Quantum Information Science Vis–à–Vis Information Schools

P. K. Paul
Raiganj University, India

D. Chatterjee
Seacom Skills University, India

A. Bhuimali
Raiganj University, India

INTRODUCTION

Quantum Information Science (QIS) is a combination of Quantum Science (which combines Radio Physics, Condensed Physics, and Electronics) and Information Science (which combines Computer Science, Information Technology, Mathematics, Information Studies, and Documentation Studies and so on. Quantum Information Science (QIS) is actually an extension of Quantum Computing. Quantum Information Science (QIS) is mistakenly taken as Quantum Information Theory but it has several differences with this. Quantum Information Science (QIS) is mainly responsible for improved and faster acquisition, transmission and processing of information. The 20th century is marked by three monumental achievements, namely, computer science, quantum physics and information theory, which have not only stunned the civilized world but also ushered into a new world – a new paradigm of science and technology. The information technology revolution of this century was directed towards the miniaturization of electrical circuitry on silicon chips on one side, enabling performance to double every 18 months (Moore's Law) and the deepening understanding of classical information in coding, cryptography and computational complexity on the other side. Thus a new era dawned with the promise of a new design strong enough to handle the ensuing new problems. Considerable planning has already

been devoted to the challenges of designing and fabricating devices at the atomic scale using nanotechnology and quantum theory. Indeed quantum effects are being exploited to perform important, otherwise impossible information processing tasks, in addition to the creation of unbreakable codes and possibly a quantum computer to perform easily computations that would have taken millions of hours for its performance. Quantum Information Science (QIS) is actually an extension of Quantum Computing. Quantum Information Science (QIS) is mistakenly taken as Quantum Information Theory but it has several differences with this. Quantum Information Science (QIS) is mainly responsible for improved and faster acquisition, transmission and processing of information. Quantum Information Science (QIS) is actually nothing but an application and integration of Quantum Science and Information Science principles (See Figure 1). Thus Quantum Science is mainly rooted by the Quantum Physics principles and then Quantum Computing and lastly Quantum Information Science. QIS is an existing field which need an intellectuality and mentality towards achievements. Quantum Information System is the ultimate result of healthy Quantum Information Science (QIS) practice. This paper talks about Quantum Information Science (QIS); its background and origin. Possibilities of Quantum Information Science (QIS) as an academic domain and possible courses emphasiz-

ing challenges and opportunities to introduce it in I-School or Information Science departments with specialization are explored.

BACKGROUND AND EXISTING LITERATURE

Practically, Quantum Information Science [QIS] is combination of some more subfield. The main field from Quantum Side is Quantum Physics, Quantum Mechanics, Quantum Computing and other hand the domain of Information side; which is combination of Management Science, Computer Science, Information Technology, Cognitive Science, and Operation Research and so on (Bouwmeester et.al., 1997; Ahn, 2000; Paul, 2013a).

In other words, Quantum Information Science (QIS) is a combination of Quantum Science (which combines Radio Physics, Condensed Physics, Electronics) and Information Science (which combines Computer Science, Information Technology, Mathematics, Information Studies, Documentation Studies and so on, which has possibilities of healthy Information Infrastructure and speedy information access between information channels, information networks, information centre to information networks and so on (Devoret, 2013; Paul, 2013b). The wider benefit and possibilities of Quantum Information Science (QIS) attract thousands of scientists and technological experts in the field of physics and mathematics and its integration into information science. The Information Technology revolution of the past several decades has been driven by steady advances in the miniaturization of electronic circuits on silicon chips, allowing performance to double roughly every 18 months (Moore's law). Quantum Computing and Information Science mainly differs in the perspective of different uses and scope. Here physical form of information has a qualitative rather than merely quantitative bearing on how efficiently information can be processed (DiVincenzo, 2001; Paul, 2015). The economic impact of this quantum information

science (QIS) is going to be no less profound. The complexity of the economic world with its colossal information will be resolved to generate a wholly new economic paradigm. So it is important that the necessary foundation of QIS be built to provide tools to solve those problems and enable progress move forward towards more specific technical and economic growth (See Table:1 for more clarification).

OBJECTIVE AND HYPOTHESIS

The main aim and objective of the study include:

- To know about the Quantum Information Science (QIS) and its nature.
- To learn about Quantum Information Science (QIS) and its basic nature.
- To find out main advantages and engineering applications of Quantum Information Sciences.
- To find out possibilities of I-School based Quantum Information Science (QIS) programmes.
- To know about attributes and characteristics of modern Quantum Information Science (QIS).

QUANTUM INFORMATION SCIENCE [QIS] AS A DOMAIN AND GROWING INTERDISCIPLINARY NATURE

The interdisciplinary Quantum Information Science [QIS] is providing a new way into fundamentals problems related to Computing as well as Physics (NSF, 1999). 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 (Leuenberger & Loss, 2001).

Quantum Information Science (QIS) is a kind of science supported by several technologies

Related Content

Deploying Privacy Improved RBAC in Web Information Systems
Ioannis Mavridis (2011). *International Journal of Information Technologies and Systems Approach (pp. 70-87).*
www.irma-international.org/article/deploying-privacy-improved-rbac-web/55804

Business Model Innovation-Oriented Technology Management for Emergent Technologies
Sven Seidenstrickerand Ardilio Antonino (2018). *Encyclopedia of Information Science and Technology, Fourth Edition (pp. 4560-4569).*
www.irma-international.org/chapter/business-model-innovation-oriented-technology-management-for-emergent-technologies/184164

The Analysis of Instrument Automatic Monitoring and Control Systems Under Artificial Intelligence
Qinmei Wang (2024). *International Journal of Information Technologies and Systems Approach (pp. 1-13).*
www.irma-international.org/article/the-analysis-of-instrument-automatic-monitoring-and-control-systems-under-artificial-intelligence/336844

Complexity Analysis of Vedic Mathematics Algorithms for Multicore Environment
Urmila Shrawankarand Krutika Jayant Sapkal (2017). *International Journal of Rough Sets and Data Analysis (pp. 31-47).*
www.irma-international.org/article/complexity-analysis-of-vedic-mathematics-algorithms-for-multicore-environment/186857

Interpretable Image Recognition Models for Big Data With Prototypes and Uncertainty
Jingqi Wang (2023). *International Journal of Information Technologies and Systems Approach (pp. 1-15).*
www.irma-international.org/article/interpretable-image-recognition-models-for-big-data-with-prototypes-and-uncertainty/318122