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STREAM

CEI Newsletter



CEI Newsletter

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If you have comments or are interested in contributing to the next edition of the magazine, please write to the editor.

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FROM THE DIRECTOR

I am very pleased that the Computer Engineering & Informatics (CEI) have launched still more exciting initiatives in teaching, programmes, industry partnerships & certifications , technology upgrades and student competitions.

Middlesex University Dubai vision of “Transforming Potential into Success” has been proactively supported by the CEI Faculty Team led by Dr. Fehmida Hussein. This is evident from the numerous inter-university competitions that our students have won. Our students during the course of their studies have the opportunity to gain certifications from Microsoft, Oracle, CISCO, SAP, Google and increasing the employability options for our students.

This year we will be delighted to see our first cohort of Computer Engineering students graduate. CEI is also looking to introduce new programmes at the Masters level in Information Systems and Robotics and once the approval process for these are completed a formal announcement will be made.

We are grateful for the support of our Industry partners. Students, I urge you to actively participate in the events and activities organised by the CEI and make the most of your time at Middlesex.



Dr.Cedwyn Fernandes

Director
Middlesex University Dubai

FROM THE DEPUTY DIRECTOR



Welcome to the 3rd edition of the MDX Stream newsletter. The pages that follow highlight the successes and activities CEI Academic team, led by Dr. Fehmida Hussain, and the exceptional Undergraduate and Post Graduate Students this past year. The Team has been quite busy hosting and participating in range of activities, events, and conferences with Industry Partners, celebrating some tremendous student successes at national and international competitions, and welcoming new members to the teaching team!

The CEI Department at Middlesex University Dubai is one of the premier departments in the region, and I look forward to celebrating the continued growth, development and success with the students and faculty in this dynamic department, and in particular celebrating the first cohort of Computer Engineering graduates graduating at the end of this academic year!



Dr. Cody Paris
Deputy Director
Middlesex University Dubai

FROM THE PROGRAM HEAD



Time flies when you are having fun! Well, that is how quickly the time has passed since the print of our second issue and we have certainly enjoyed the successful academic year. Once again, I am delighted to welcome you to the third issue of mdx.Stream, newsletter for Computer Engineering and Informatics (CEI), Middlesex University Dubai.

It has been an exciting and immensely busy academic year for both the students and staff. Meeting professionals from the industry, going on field trips, participating in competitions, hosting events and of course studying. Our programmes are running smoothly, industry partnerships are going from strength to strength – all signs of a mature and reputable institution and the department. After all our vision is “to be among UAE’s premier Computer Engineering and Informatics departments, recognized for its outstanding teaching and industry outreach programs, preparing graduates for the challenges of the 21st century through technology.”

We look forward to another exciting year ahead. We also have an interesting events’ calendar already planned out for students, starting with The Chartered Institute of IT (formerly BCS)

sponsored national level student competition in October 2017. We believe in providing maximum industry exposure to our students while they are in University to prepare them for their professional endeavors. We have many guest speakers and field trips planned for students, in addition to a plethora of other events which will keep the students informed and intrigued. Our academic alliances with EMC, CISCO, SAP, Oracle and IBM certainly help us offer courses about emerging technologies and/or certifications like Cloud computing, Big Data, CCNA, ERP and access to various software and development platforms. This year again we have a bigger and better Computing career fair planned out in early 2018 to provide students with maximum opportunities for internships and graduate placements.

I hope that this newsletter will serve as a powerful communication tool for fostering ties between the prospective students, existing students, the Alumni, and the University. We welcome your comments and suggestions, so please feel free to contact me should you have any queries.

I am grateful to our Director, Dr. Cedwyn Fernandes and our Deputy Director, Dr. Cody Paris for their support and encouragement. Also, my sincere thanks to the Editors of the newsletter, Mr. Santhosh Menon (lecturer in CEI) and Joseph Kevin Lester Limeta (BEng Year 2 student) along with the Marketing department for continuing the publication of mdx.Stream.

Dr. Fehmida Hussain
Head of Computer Engineering and Informatics
Middlesex University Dubai

EDITOR'S NOTE



Over the course of the previous year, we have seen great strides in the field of Computer Science. Technological innovation is shaping not only how we go about our daily lives, but how we see life itself. Artificial Intelligence becomes more pervasive by the day, augmenting and redefining the activities that we humans perform, from service optimization to driving commercial vehicles. The digital world has slowly found its way into our realm and is now merging with it as part of our reality, not only through the now-mainstream Virtual Reality but with promising concepts such as Hyper Reality, as seen in one of our student features. As students under Middlesex University's Computer Engineering and Informatics (CEI) department, we stand at the forefront of a new technological revolution. In the unceasing effort to keep up with the wave of innovation, the department, headed by Dr. Fehmida Hussain and our esteemed faculty as well as our student-led MDX Computing Society, goes to great lengths in order to provide the students the skills needed to flourish in this vast field both inside and outside the classroom.

It is with great honor that our team publishes this issue of MDX.Stream. In my first year as its Student Editor, I was able to closely follow and chronicle the journey of CEI one event at a time. I sincerely hope that our readers can have a glimpse of the rapid developments that occur within our halls and feel the bustling life and talent within Middlesex University through the eyes of our students.

I wholeheartedly thank our faculty for their undying support, especially Mr. Santhosh Menon and Dr.Fehmida Hussain, along with the MDX Marketing Department for continuing the publication of MDX.Stream. I look forward to seeing more students share their thoughts and experiences in the next issue.



Joseph Limeta

Student Editor,
2nd Yr BEng(Hons) Computer Systems Engineering,
Middlesex University Dubai

FACULTY PROFILES



Dr. Fehmida Hussain

Senior Lecturer, Head of Computer Engineering and Informatics

Qualifications

DPhil – Informatics University of Sussex, UK
BS Computer Science – University of Houston, USA

Courses

Information Systems Foundations (BIS1201), Fundamentals of Science, Technology, Engineering and Mathematics (CCE1020), Information Systems Project (BIS3999), Individual Project (CCE3050), Information Technology Project (ITX3999), Project Research and Communication Skills (CCE4900), Postgraduate Project in Computer Communications (CCE4910)

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Research Interests

Computational Modelling, Health Informatics, Digital Forensics, Cloud Computing, E-Learning



Dr. Eliseo Ferrante

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Ph.D. (Applied Sciences), Université Libre de Bruxelles, Belgium
M.Sc. (Computer Science), University of Illinois, (USA)
M.Sc. (Computer Science Engineering), Politecnico di Milano (Italy)

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Swarm Robotics, Self Organization, Non-Equilibrium Statistical Physics, Evolutionary Biology



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Master of Computer Science, American University of Beirut
Bachelor of Computer Science, American University of Beirut

Courses

Programming for Data Communication and Problem Solving (CCE1010), Emerging Technologies in Practice (ITX1000), Remote Hosts and Webservers (ITX2000), Database Design (CSD2000), Human Factors in Design (CSD3820)

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Human Computer Interaction, Practice Oriented Teaching and Learning in IT, Data Visualization, Information retrieval & filtering, e-Learning



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Qualifications

PhD in Cybernetics, University of Reading, UK
PG Certificate in Higher Education, Birmingham City University, UK
B.Eng (Hons), USTO, Algérie

