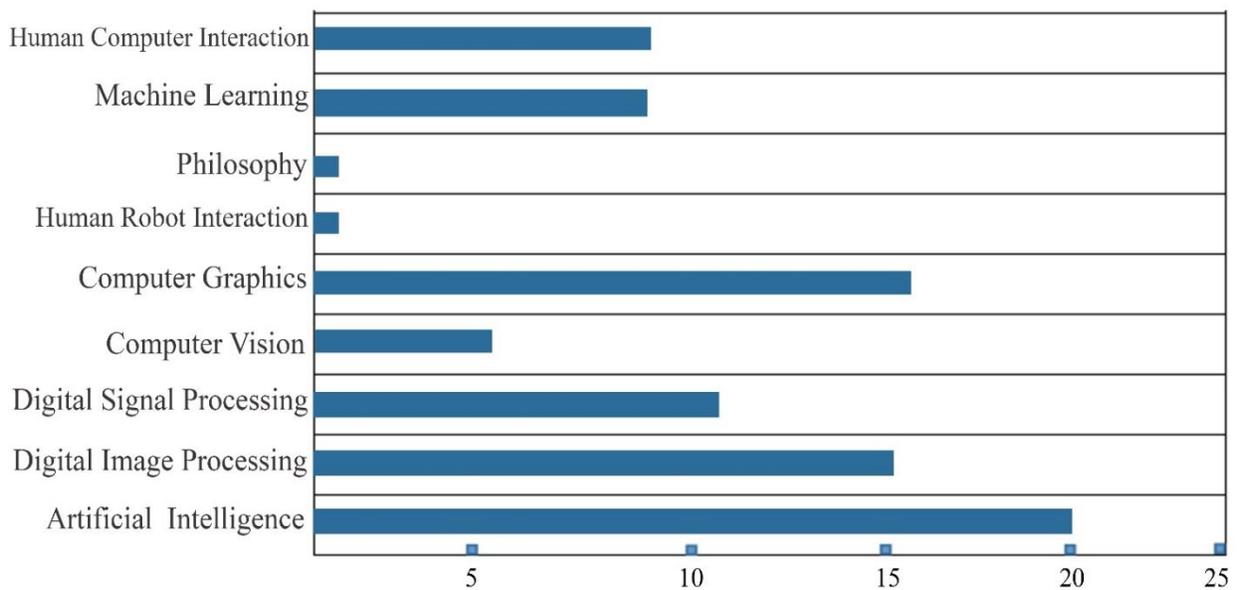


Figure-3.1: HCI and related courses taught in universities in Bangladesh

There are a lot of references and also standards for computer science training, such as the ACM’s “Computer Science Curricula 2013,”¹⁰ continually note the importance of HCI, recognizing it as part of the body of knowledge and promoting its inclusion in the computer science curriculum. Though HCI is included in Master’s and Doctorate 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. So, HCI courses is very essential for both educational purpose and software industry.

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

Rank	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		Yes (Optional)
7	Bangladesh University 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)

3.3 Software industry requirements

In recent years Bangladesh has been developing in ICT sector. Software industry has been growing rapidly. It is a great success for a country. In recent years governments has been raising their thinking and strengthening of the software industry through the Ministry of information communication and technology. Government focusing IT sector to develop it and also 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 researched on top 10 software industry in Bangladesh. There are very few companies are researching 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 research 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.

