QUANTUM INFORMATION SCIENCE AND ITS REQUIREMENT FOR SOPHISTICATED INFORMATION SYSTEMS BUILDING

P. K. PAUL[a], R. SENTHAMARAI[b,*], A BHUIMALI[c] and D. CHATTERJEE[d]

[a]FBAS, Indian Institute of Engineering Science and Technology [IIEST], Shibpur- An Institute of National Importance, HOWRAH (W. B.) INDIA
[b]HOD, Department of Computer Applications, AVIT, VM University, CHENNAI (T.N.) INDIA
[c]Vice Chancellor, Raiganj University, RAIGANJ (W. B.) INDIA
[d]Vice Chancellor, Seacom Skills University, BOLPUR (W. B.) INDIA

ABSTRACT

Quantum Information Science [QIS] is a new field which is responsible for faster and advance Communication powered by QBIT. The integration of Quantum Science and Information Science may be treated as Quantum Information Science [QIS]. Quantum Computer plays an important role to build healthy Quantum Information Science [QIS] practice. Today's super computer and in future computer QBIT may solve hard problem and may able in speed up communication in Computation. Thus, ultimately speedy processor makes sophisticated Information Infrastructure and Communication Networks. This paper is talks about Quantum Information Science [QIS]; its need, role, values and formation of subject. Paper also mentions the way to build sophisticated Information Infrastructure. Paper highlights possible and potential courses in this field to make modern Computing and Informatics Systems.

Key words: Quantum, Quantum information science, QIS, Quantum computing, Information systems, Information science, Information science and technology, IST, Quantum informatics.

INTRODUCTION

Quantum Information Science [QIS] is actually an important knowledge domain with the potential to cause revolutionary advances in the fields of science and technologies, which integrates computers, communication, precision measurement and fundamentals Quantum Science. The background of this field was Quantum Mechanics. Actually during 1970's -80's some Scientists plans to integrate Quantum Mechanics with the classical

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Turing Computing machine. During 1990's and mainly of mid 1990's some organization realizes the importance of Quantum Computer for speedy and large numbers super efficiency. Very next, the super and semiconductor industry move to computing with Quantum benefits. Thus, this way Quantum Computing gain popularity; during first decade of 2000's Quantum Computing enlarge and Information Professionals are moved to integrate Quantum Computing benefit in Information Science for advance Information Science practice for speedy Information Networks, Network wise Communication, and so on.

Objective and hypothesis

The main aim of this paper is includes, but not limited to:-

- To learn basic about Quantum Computing and Quantum Mechanics;

- To find out Quantum Information Science [QIS]; its characteristics, features and functionalities;

- To find out possibilities of Quantum Information Science [QIS] for healthy Information Infrastructure building;

- To learn about main and core areas of Quantum Information Science [QIS] at a glance;

- To find out possible and potential courses in the field of Quantum Information Science [QIS] and related knowledge domain.

Quantum Information Science [QIS]: Basics

Quantum Information Science [QIS] is mistakenly treated as Quantum Information Theory but Quantum Information Science [QIS] is actually extension of Quantum Computing and integration of Information Science with Quantum Computing.
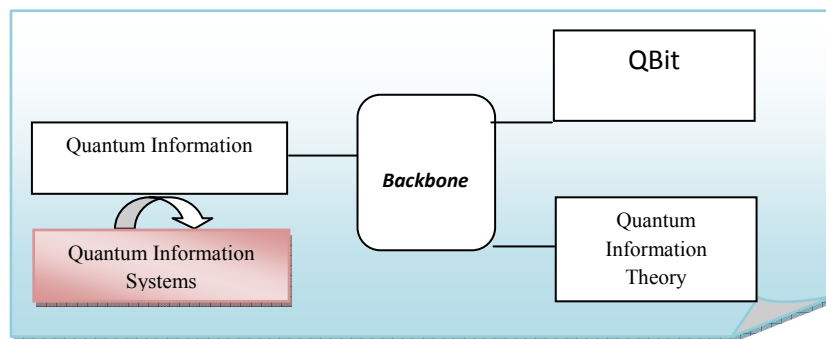

Fig. 1: Depicted the background of quantum information systems

Actually, the rapid development in Mathematical and Physical Science results so many trapped atomic icons, advance optical cavities, quantum dots and many other construction of healthy Quantum Logic devices. Further, it is noted that Quantum Computing is also able in healthy and powerful Security Systems. Quantum Physics, Information Theory and Computer Science are mainly responsible to build Quantum Information Science [QIS] which is an interdisciplinary domain with much more intellectuality. Practically, today's Computers are run or govern by classical BITs but Quantum Computer are build with Quantum BITS or QBITSQuantum Information Science [QIS] will be helpful in Digital Archives, Digital Libraries, Information Networks and Information Systems and so on.
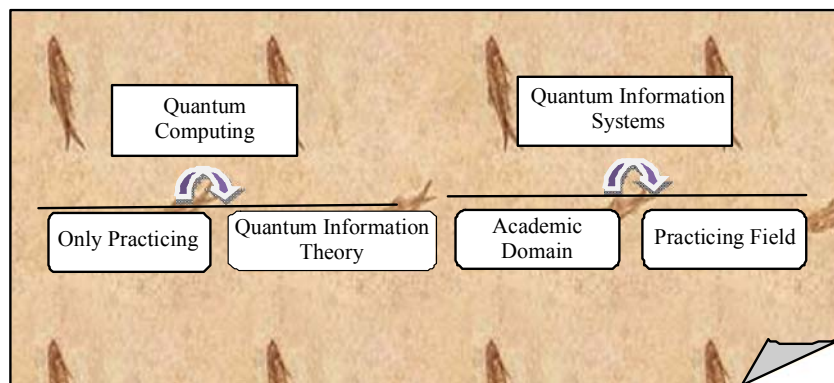