Courses

Data Communications (CCE2000), Social, Professional and Ethical Issues in Information Systems (BIS3400), Embedded Linux System and Application Development (CCE3010), Internet Scale Applications and Development (CCE3110)

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Data Communications, Internet Scale Applications and Development, Embedded Linux Systems and Application Development, Social, Professional, and Ethical Issues in Information Systems



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Bachelor of Computer Science (Software Development), UOW
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Computer Systems Architecture and Operating Systems (CCE1000),
Decision Support Systems (BIS2500), Web Development (CSD2500),
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Data Science and Visualization, Blockchain Technology, E-Learning, Information Retrieval and Filtering

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PhD Information Systems & Technology (MIS), Indian Institute of
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Courses

Information Systems Research (BIS2400), Research Methodol-
ogy and Professional Project Development (CCE2060), Strategic
Management and Information Systems (BIS3300), Virtualisation and
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Research Interests

Green IT, Cloud Computing Analytics and Business impact, Big Data Analytics, Utilizing Data Visualizations for
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Pallavi Ranjan

Lecturer

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M.Tech (Computer Science and Engineering)
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Courses

Business Information Systems in Practice (BIS1001), Information
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Computer Networks (CCE1030), Introduction to Programming
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Network Technologies, Bioinformatics

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Qualifications

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Introduction to Business and Organisations (BIS1100)

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UX Consultant

Qualifications

MS in Human-Computer Interaction, Carnegie Mellon University, Pittsburgh

BSc (Hons) IT & Business, Middlesex University, Dubai

Courses

Human Factors in Design (CSD3820)

Research Interests

User Interface Design, Typography, Prototyping, Heuristic Evaluation, Experience Mapping, Cognitive Walk-through, A/B Testing, Competitive Analysis, Information Architecture

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Qualifications

MSc Engineering Management, Middlesex University

Engineer, Electronics & Electrical - Institut Teknologi Nasional, Bandung, Indonesia

Courses

Emerging Technologies in Practice (ITX1000)

Research Interests

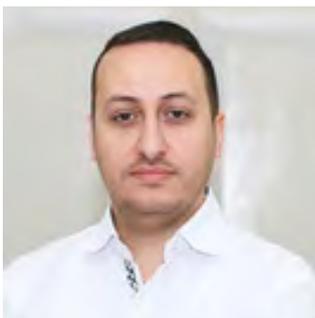
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Courses

Engineering Innovation (PDE4230)

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Innovation Practise and application in Industry

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Director-Middle East & North Africa at ORM&E LLC

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Oct 2016

About 40 students of CEI attended the 36th GITEX Technology Week on October 19, 2016. Accompanied by CEI faculty, Dr. Fehmida Hussain and Ms. Engie Bashir, the students were given a taste of cutting-edge technology across various industries. The vast amount of information available from technological giants and up-and-coming trendsetters are sure to enrich the student experience while giving them an insight into the industries they may wish to enter in the future.

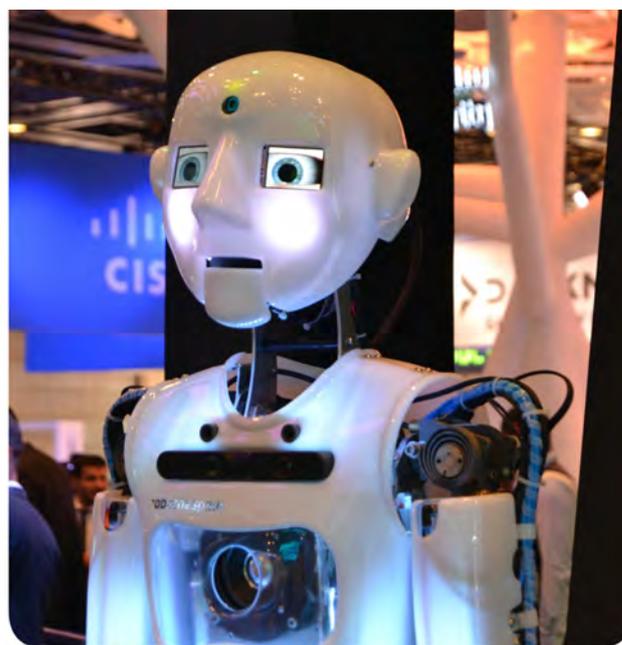


CEI students getting a first-hand experience on the latest and upcoming technologies in the region.

CEI goes to GITEX 2016

The biggest and most anticipated international tech exhibition in the region with the theme “Reimagining Realities” poised on taking a second look at the conventional lifestyle and how it transforms with the latest developments in technology. Virtual Reality, Augmented Reality, Artificial Intelligence, and robotics take the spotlight, as they closely integrate life created in the digital world and our very own.

On the road towards creating truly smart cities, the Dubai Government and businesses from all around the globe came together and provided various solutions to make everyday life safer and more convenient to the masses. Innovative approaches to public utilities, energy, transportation, the environment, and peace and order are prominently featured and will soon see widespread implementation.



Systems governing fleet management, resource management, crime prevention, emergency response, medicine and healthcare, and public information services are all expected to further elevate the already-stellar living conditions of Dubai.

On a more personal scale, IoT platforms, corporate software, cyber security solutions, and cloud-based services were showcased as well, lending a helping hand towards individuals and businesses.

Students shared their thoughts on the event. “I found the GITEX trip very informative and fascinating. I got to see and experience new and upcoming technology in all the different fields.” said Mohammed Taha, from BEng Computer Systems Engineering.

“I was able to have a glimpse of how frontrunners in the tech industry are transforming the very foundations of our society through emerging technologies. It was quite amazing to see the future materialize right before our very eyes.” Joseph Limeta, another BEng Computer Systems Engineering student, remarked.

Smart Dubai for

Happy Living

Guest Lecture by Ms Noora al-Suwaidi, Smart Dubai

Oct 2016

Ms. Noora Al-Suwaidi, the head of Strategy and Performance Management at Smart Dubai Office, delivered a lecture on the Smart Dubai initiative, to the CEI students on October 11 2016.

The lecture was well received by the students who learned from the best practices of Smart Dubai and related their approach, strategy and smart services to the theoretical concepts they cover in the classroom.

The Smart Dubai initiative aims to address the vision of His Highness Sheikh Mohammed bin Rashid Al Maktoum, to make Dubai the happiest city on earth. This is established through strategic partnerships and collaboration with the government and the private-sector who have already brought in smart initiatives and services for residents & families, business owners, tourists and city planners. From here, Ms. Noora emphasizes the goal of Smart Dubai to integrate and centralize all of these services under one platform, namely known for now as DubaiNow. The DubaiNow app was born from a conviction that today is no longer good enough. People want to be able to access city services instantly and now, thus the app empowers, delivers and promotes an efficient, seamless, safe and impactful city experience for Dubai residents and visitors.

Middlesex University and the Smart Dubai Office look forward to many more similar collaborations in the future, working towards a common goal of making Dubai the smartest and happiest city on earth.

This session was arranged by Ms. Engie Bashir.

Ms. Noora also highlighted the importance of participation and involvement of students and academics in Higher Education in this smart initiative not to forget that the “involvement of the stakeholders is the cornerstone of Smart Dubai strategy”.



