K. K. Wagh Institute of Engineering Education and Research, Nashik.
Department of Computer Engineering
Academic Year-2020-21

Report on Five Days Online National Level Workshop on "Quantum Computing" from 2nd to 6th Feb. 2021 in association with Aress Software and Education Technologies Pvt. Ltd.

Day,Date& Time: 2nd, 3rd,4th, 5th & 6th Februray 2021

Online Platform: GoTo Webinar

5-Days National Level Online Workshop on "Quantum Computing" was conducted from 2nd February 2021 to 6th February 2021 by department of Computer engineering, K. K. Wagh Institute of Engineering Education and Research, Nashik, in association with Aress Software and Education Technologies Pvt. Ltd. for faculty, Ph.D Research Scholars, UG & PG students from Educational Institutions in India / Abroad and Professionals from Industries / Research labs.

The objectives of this online workshop were

1. To know the basics of Quantum Computing, Algorithms, Quantum Information Science and Applications of Quantum Computing
2. To explore the Research Areas in the field of Quantum Computing

Resource Person:

1. Prof. Dr. Bhanu Das, Professor, Tokyo Institute of Technology, Japan & Hon. Professor, Center for Quantum Engg. Research and Education, Kolkata
2. Prof. Dr. Sachin Kadam, Director-ICT, Bharati Vidyapeeth University, Pune, MH
3. Prof. Dr. Sunil R Patil, Associate Prof., Institute of Science, Nagpur, MH
4. Mr. Amit Saxena, Program Director, C-DAC, Pune, MH
5. Er. Manoj B Bhatkar, VP – IT, AnandRathi IT Pvt. Ltd
6. Prof. Dr. Bibhash Sen, Associate onsultantProf., NIT, Durgapur, WB
7. Prof. Dr. Nisheeth Joshi, Professor, Banasthali , University, RJ
8. Prof. Dr. Siddhartha Bhattacharyya, Professor, Christ University, Bangalore
9. Prof. Jayanta Pal, Assistant Prof. Tripura University, TR
10. Mr. Bikash K. Behera Founder, Director of Bikash's Quantum
11. Dr. Ankur Raina, IISC Banglore & Research Specialist, Univ. of Arizona, Arizona, US

Prof.Dr.K.N.Nandurkar,Principal,KKWIEER,Nashik, E-Inaugurated the three days workshop and briefed about K.K.Wagh Educational Society.

Prof.Dr.S.S.Sane,Head, department of Computer Engineering addressesd the participants during inugral fuction and briefed about the objective of the workshop.

Mr. Rahul Malhotra, Aress Software, Nashik addressed the participants

Day 1:

Session I started with the Keynote address on Quantum Computing by Prof. Dr. Bhanu Das Professor, Tokyo Institute of Technology, Japan & Hon. Professor, Center for Quantum Engineering Research and Education, Kolkata

In Session 2, Prof. Dr. Sachin Kadam Director - ICT, Bharati Vidyapeeth University, Pune gave Introduction to Quantum Computing

In Session 3, Prof. Dr. Sunil R , Patil, Associate Prof., Institute of Science, Nagpur, MH briefed about Quantum Information Science

Day 2:

In Session 1, Dr. Ankur Raina IISC Banglore & Research Specialist, Univ. of Arizona, Arizona, US explained "Basic Quantum Algorithms"

In Session 2, Prof. Dr. Bibhash Sen Associate Prof., NIT, Durgapur, WB introduced the concept of "Quantum-dot Cellular Automata: an era of Nanotechnology"

"Underlying Clocking Scheme in Quantum-dot Cellular Automata"concept was explained by Prof. Jayanta Pal Assistant Prof. Tripura University, TR in Session 3

Day 3:

In Session 1, Prof. Dr. Siddhartha Bhattacharyya Professor, Christ University, Bangalore focused light on "Understanding Quantum Back Propagation".