Fig. 2: Depicted the domain nature of quantum information science and quantum computing

Quantum information science [QIS] interdisciplinary characteristics and quantum computers

Though it is important to note that, Quantum Information Science based on basic Mathematical principles and which are not new but integration is new that produce several new information mechanism powered by Quantum BITs. There are several differences we may find out between General or Classical Computer and Quantum Computer. The following Table – Fig. 3 will be helpful to understand such matter clearly:-

General Information Science	Quantum Information Science [QIS]
• Classical Information can be read and copied without disturbed;	• Information carried by a Quantum System flouts such Common sense principles;

Cont…

General Information Science	Quantum Information Science [QIS]
• In General and classical Information, it is tough or impossible to exploited perform task; • Today's general Computer will take billion of years to find the prime factor; • It is small-scale Computing depended; • **To find out a particular item in general computer will take *N* to search.**	• Quantum Information Science [QIS] can be exploited to perform task; • Where as Quantum Information Science [QIS] based computer will take just second for that; • It is large-scale Computing depended; • Where as in Quantum Information Science [QIS], Computer will take square root of *N.*

Fig. 3: Depicted some disparities between general and quantum information science

Quantum information science [QIS]: need for healthy information transfer cycle

We know that, Information Science is an interdisciplinary Science responsible for Information Activities; which includes collection, selection, organization, processing, Management and dissemination. Use of IT and Computing are the main pillar of modern Information Science practice. With the integration of Quantum Computing in Information Science several things are possible, which includes:-

- Quantum based Computer will be much more faster and speedy by one Information Centre may communicate with another and one Information Centre with IN and IS;

- The Quantum BIT based internet will be much more speedy which includes Extranet, Internet and internet will be robust powerful and speedy;

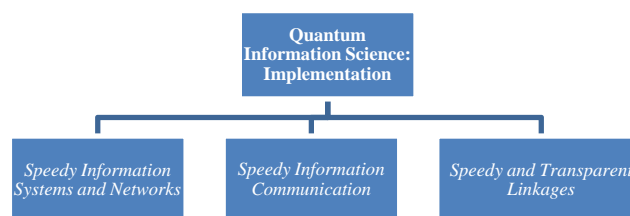- A Quantum Computer cloud efficiently and accurately simulate the evolution of QIS

Fig. 4: Depicted quantum information science and quantum computing and their benefits in information world

- Quantum Computer may process billion of data within short time; thus Information Processing and Management will be much more speedy and valuable;

- Quantum Information will be helpful to build quantum based knowledge Grids; thus it may be helpful in domain based Information Networks and Knowledge Grids;

- Quantum BIT is the ultimate oxygen which transfer Information within a small gradients;

- Information carried by a Quantum Systems floats such common sense principles;

- QIS is larger than QIT and QIT is bigger than Quantum Computing.

Quantum information science [QIS]: Possible courses

Quantum Information Science [QIS] is a broad and rapidly expanding field, there are a few underlying recurrent themes. Information Technology is actually stands in between Classical Information and Quantum Information. Now take look of some possible Degree programme in Indian and European Educational context:-

Computer Science context	Information Science Context	Physical Science Context
BSc/MSc-Computer Science [Quantum Information Science] **BTech/MTech- Quantum Information Science [QIS]** **BTech/MTech-IT[Quantum Information Science]** **BTech/Mtech-CSE [Quantum Information Science]** **BCA/MCA-Quantum Information Science [QIS]**	BSc/MSc-Information Science [Quantum Information Science] MPhil-Information Science [QIS] MPhil- Quantum Information Science BSc/MSc- Quantum Information Science [IS]	BSc/MSc-Mathematics-Quantum Information Science [QIS] BSc/MSc-Physics[Quantum Information Science BSc/MSc-Chemistry [Quantum Information Science] MPhil-Math/Physics/Chemistry [Quantum Information Science]

Fig: 5 Depicted possible courses with QIS flavor

However, apart from degree programme specialization and full-fledged programme, Quantum Information Science [QIS] may also include as optional Group in BSc in Indian University.

Findings

- QIS is a combination of Quantum enriched and powered Networks, Devices and hardware;

- Based on thousand of Quantum Networks it is possible to build Quantum Internet which should be more reliable and speedy;

- QIS as an educational programme started in some universities;

- Still full-fledged programme on QIS is very much limited;

- QIS has become an academic cum professional field.

Suggestion

- It is essential to start Quantum based Networks and Quantum based internet;

- QIS need to start as full-fledged programme in Indian University;

- Proper funding is essential to builds Quantum based Information Infrastructure;

- Better cooperation in Computer Science, Information Science, Management Science and Physic al Science may bring more interdisciplinary research.

CONCLUSION

The potential of Quantum Information Technology is starting to be recognized by commercial companies and other defense companies. Academics need to do much more with better Quantum Information Science [QIS] practice. Quantum Mechanics though, already started and initiated in Degree programme but full-fledged Quantum Information Science [QIS] initiation may solve complete problem and helps in better Information Infrastructure in near future with skilled manpower.

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