Ms. Noora al-Suwaidi delivering the lecture at MDX

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Ethical

Hacking

Nov 2016

Guest Lecture by Mr Ankit Satsangi, Security Expert and Consultant

CEI hosted a guest lecture for Business Information Systems and Information Technology students.

The lecture was taken by Mr. Ankit Satsangi, working as a CEH-Cybersecurity-Presales Specialist in Dubai. The session aimed at introducing various concepts related to Hacking in general & Ethical Hacking in particular, Cyber Security, job opportunities in the area of Ethical Hacking and Cyber Security

Mr. Ankit Satsangi with the students after the lecture.



Nov 2016

Emirates NBD

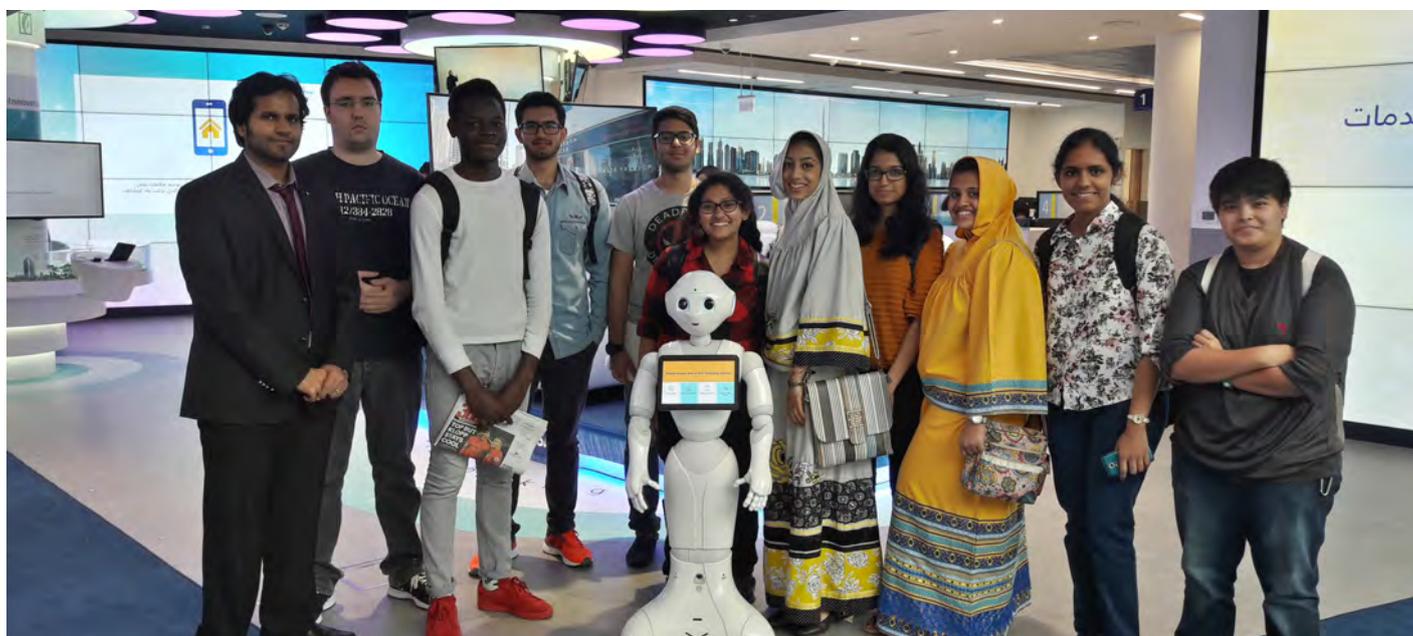
Innovation Lab

Field trip



CEI students accompanied by Dr. Krishnadas Nanath visited Emirates NBD Innovation Lab on 7th November 2016. Students not only witnessed latest technologies in banking, but also experimented with real applications on mixed reality, robotic banking, VISA integrated banking in automobiles and several other prototypes.

This trip was a part of 'Introduction to Business and Organizations' course and it was an attempt for students to think in the lines of future technologies in diverse business verticals. Emirates NBS is on a mission to merge technologies with banking for providing smooth experience to their customers.



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Cisco

Nov 2016

Experience Center

Field trip

The students from the 1st year Engineering program at MDX went on a field trip to the Cisco Experience Center. The students were given a tour of the data center and various technology demonstration rooms at the center, including telepresence and remote service center kiosks. Mr. Ahmed Elkabbany, Regional Manager at Cisco systems was able to answer the students questions.

The trip was arranged by Mr. Santhosh Menon.



MDX hosts

2016 Graduation Ceremony

MDX celebrated the academic success of over 800 students at its Annual Graduation Ceremony held on 12 November 2016. Graduates hailing from over 90 nationalities were awarded their degrees in front of family, VIP guests and the Middlesex University teaching faculty at the event which took place at Jumeirah Beach Hotel's Safinah Ballroom.

As the first overseas campus of the UK's highly-regarded Middlesex University, Middlesex University Dubai opened its doors in the emirate in 2005. Now in its 11th year, students at the graduation ceremony were awarded degrees across the wide range of disciplines offered by the University including Business, IT, Computer Engineering, Media, HR and Psychology.

Each year, Middlesex University Dubai bestows an honorary degree on those who it deems to have made a major impact through their vocation or through their activities, such as education, business, culture, creative works or services to the public. The 2016's Graduation ceremony also honoured two key figures for their outstanding contributions to UAE society.

Honorary Doctorates of the University (DUniv) were awarded to Dr. B.R. Shetty Executive Vice Chairman and CEO of NMC Healthcare, in recognition of his outstanding contributions to the healthcare industry in the UAE, and Mr. Gerald Lawless, Chairman, World Travel & Tourism Council and Head of Tourism and Hospitality at Dubai Holding, in

recognition of his outstanding contribution to the hospitality industry, both in the UAE and globally.

Guests of honour at the Graduation include Deputy Vice Chancellor, Professor Andrea D'Laska and Ms. Anna Kyprianou, Pro Vice Chancellor and Executive Dean, Faculty of Professional Studies and officials from KHDA, TECOM, Business and Government Organisations.

"The success of Middlesex University Dubai is interlinked with the rise of the UAE as a dynamic, forward looking economy and society."

"Congratulations to all of our graduates at Middlesex University Dubai for their hard work, resilience and continued motivation throughout their studies," said Dr. Cedwyn Fernandes, Director of Middlesex University Dubai.

"The success of Middlesex University Dubai is interlinked with the rise of the UAE as a dynamic, forward looking economy and society."

"I am very grateful for the many opportunities that the UAE has given me since I arrived here in 1973," said Dr. B.R. Shetty. "I believe that giving back is just as important as succeeding and I feel honoured that my efforts have been recognised by Middlesex University Dubai."

"I have worked in the hospitality industry for four decades, and it feels like a great honour to be recognised by such a prestigious institution as Middlesex University Dubai for my involvement in the evolution of Dubai's hospitality and tourism sector into the international hub it is today," said Mr. Lawless



Dr. Cedwyn Fernandez addressing the students at the 2016 Graduation Ceremony



Dr. Cedwyn Fernandez, Mr. Gerald Lawless, Prof. Andrea D’Laska and Dr. Cody Paris

“Now in our 11th year of operations here in Dubai, each graduation ceremony represents all that our students have achieved during their academic journey with us. We wish them every success for the future with a new set of skills and qualifications to take the next step in their chosen careers.” said Dr. Cedwyn



Mr. Mohammad Kollere, winner of the best UG student for all UG programs in CEI.