"Quantum Metaheuristics" was covered in Session 2 by Prof. Dr. Siddhartha Bhattacharyya Professor, Christ University, Bangalore

Er. Manoj B Bhatkar VP – IT, AnandRathi IT Pvt. Ltd explained "Quantum Computing Stack with Banking and Finance Use Cases" in Session 3

Day 4:

In Session 1, Dr. Ankur Raina IISC Banglore & Research Specialist, Univ. of Arizona, Arizona, US covered "Basics of Quantum Information Processing"

"Quantum Simulator" was explained by Mr. Amit Saxena Program Director, C-DAC, Pune, MH, in Session 2

Session 3 focused on " Applications of Quantum Computing: A Case Study Approach", by Prof. Dr. Sachin Kadam Director - ICT, Bharati Vidyapeeth University, Pune , MH

Day 5:

In Session 1, Prof. Dr. Nisheeth Joshi Professor, Banasthali University, RJ introduced the concept of "Quantum Machine Learning"

In Session 1, Prof. Dr. Nisheeth Joshi Professor, Banasthali University, RJ introduced the concept of "Quantum Machine Learning"

In Session 2, Prof. Dr. Nisheeth Joshi Professor, Banasthali University, RJ explained "Quantum Computing Using QISKIT"

In Session 3, Mr. Bikash K. Behera Founder, Director of Bikash's Quantum Career and Research shredded light on "Opportunities in Quantum Computing"

At the end of the sessions, a Quiz of 50 marks was conducted on Quantum Computing

In total ,there were about 151 participants benefited all around India.

Fig 1: Session on "Quantum Machine Learning" by Prof. Dr. Nisheeth Joshi Professor, Banasthali University.

The workshop was coordinated by Prof. Dr. S. S. Sane, Prof.J. R. Mankar , Prof.C. R Patil along with staff members of Computer Engineering department.

Prof. S. M. Kamalapur, Prof. N. M. Shahane, Prof. S. K. Gondhalekar, Prof. P. P. Vaidya, Prof. S. M. Malao proposed vote of thanks for various sessions of the workshop

Prof. N. M. Pagare, Prof. M. N. Shinde and Prof. S. D. Jadhav did anchoring for the workshop

Prof. R. H. Jadhav

Prepared By

Prof. Dr. S. S. Sane

Head,

Computer Engineering Department

REGISTRATION FORM

Five Days Online National Level Workshop

On

Quantum Computing

2nd – 6th February 2021

Full Name   : _____

Designation   : _____

Organization: ....

Qualification:....................................

....

Postal Address:...............................

...................................Pin Code............

Mobile No. ....

SIGNATURE AND STAMP OF THE SPONSORING ORGANIZATION

REGISTRATION

For registration, duly filled registration form should be sent in advance to the Course Coordinators through the Email provided below.

No registration fees

The confirmation would be sent through Email.

Registration Link

https://attendee.gotowebinar.com/register/13 7078244832954956

MODE OF CONDUCTION

All sessions will be conducted online. The workshop includes discussions and online test that will be conducted at the end of the program. E-certificate will be provided to the participants who have attended all the sessions and the test.

IMPORTANT DATES

Last Date to Register : Thursday 28th Jan. 2021

COORDINATORS

J. R. Mankar (9175392970)

C. R. Patil (9673330951)

Assistant Professor

Department of Computer Engineering

K. K. Wagh Institute of Engineering Education & Research,Nashik.422-003

E-Mail : comp-event@kkwagh.edu.in

Five Days Online National L

Workshop On

"Quantum Computing"

2nd – 6th February 2021

Organized By

Department of Computer Engine

K.K.Wagh Institute of Enginee

Education & Research, Nashik. 4

in association with

Aress Software and Educatio

Technologies Pvt. Ltd.

CONVENER

Prof. Dr. S S Sane

Professor & Head

Department of Computer Engineer

KKWIEER,Nashik.422003

Website: www.engg.kkwagh.edu

ABOUT KKWIEER NASHIK

The institute was established in the year 1984. A land of 20.5 Acres was generously donated by Shri. Kakusheth Udesi of Hirabai Haridas Charitable Trust, Mumbai. The institute is approved by the All India Council of Technical Education (AICTE), New Delhi and Government of Maharashtra, permanently affiliated to Savitribai Phule Pune University and has recognition under section 2(F) and 12(B) of (UGC ACT 1956). The institute is adjudged as Grade 'A' by Government of Maharashtra. The institute is Accredited by National Assessment & Accreditation Council (NAAC) with 'A' Grade, and accredited by National Board of Accreditation (NBA) for 08 of its branches. It is also accredited by HLACT International. It is the only institute in Nashik to receive recognition thrice under "Platinum Category" by AICTE-CII Survey of Industry Linked Institutes and according to NIRF ranking survey 2016 was ranked 85th amongst all engineering institutes in India. From A. Y. 2020-21, the Institute has started offering two new UG programs, namely, Artificial Intelligence & Data Science and Robotics & Automation with intake of 60 each.