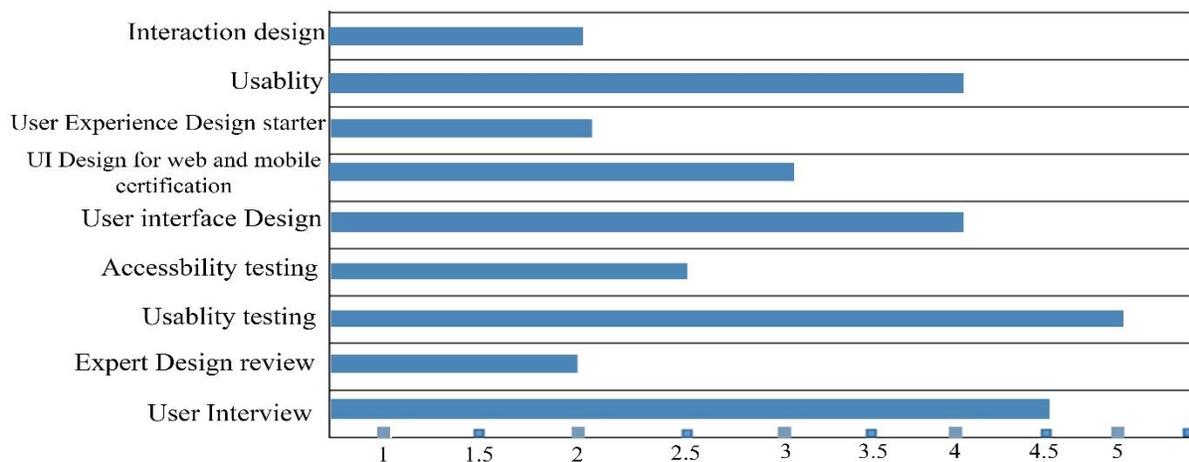


Fig-3.2: Research areas related HCI in software industry in Bangladesh.

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, such as mobile platforms or interactive digital television. Another important area is interaction scenarios in social networks a growing segment of society [5].

CHAPTER 4

HCI STATUS IN ACADEMIC AND INDUSTRY

4.1 Current 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. [19]

4.2 Main problems in HCI Academia

There are a lot of problem in HCI academia. “Lack of technical skill” is the main important problem. [1] 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.

4.3 Research 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. There is no conferences on HCI. 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. They 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.

4.4 Academia and Industry

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].

CHAPTER 5

DISCUSSION AND RESULT

Bangladesh has an emerging community in technology field. HCI Education is essential for capitalizing on the enormous potential of these ICT developments. Bangladesh has 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. Considerable effort is needed in HCI education, research and practice. In the area of education, the educational community must transform computer science.

HCI will have a more significant role to play in the next few years in the Bangladeshis software industries. One of the most important developments that must be addressed is the ability of the non-expert to use computers effectively and efficiently in order to accomplish their everyday goals. The impact of HCI on industry itself could be changes dramatically. HCI inputs will help the industry move ahead in this course as ‘providers of innovative, proactive, full-lifecycle, integrated solutions This document is by no way a complete or definitive work. Its objective is to create a precedent in the field and to focus the inclusion of new kinds of study.

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:

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. That’s are related to the promoting of HCI, including of HCI education in Bangladesh.

HCI curriculum: It is important to define a common, basic understanding about HCI. We want establish basic HCI curriculum in Bangladesh.

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.

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.

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.

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 but our neighbor countries are trying to do so we should to focus on it to develop our country in both education and ICT sector. It is really true that HCI is a growing hot research field for our country. So it is need 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 benefited

This position paper analyses the topics taught in the area of HCI as a part of a standardized curriculum. These course examples also suggest an open learning environment, in addition to conventional course study. As these types of learning materials can be used for everyone, possible collaboration networks for learning and material sharing are discussed.

Next few years HCI will play most significant role in the Bangladeshis software industries. The impact of HCI on industry itself could be changes dramatically. Latest HCI innovates many technologies such as virtual reality, personal digital assistant, biometric authentication, finger print etc. Now a day we can be monitor our health, manage our daily schedules, navigate from one place to another using different forms of hardware and software HCIs.

CHAPTER 6

CONCLUSION AND FUTURE WORK

Human-computer interaction has become a necessary part of daily life for the majority of Americans and millions of others around the world. 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.

Supported by enhanced HCI and usability practices the sustained growth of the IT sector in Bangladesh will contribute to overall economic growth. This in turn has the potential to feedback into economic development this nation thereby reducing the gap between the urban rich and the rural poor. Government and funding agencies, and other organizations, especially private industry, can assist to achieve HCI goals through funding.

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APPENDIX

Appendix A: Survey form for University

Respondent Information:

Respondent Name :
Position :
University Name :
Date :
Time :

Course Name	Undergraduate			Postgraduate		
	Main	Optional	No	Main	Optional	No
Artificial Intelligence						
Machine Learning						
Digital Image Processing						
Digital Signal Processing						
Computer Graphics						
Computer Vision						
Human Robot Interaction						
Philosophy						
Human Computer Interaction						

Appendix B: Survey form for Software Industry

Respondent Information:

Respondent Name :
Position :
Industry Name :
Date :
Time :

Research/Practicing Area	Available	Unavailable
Interaction design		
Usability		
User experience design starter		
UI design for mobile and web		
User interface deign		
Accessibility testing		
Usability testing		
Expert design review		
User interview		