Mr. Juno Srivastava, Winner of the best student award for the PG programs in CEI



Dr. B. R. Shetty



Mr. Gerald Lawless

ORACLE®

Oracle Academy Day

MDX Dubai's CEI hosted the 2016 Oracle Academy Day with the aim of enriching the experience of both students and educators alike in the field of Computer Science. The event, held on November 21, 2016 during the UAE Innovation Week, was headed by CEI lecturer Ms. Pallavi Ranjan in close partnership with Oracle Academy. To jumpstart the event Ms. Ranjan, along with MDX Dubai Deputy Director Dr. Cody Morris Paris, and CEI Campus Coordinator Dr. Fehmida Hussain, gave their opening remarks.

Oracle Academy coordinators delivered talks in the morning to teachers and professors. Mrs. Jane Richardson, Senior Director of Oracle Academy Europe, Middle East, and North Africa discussed the importance of incorporating coding as part of a child's learning experience. She expounded upon the ever-growing need for professional programmers and computer science graduates in various industries in an age wherein technology increasingly governs every aspect of our daily lives. Oracle Academy aims to bridge this skill gap by providing free and accessible learning tools and materials to both students and educators alike. The courses are subsequently tackled in detail by Ms. Ola Ramadan, Oracle Academy Country Manager for Middle East and Africa. The day session was then capped by Mr. Bilal Ibdah from Oracle's Big Data Analytics and Presales with his take on the technical and practical aspects of Big Data, and how these factor into emerging trends in businesses.

In the afternoon, Middlesex University Dubai in collaboration with Oracle hosted the Code-Jam 2016, an inter-school and inter-university

Students from various high schools and universities across the UAE participate in the Code Jam Hackathon conducted side-by-side with the Oracle Academy Day seminars for educators



Oracle Academy Representatives with the CEI Faculty and educators from various institutions

MDX Hosts & Code-Jam 2016

Nov 2016

hackathon with over 100 participants from across the UAE. 33 teams from various schools and universities throughout the UAE revved up their coding skills for the final stage. Students brought their best and brightest ideas to the table in an admirable effort to innovate E-learning, E-government, and E-health services.

Students were expected to build web applications or mobile apps related to the topic of e-learning, e-government or e-health. The judging panel consisted of eight distinguished personalities from academia and industry. Students were assessed on both creativity and technical skills and laptops and iPads were awarded to the first and second place teams in both categories (school and university).

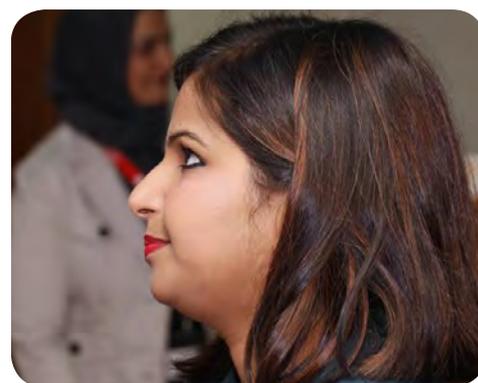
Six teams emerged victorious in the end, with three coming from the schools and the other three from the universities. BITS Pilani Dubai Campus took the top spot among the universities, followed by Middlesex

University coming in a close second, and Abu Dhabi University in third. For the schools, Dubai College won first place, Cambridge International School came in at second, and Our Own English High School securing the third place.

Allen Mathew, a member of MDX's winning team, found the competition to be enjoyable and challenging, giving emphasis on the task of developing an application within a limited time frame. He likewise expressed his appreciation for the way the event was managed. "We found that it was organized very well. Everything was handled properly. The volunteers were really nice and they helped us a lot," he said.

Mrs. Richardson shared her thoughts on the event, citing the CODE-JAM presentation as its most interesting aspect. "The most exciting part, wasn't just the ideas that were coming through, but also the fact that many of the students have been able to actually execute them into code," said Mrs. Richardson. "From an Oracle Academy perspective, we really had a very positive experience. It's something that we would be very keen to support in the future. It was very important for the youth coming from the schools, particularly to show that they are actually beginning to develop their programming skills," she added.

This event was part of the Second Annual UAE Innovation week. The event was overall coordinated by Ms. Pallavi Ranjan and volunteers from the Middlesex Computing Society.



Dec 2016

Microsoft Invites Middlesex University Students to Imagine Cup

Announces This Year's Microsoft Student Partners



Microsoft Imagine Cup Roadshow at Middlesex University's Oasis Theatre

Microsoft Corporation conducted its annual Imagine Cup Roadshow at Middlesex University's Oasis Theatre. Imagine Cup, the largest international tech competition for students, was founded by Microsoft founder and business magnate Bill Gates with the intention to foster technological innovation among the youth. This year, prominent real estate developer Emaar Properties will be the competition's sponsor. They will be working hand-in-hand with Microsoft in encouraging students to develop ideas in line with the UAE's push towards building smart cities. Cash prizes will be awarded to the top 3 ideas, with \$15,000 at stake for first place, \$10,000 for second place, and \$7,000 for third. Additionally, the team garnering the top prize will have the opportunity to compete in the regional finals and later on in the international finals, where the members can win a grand prize of \$100,000.

This year's Microsoft Student Partners (MSPs), international student technology leaders empowered by Microsoft's training programs and events, were announced at the conclusion of the Roadshow. Five students from the CEI were chosen as MSPs namely, Joseph Limeta and Jasmita Malik from BEng Computer Systems Engineering, along with Aamir Khan, Shivani Ajit Kumar, and returning MSP Ali Sajjad, from BSc Business Information Systems. These students will participate in hosting and supporting Microsoft's programs and initiatives throughout the year while receiving exclusive training and opportunities available only to MSPs.

Team Bane's Mercenaries Aamir Khan, Ali Sajjad and Kaavish Hussain with Ms. Engie Bashir and Dr. Krishnadas Nanath