ABOUT DEPARTMENT

The Department of Computer Engineering at the K. K. Wagh Institute of Engineering Education and Research, Nashik was established in the year 1984. Since then, especially in the last twenty years of the IT revolution, the department has taken long strides and is now among one of the best departments in the University. The Department has well furnished laboratories equipped with state-of-the-art hardware and software resources, instruction halls, a seminar hall and tutorial and faculty rooms. The Department has a blend of experienced and young faculty members who also work as mentors to the equally diligent, hardworking and intelligent students. The department is accredited recently by the AICTE-NBA in Dec 2019 for 3 years.

WHY QUANTUM COMPUTING

Quantum computing has the potential to revolutionize the way we think about computing and information processing. The first batch of quantum algorithms has shown that quantum computers can outperform classical computers in certain specialized tasks. New applications are being proposed in a variety of fields. This course will introduce you to the basics of quantum computing and research areas under it.

OBJECTIVE

- To know the basics of Quantum Computing, Algorithms, Quantum Information Science and Applications of Quantum Computing
- To explore the Research Areas in the field of Quantum Computing

BENEFITS AND OUTCOMES OF THE COURSE

At the end of the session participants will be able to

- Understand fundamentals of Quantum Computing
- Identify various Research areas in Quantum Computing

CONTENTS

- Introduction to Quantum Computing
- Quantum Information Science
- Quantum-dot Cellular Automata
- Quantum Simulators
- Understanding Quantum back propagation
- Quantum Algorithm
- Applications of Quantum Computing
- Quantum Metaheuristics
- Quantum Machine Learning
- Quantum Computing Using QISKIT
- Basics of Quantum Information Processing
- Quantum Computing Applications
- Career and Research Opportunities in Quantum Computing

ORGANIZING COMMITTEE

Chief Patrons

Hon. Shri. Balasaheb Wagh
President, K. K. Wagh Education Society, Nashik.

Prof. K. S. Bandi
Secretary, K. K. Wagh Education Society, Nashik

Patron

Prof. Dr. K. N. Nandurkar
Principal, KKWIEER, Nashik

CONVENER

Prof. Dr. S. S. Sane
Professor & Head, Dept. of Computer Engg., KKWIEER, Nashik

RESOURCE PERSONS

- Prof. Dr. Bhanu Das, Professor, Tokyo Institute Technology, Japan & Hon. Professor, Center for Quantum Engg. Research and Education, Kolkata
- Prof. Dr. Sachin Kadam , Director - ICT, Bharati Vidyapeeth University, Pune, MH
- Prof. Dr. Sunil R Patil , Associate Prof., Institute of Science, Nagpur, MH
- Mr. Amit Saxena, Program Director, C-DAC
- Er. Manoj B Bhatkar, VP – IT, AnandRathi Share, MH
- Prof. Dr. Bibhash Sen, Associate Prof., NIT, WB
- Prof. Dr. Nisheeth Joshi, Professor, Banasthali University, RJ
- Prof. Dr. Siddhartha Bhattacharyya, Professor, RCC University, Bangalore
- Prof. Jayanta Pal, Assistant Prof. Tripura University
- Mr. Bikash K Behera , Founder, Director of Quantum
- Prof. Dr. Ankur Raina, IISC Banglore & Research Specialist, Univ. of Arizona, Arizona, US

ELIGIBILITY

This workshop is open for faculty, Ph.D. Scholars, UG & PG students from Education in India / abroad and Professionals from Research labs.

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Technology that Impacts Business

K. K. Wagh Institute of Engineering Education and Research, Nashik
Department of Computer Engineering Organizing
Five Days Online National Level Workshop on
"Quantum Computing" from 2nd to 6th Feb. 2021
in association with Aress Software and Education Technologies Pvt. Ltd.