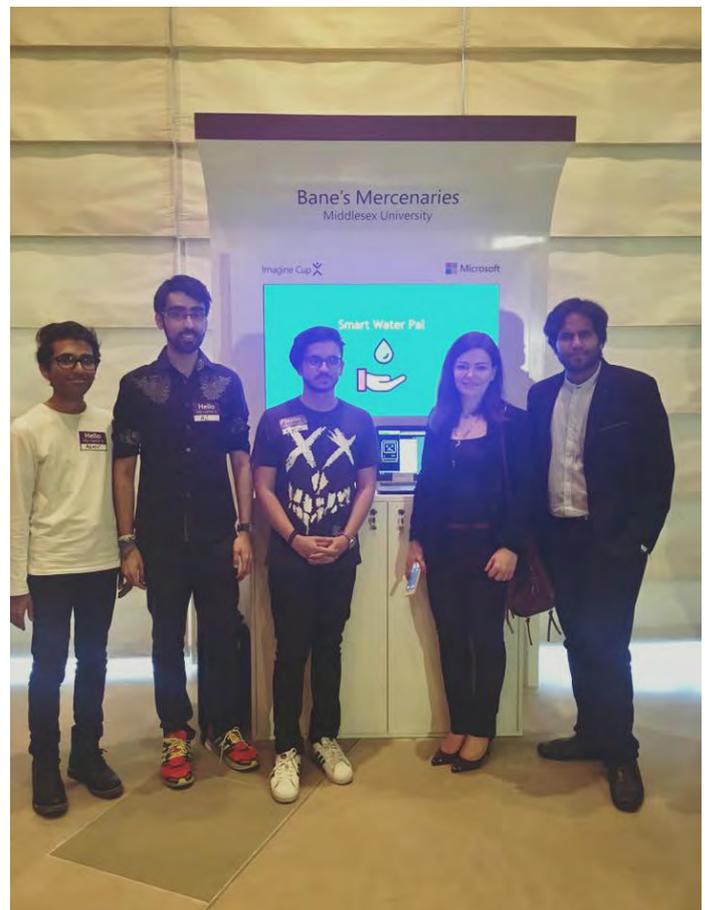
Dec 2016



MDX BIS Students Qualify for Microsoft Imagine Cup 2017 UAE Finals

Technological advancement is not mutually exclusive with preserving the natural environment, and may in fact even play a significant role in encouraging green initiatives.

A team of 2nd Year BSc Business Information Systems students qualified for the UAE Finals of Microsoft's Imagine Cup 2017, the world's premiere tech competition for computer science students all across the globe. Ali Sajjad, Aamir Khan, and Kaavish Hussain, collectively known as "Bane's Mercenaries" made it to the final round of judging among hundreds of participants with their "Smart Water Pal" app in line with this year's theme of Smart Cities. The application tracks the users' water consumption within a set time frame and allows them to set limits on a monthly basis. The users are then sent notifications if the threshold is breached allowing them to adjust their usage accordingly. The team aims to instill a sense of responsibility and sustainability while at the same time making it enjoyable to practice efficient consumption through gamification, accrual of points in cooperation with DEWA, and other similar incentives. "Getting into the finals was an enlightening experience. We got to explore our creative side and incorporate things we've learnt throughout school and university into our idea." shared Aamir. "The most challenging part was actually delivering the idea to the judges, which thanks to Microsoft, we got the amazing Andreea Zoia to train us. It was a rigorous 2-day boot camp." he added.



| Dec 2016

Management

Information Systems

Guest Lecture by Mr Zubair Wahid, ESET Middle East

Mr. Zubair Wahid, working as a Product Manager with EMT Distribution MEA delivered a guest lecture to Business Information Systems and Information technology first year students.

The topic of the guest lecture was outlining the traditional organizational structure. Zubair covered aspects like flow of information in organizations, Decision Making and Problems solving models, Decision support and executive information systems in terms of strategic, tactical and operational needs.

Mr. Zubair Wahid



| Jan 2017

Network & Engineering

CCNP Troubleshooting

Guest Lecture by Dr. Clifford Sule, Middlesex University London

Senior Lecturer and the Programme Leader for BEng/MEng Computer Communications and Systems Engineering programs at Middlesex University, Dr. Clifford Sule visited MDX campus in January. During the visit he gave two guest lectures to the Engineering students, one to the UG students and another for the PG students.

Interacting with the UG students, he asked them about their career plans and enquired regarding the program. He also gave them a view on how to go about studying Networking and how it could help them in their career in the future. Talking to the PG students at the other lecture, he answered questions on the CCNP troubleshooting techniques.

Dr.Clifford Sule



Harvesting from Life Experiences

Feb 2017

Design Talk by Ms Arundhati Basu, UX Consultant and MDX Dubai Graduate

The CEI department of MDX continues to bring in the industry experience to the students enrolled in its academic programmes. This time, the department invited our alumni student Miss Arundhati Basu to share her knowledge and expertise on User Experience and Interaction Design with third year IT students.

Arundhati explained that often many of us measure their success after university through the companies that hire us or the jobs that we grow into, however we subdue our sense of control along with the freedom and security of making choices. She added that there are a lot of myths and rhetoric around the field of User Experience and those who practice it and how she dispels some of these by questioning the different roles you can play in the process. She also discussed a few key trends in design such as dark patterns, service design and the perception of time in

interaction design through stories to show how they actually came to be a part of our everyday lives.

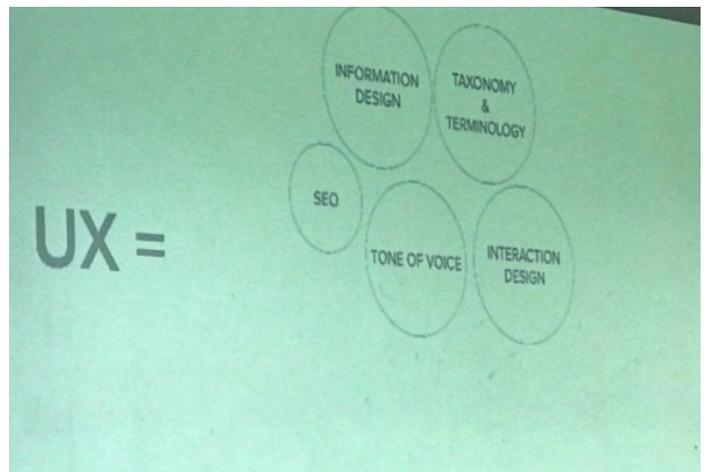
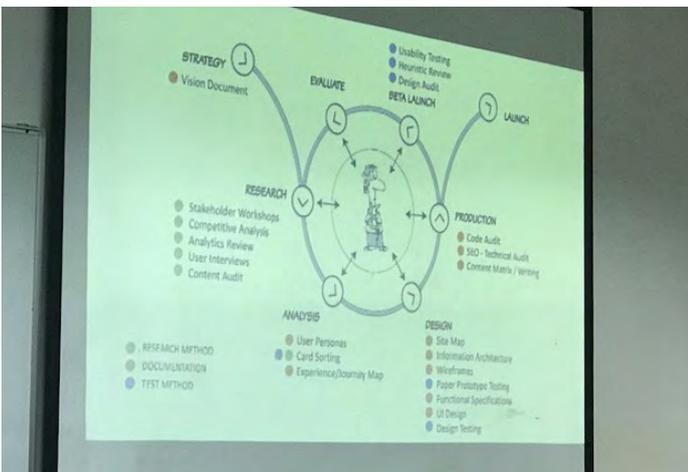
The session was an honest behind-the-scenes conversation about stepping out into a not so forgiving world and taking on the responsibility of designing your own life towards the best outcomes.

This session was arranged by Ms. Engie Bashir.

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Ms. Arundhati Basu



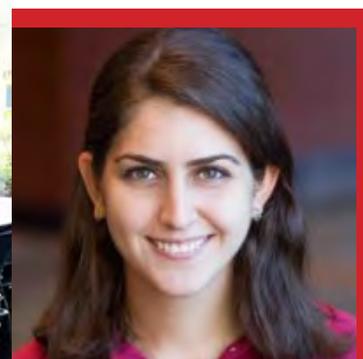
National Instruments

Feb 2017

Gives Computer Systems

Engineering Students

a Look Into the Future



23

Ms. Leen Adnan

National Instruments (NI), predominant provider of technical solutions in the fields of science and engineering, delivered a talk to the first year BEngg Computer Systems Engineering on their futures in the field of computer science and engineering. National Instruments equipment form an integral part of MDX's Engineering programs, playing major roles in the education of students from the moment they step foot in the university up until their final year of study.

The session, delivered by NI Field Sales Engineer Ms. Leen Adnan, touched upon the responsibilities and goals associated with the various fields of engineering. The topic of the 14 Grand Challenges of Engineering was used as a starting point of the talk to give a clearer overview on the role of engineering in our current generation. These challenges, decided upon by a panel of the world's leading technological visionaries, cover a wide array of topics ranging from environmental protection and efficient energy production to the advancement of urban infrastructure and cyber security, among others. The students were then introduced and acquainted with the solutions provided by National instruments that simplify the processes involved in development, testing, and experimentation, helping pave a better path towards solving the most critical issues of our time. Working on National Instruments hardware as students similarly allow them to take a hands-on approach to learning, complementing the theories they learn in lectures.

Ms. Adnan concluded the talk with an interactive forum and a demonstration of the CompactDAQ data acquisition platform. The students actively engaged in a fruitful discussion on the nature of National Instruments' work and research both locally and internationally, the long-term and emerging trends in industrial hardware, as well as the recent advancements in developing the 5G telecommunication standard.



Design and Collaboration



Mr. Amol Kadam

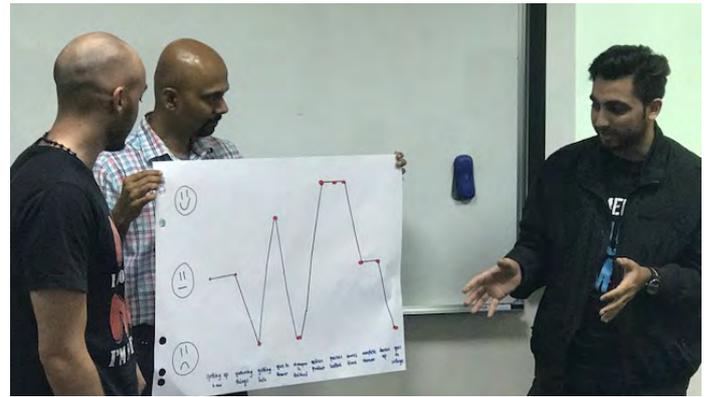
Workshop by Mr. Amol Kadam, RBBi

A fantastic workshop was held by Mr. Amol Kadam, co-founder of RBBi.

RBBi was founded in UAE in 2012 by Amol Devesh Mistry and aim to be a very different kind of an agency. An agency that truly puts end-users needs first. An agency that truly looks at the bigger picture in every project undertaken – how is this going to enhance the digital ecosystem around us? It is the first and only digital marketing agency in the Middle East to specialise in UX, Usability, SEO, CRO, Analytics and Performance Marketing. In this short time period, they have an impressive list of clients from different business areas - Toyota to Emaar, Marriott to the RTA. The diverse experiences from these customers make the agency special.

The workshop proposed to bring the UX industry practices to the third IT students taking the “Human Behaviors In Design” module. The workshop discussed the user experience process and its methods and provided three hands on team activities to the students on product design and innovation.

The workshop was organized by Ms. Engie Bashir.



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Report Writing

Mar 2017

for Interaction Design

Guest Lecture by Dr. Simon Attfield, Middlesex University London

Associate Professor of Human Centred Technology at Middlesex University London, Dr. Simon visited MDX in March 2017. He gave a guest lecture to the students in the Human Factor in Design module on report writing.

He explained the 8 rules for writing a good report and advised on what content should be selected to write out the various sections of the report like the Introduction, methods, results and discussion. He explained these with good samples and compared them to bad writing examples so that students could be made aware of the difference.

The students got helpful advice on something very important in their academic life and also in future careers - effective written communication.

He also gave a talk on Human Centered Visualisation. Interactive visualisations are tools which are intended to help users explore data in the interests of deriving insight. Designing the right information visualisation for a given user-problem however remains as much an art as it is science. The problem, design and evaluation of a visualisation tool for patterns of life analysis was presented. One of the questions in the talk is whether the use of animation in visualisation can provide analytic advantage.



The lecture was organized by Ms. Engie Bashir.



Dr. Simon Attfield

ESD Awareness Session

for CEI's BEngg Students



CEI students with Ms. Pallavi Ranjan and Mr. Satish V.P. Shown in front are the electronic equipment demonstrated during the session.

 **NEURO TECHNOLOGY** MIDDLE EAST FZE

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The CEI's first year Computer Systems Engineering students were treated to a shocking experience at the ESD Awareness Session conducted by Neuro Technology Labs at their main office on April 9, 2017. The session was headed by Neuro Technology Managing Director Satish V.P. who delivered lessons on the dangers of electrostatic discharge when handling sensitive components and equipment which comprise a significant portion of the students' coursework and professional practice in the future. Mr. Satish went through the science behind electrostatic buildup and its properties before testing the students' knowledge on the subject through an interactive quiz session.

The concept of mind mapping and the use of corresponding software were similarly touched upon as a way of introducing a method that could prove to be valuable in a professional collaborative setting. The students were then treated to a tour around their laboratories, showcasing the industry-standard equipment they provide to various companies in the field of engineering and aviation across the UAE, immediately followed by an introduction to their soldering school, which is a first in the country.

Before concluding the field trip, the students were given the chance to experience an extreme case of static electricity generation, transfer, and discharge through the use of a Van de Graaff generator. The students found the educational trip to be quite informative while at the same time enjoyable, giving them an idea on how to prevent unintentional and hard-to-detect damage to circuitry and electronic devices by taking proper safety precautions through a series of engaging activities.

The trip was organized by Ms. Pallavi Ranjan.



COMPUTING SOCIETY EVENTS



App Hack



26

Code Jam





Imagine Cup

Women in Stem Conference



DEWA Hackathon



Startup Weekend in Abu Dhabi



Ministry of Finance Hackathon



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Ministry of Education Hackathon



Innovation Week

Innovation is not merely a buzz word especially in the context of the UAE, and the UAE Innovation Week from 20th Nov 2016 to 26th Nov 2016 is a proof of the importance that the government gives to innovation.

Students at Middlesex University Dubai are constantly encouraged to embrace innovation and seek opportunities to contribute to the vision of the UAE to become a hub of innovation. The UAE Innovation Week was a busy time for students of CEI, as they were engaged in numerous creative and innovative endeavors.

The week started off with 3 teams comprising students from Year 1 and 2 (across IT, IS and Engineering programs) submitting their projects to the Open Source Competition by the TRA. The demo day was hosted later in the week at the University of Sharjah. Two of the teams were mentored by Ms. Engie Bashir, and one by Mr. Jaspreet Singh. The team of second year BIS students Ali Sajjad, Ayoub Mahdavi, Augustin, Isuri Wijesooriya and Kaavish Hussain, mentored by Ms. Engie made it to the final rounds of the competition. The team was appreciated for their innovative idea related to saving water using sensor based technology.