Schedule

Time	Name of Person	Topic
Day 1: 2nd Feb. Tuesday		
10.30 – 12.00	Inauguration & Session 1: Prof. Dr. Bhanu Das Professor, Tokyo Institute of Technology, Japan & Hon. Professor, Center for Quantum Engineering Research and Education, Kolkata	Keynote address on Quantum Computing
1.00 – 2.30 pm	Session 2: Prof. Dr. Sachin Kadam Director - ICT, Bharati Vidyapeeth University, Pune, MH	Introduction to Quantum Computing
3.00 – 04.30 pm	Session 3: Prof. Dr. Sunil R Patil Associate Prof., Institute of Science, Nagpur, MH	Quantum Information Science
Day 2 : 3rd Feb. Wednesday		
10.30 – 12.00	Session 1: Dr. Ankur Raina IISC Banglore & Research Specialist, Univ. of Arizona, Arizona, US	Basic Quantum Algorithms
1.00 – 2.30 pm	Session 2: Prof. Dr. Bibhash Sen Associate Prof., NIT, Durgapur, WB	Quantum-dot Cellular Automata: an era of Nanotechnology
3.00 – 04.30 pm	Session 3: Prof. Jayanta Pal Assistant Prof. Tripura University, TR	Underlying Clocking Scheme in Quantum-dot Cellular Automata
Day 3 : 4th Feb. Thursday		
10.30 – 12.00	Session 1: Prof. Dr. Siddhartha Bhattacharyya Professor, Christ University, Bangalore	Understanding Quantum Back Propagation
1.00 – 2.30 pm	Session 2: Prof. Dr. Siddhartha Bhattacharyya Professor, Christ University, Bangalore	Quantum Metaheuristics
3.00 – 04.30 pm	Session 3: Er. Manoj B Bhatkar VP – IT, AnandRathi IT Pvt. Ltd	Quantum Computing Stack with Banking and Finance Use Cases
Day 4 : 5th Feb. Friday		
10.30 – 12.00	Session 1: Dr. Ankur Raina IISC Banglore & Research Specialist, Univ. of Arizona, Arizona, US	Basics of Quantum Information Processing
1.00 – 2.30 pm	Session 2: Mr. Amit Saxena Program Director, C-DAC, Pune, MH	Quantum Simulator
3.00 – 04.30 pm	Session 3: Prof. Dr. Sachin Kadam Director - ICT, Bharati Vidyapeeth University, Pune , MH	Applications of Quantum Computing: A Case Study Approach
Day 5 : 6th Feb. Saturday		
10.30 – 12.00	Session 1: Prof. Dr. Nisheeth Joshi Professor, Banasthali University, RJ	Quantum Machine Learning
1.00 – 2.30 pm	Session 2: Prof. Dr. Nisheeth Joshi Professor, Banasthali University, RJ	Quantum Computing Using QISKIT
3.00 – 04.00 pm	Session 3: Mr. Bikash K. Behera Founder, Director of Bikash's Quantum	Career and Research Opportunities in Quantum Computing
4.00 – 5.00 pm	Test/Valedictory /feedback	

K. K. Wagh Institute of Engineering Education & Research

29-01-2021

To,
Prof. Dr. Bhanu Das
Professor,
Tokyo Institute of Technology, Japan &   Hon. Professor,
Center for Quantum Engineering Research and Education, Kolkata

Subject: Invitation for online inauguration and keynote address

Sir,

Greetings from Department of Computer Engineering, K K Wagh Institute of Engineering Education & Research, Nashik, MH, India.

I am thankful to you for accepting our request to Inaugurate and deliver keynote address in an online manner for the five days online workshop on Quantum Computing organized by our department in association with Aress Software and Education Technology Ltd. Nashik, MH, India.

The inauguration session is scheduled on *Tuesday 2nd February 2021 at 10.30 AM (IST)*. You will receive a link from our side on your email. Request you to kindly join the inauguration function using the link.

Thanking you.

Dr. S S Sane
Vice Principal, Professor & Head of Computer Engineering & AI-DS

Encl:-

- Agenda for Inaugural function
- Banner of the event
- Brochure of the event with schedule for various sessions (Kindly do not use the link provided in banner & brochure. It is for participants)

K. K. Wagh Institute of Engineering Education & Research
Accredited by NAAC (Grade 'A') & NBA third time (Eight Departments)
(Permanently Affiliated to Savitribai Phule Pune University & Approved by AICTE, New Delhi), AISHE Code : C-41256

K. K. WAGH EDUCATION SOCIETY'S
K. K. Wagh Institute of Engineering Education & Research
Hirabai Haridas Vidyanagari, Amrutdham, Panchavati, Nashik

ACADEMIC YEAR 2020-2021

Receipt No.: R-10676 Payment DD Receipt Date : 12/01/2021

Student Name : Aress Software & Education Technologie PRN :

Branch : Division Year :

Sr. No.	Particulars	Payable Amount (Rs.)	Paid Amount (Rs.)
1	Miscellaneous Income	35000	35,000
		TOTAL	35,000.00

In words Rs. Thirty-Five Thousand Only

08 12/01/2021
Date

Demand Draft / Cheque / Bank Challan No.
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PRINCIPAL