On Sunday, 20th Nov, our winning students from Team Alpha (Leanne Dsouza, Ayoub Mahdavi, Akshay Vishnani, Kathy Tavares & Macy Fernandes) of the Emirates NBD Future Intelligence Program (held earlier this year) were invited to showcase their winning idea at an exclusive event, the Innovation Expo at Emirates NBD Innovation Day. This opportunity allowed the students to demo their idea to senior management and C-level executives of ENBD. Further ENBD recognized Middlesex University Dubai as a valuable partner for the role played in making the Future Intelligence program a success.

On 21st Nov, Oracle sponsored Code Jam was held on campus with nearly 100 students from schools and college participating and competing to showcase their ideas and projects. Active participation from school and university faculty who were on campus to attend the Oracle Faculty Day was another highlight of the event. The University Category of Code-Jam saw 2nd year Engineering students Allen Mathew and Tarun Gupta walk away with the second prize for their project in the E-Learning category. The event was a major success thanks to the efforts of Ms. Pallavi Ranjan, lecturer with CEI.

In parallel with Code-Jam, 17 students from CEI from across the three years of degree programs were busy at The Annex, Burj Khalifa, brainstorming and putting their innovative ideas to fruition over a 36-hour period at the Microsoft sponsored Ministry of Finance Hackathon. All teams did a brilliant job and gave strong competition to other participants at the event.

However, our students saved the best for the last. Two student groups enrolled for the Ministry of Education Hackathon held on 24th-25th Nov at the Festival Arena, Dubai Festival City. Team 404, with Allen Mathew, Leanne Dsouza and Tarun Gupta emerged as the overall winners for their project idea centered on reducing electricity consumption and walked away with a prize of AED 20,000 sponsored by the Emirates NBD.

It was indeed a week of brilliant performances, and we at MDX are proud of all our students.

Competitions List

IATA NDC Hackathon

October, 2016

Leanne D’Souza participated in the competition representing MDX.

OSS Competition

November, 2016

Group 1: Ali Sajjad, Ayoub Mahdavi, Kaavish Hussain, Isuri Geesha, Augustin Thomas Jose

Group 2: Faheem Fazil, Yusuf Turaki, Lucas Moreira, Rohit Vaddi, Tito Dobir

Group 3: Allen Mathew, Tarun Gupta, Gatlin George

Oracle Code Jam

November, 2016

Team consisting of Allen Mathew & Tarun Gupta



The team won the 2nd Prize in the competition.

UPDATES

Ministry of Finance Hackathon

November, 2016

Individual participants: Leanne Dsouza, Jasmita Malik, Jyotika Thukral, Tarun Gupta, Allen Mathew, Mohammad Taha, Nikhil Suresh, Anusha Pramod, Isuri Geesha, Augustine Jose, Kaavish Hussain, Ayoub Mahdavi, Ali Sajjad, Faheem Fazil, Rashid Jaffar, Rohit Vaddi

Ministry of Education Hackathon

November, 2016

Leanne D'Souza, Allen Mathew, Tarun Gupta



Won the 1st Prize in the Hackathon.

GlassQube Startup Weekend FinTech Abu Dhabi powered by Google

December, 2016

Team: Aqueel Ahmed, Leanne Dsouza, Shivani Ajit, Jyotika Thukral + 3 externals.

Other Participants:

Rohit Vaddi, Allen Mathew, Mohammad Taha, Nikhil Suresh, Anusha Pramod, Lucas Moreira, Omar Gado, Tarun Gupta

Microsoft Imagine Cup

1 Team

Caltech Hackathon 2017

March, 2017

Leanne D'souza was selected for this prestigious event from the Middle East region.

NYUAD Hackathon

April, 2017

Leanne D'souza

5th UAE Undergraduate Research Competition, ADU

May, 2017

Carolyn Arbo, Leane DSouza, Carl & John Lozano

2nd Student Research Colloquium, Manipal University

May, 2017

Carolyn Arbo, Leane DSouza, Carl & John Lozano

If you have heard of a competition and would like to participate in it, please get in touch with CEI faculty Mr. Jaspreet Singh (j.sethi@mdx.ac.ae) or contact any of the Computing Society members. We are always looking for individuals to join our competition teams.

MDX Dubai Takes Home the Crown in Ministry of Education Hackathon

MDX students from CEI took home the crown and a AED20,000 prize in a hackathon organized by the UAE Ministry of Education and Emirates NBD with the theme “Innovation Fuels the Future.” Team “Taqat” comprised of BEng Computer Systems Engineering students Allen Mathew and Tarun Gupta and BSc Information Technology student Leanne D’Souza took upon the challenge of developing an application that aids environmental initiatives through applied learning for children. Participants were given a day to build upon their concepts based on their respective categories.

The team dazzled the panel of judges consisting of government officials and Emirates NBD executives by developing a web and Android-based game in which the desert is slowly transformed by the player into a lush, green paradise with the aim of instilling the importance and beauty of the environment into the minds of the younger generation through a friendly and interactive manner. The final build of the proposed application was planned to be created in close cooperation with DEWA and the Ministry of Climate Change and Environment. As point-based milestones are reached by groups and individuals in the game, these government entities will bring the concept into reality by planting trees within their respective communities. “Of all the hackathons I’ve joined, this one was unique in that it doesn’t focus on monetization or generating income, but rather on how individuals can make a difference in their own little way,” Allen explains as he recalls his motivation throughout the event. “We couldn’t believe it when our team name was called. We were really astonished. It was a wonderful journey, from the conception of our ideas up until their implementation. I was glad that I was able to share this great moment with my friends.” he concluded.



Allen Mathew, Tarun Gupta, and Leanne D’Souza at the awards ceremony

Joseph Limeta, Azab Jenifer, and Ndubuisi Ukwuani with their Dell-EMC Cloud Computing Associate-level Certificates

Middlesex Students Granted Cloud Computing Certifications

MDX Dubai CEI students have recently concluded its Cloud Infrastructure and Services certification course, taught by the department’s Prof. Engie Bashir, in partnership with industry frontrunner Dell-EMC as part of the university’s academic alliance. Four students namely, Azab Jenifer, Ndubuisi Ukwuani, Danish Nihal, led by top-scorer Joseph Limeta, passed the exam and received Associate-level certifications. The students can now opt to continue the Cloud Computing courses in the future for Specialist-level certifications on cloud design and implementation. The course, along with the subsequent accreditation exam, is offered for free to MDX students as an institutional benefit to this partnership.

The Cloud Infrastructure and Services certification course gave the students foundational knowledge on the revolutionary cloud computing platform, which is currently being adopted by major players in the technological world as a means of providing and hosting applications and services. The lectures, conducted over several weeks, tackled a wide variety of topics ranging from the core concepts and principles of the platform, its technical aspects such as virtualization, and efficient management of a cloud implementation.



TRAINING PROGRAMS

AT CEI

OSS Training (3 days)

October 2016

Conducted by Engie Bashir

Selected students (10) from all CEI programmes.
Part of the training for the OpenUAE OSS Competition.

Usability Lab Training

January 2017

Conducted by Engie Bashir through RBBi

Selected students (6) taking CSD3820

Cloud Infrastructure Services (CIS)

April 2017

Conducted by Engie Bashir under EMC Trainings

Open for students from all CEI programmes, the training was attended by 17 students.
The training extended over 2 weeks, for a total of 40 hrs of classes.
Total of 7 students have been certified.

Data Science & Big Data

April 2017

Conducted by Dr. Krishnadas Nanath under EMC Trainings

Open for students from all CEI programmes, the training was attended by 17 students.
The training extended over 2 weeks, for a total of 40 hrs of classes.

CCNA Training - Modules 1 & 2

October 2015 - April 2016

Conducted by Santhosh Menon and Jaspreet Singh under Cisco NetAcademy

Open for students from third year UG and all PG students in CEI programmes, the training was attended by 10 students.

The training extended over 20 weeks, 3 hrs per week for a total of 40 hrs of classes.

Online Course on IoT, CyberSecurity and Entrepreneurship

October 2015 - April 2016

Provided as self study online material under Cisco NetAcademy

Open for students from in CEI programmes, the training was attended by over 25 students.
The material was provided over the NetAcademy website for self study by the students.



Cloud Infrastructure Services (CIS)

April 2018

Conducted by Engie Bashir under EMC Trainings

Open for students from all CEI programmes, the training was attended by 17 students.

The training extended over 2 weeks, for a total of 40 hrs of classes.

Data Science & Big Data

April 2018

Conducted by Dr. Krishnadas Nanath under EMC Trainings

Open for students from all CEI programmes.

The training extends over 2 weeks, for a total of 40 hrs of classes.

CCNA Training – Modules 1 & 2

October 2017- April 2018

Conducted by Santhosh Menon and Jaspreet Singh under Cisco NetAcademy

Open for students from third year UG and all PG students in CEI programmes.

The training over 20 weeks at 3 hrs per week covers the basics of Networking devices and their configuration. The students who complete the course get the course completion certificate and discount vouchers for the Cisco CCNA certification examination.

Online Course on IoT, CyberSecurity and Entrepreneurship

December 2017 - July 2018

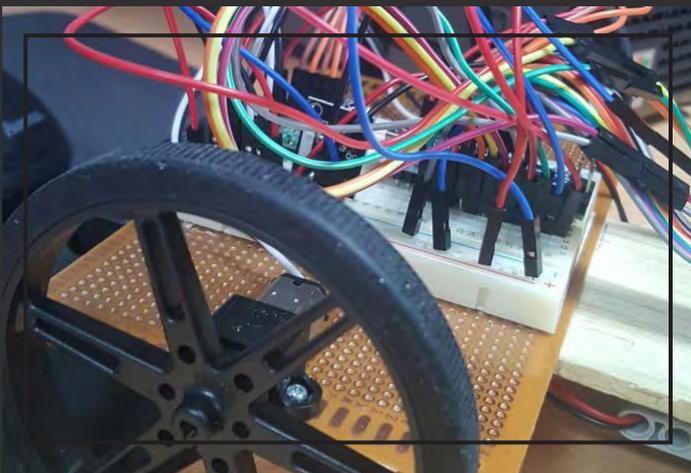
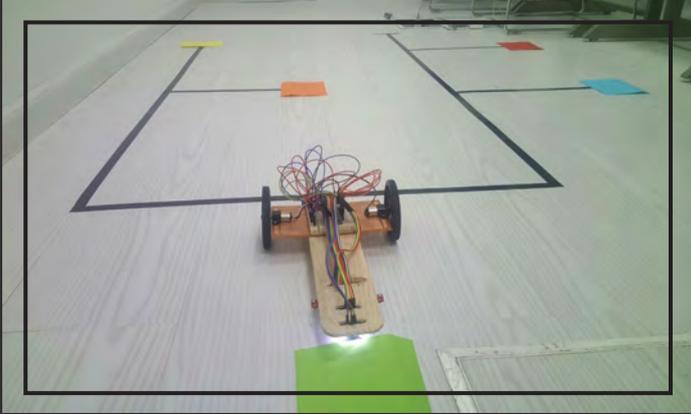
Provided as self study online material under Cisco NetAcademy

Open for students from in CEI programmes.

The material was provided over the NetAcademy website for self study by the students.

By: Joseph Limeta

Photo credits: Otobong Friday
Leanne D'Souza



PROJECT SPOTLIGHT: Otobong Friday and Leanne D'Souza

2017 BSIT graduates Otobong Friday and Leanne D'Souza have recently entered in prestigious national research competitions here in the UAE. Otobong, known as Ottee among his friends and peers, submitted his robotics project to the Fifth Undergraduate Research Competition organized by Abu Dhabi University while Leanne developed a chat bot application for the 2017 New York University – Abu Dhabi Hackathon for Social Good in the Arab World.

Ottee presented his autonomous delivery robot built under the guidance of his supervisor, MDX Computer Engineering and Informatics Department Senior Lecturer Dr. Eliseo Ferrante and his mentor, MSc Engineering Management student Judhi Prasetyo. Ottee's research project made it to the semi-finals of the competition.

// That research gave me an edge in getting my current job and I am glad I did it. -Ottee

"The project was about an autonomous delivery robot that should be able to self-learn any mapped indoor environment by reading the lines or markings that the robot is programmed to recognise and then storing what it learns internally. Then using an algorithm to optimize what it has learned, to be able to navigate from a start point to a finished point unaided." said Ottee, describing the overall concept of his submission. "This was a way to begin research on how to implement a low-cost, minimal infrastructure, self-operating indoor delivery system that could be functional in large restaurants, airports, hospitals, postal offices, factories, and the like for moving things from one point to another, especially when it involves a predetermined path, routine, or known destinations." he added.

Ottee mentioned his AI development class under Dr. Ferrante as the starting point of his project's concept. "The idea for me to research this came after a maze solver coursework in

hackathon with her mentors from the University of Oxford and Google and teammates from universities across the Gulf region. Their project, named Teslam, won as the Audience Winner.



Teslam is an interactive, intelligent conversational chatbot that aims to visualize actionable data related to non-communicable diseases in the Arab world, such as obesity and diabetes. This is achieved through methods covering big data and machine learning with the intent to share the information gathered with government agencies and business entities as well as educate those individuals who are afflicted with these conditions. "The bot is like a friend," says Leanne, who was primarily responsible for developing the chatbot itself. "It would help with overall health and fitness. Like a human it will lose weight and gain weight, somewhat similar to the user. Machine learning and data science were used too, to predict trends of issues like obesity which are common in the Gulf region though the initial model was trained on a US dataset due to a lack of data in the region. The bot supports both English and Arabic languages," she further explains.

our AI class. My professor, Dr. Eliseo Ferrante, challenged me and another student to research and program a line follower robot in preparation for a competition at a nearby university. Then I thought of achieving a delivery system using line following and maze solving algorithms. I was then introduced to Judhi Prasetyo, who has worked with the Arduino electronic chip." Ottee proceeded to discuss his development process with Mr. Prasetyo. "He then tutored me about robotics as well as the electronic aspect. Judhi ran a simulation using Macros in Excel and the algorithm used was feasible. I then wrote a paper on the methodology, featuring Judhi's algorithm and developed a line follower robot."

Ottee recounted his experience at the competition. "The Abu Dhabi competition came up and I submitted my paper for it. Sadly after screening thousands of entries, my research only made it to the semi-finals. But for the first time in my educational career, I was bold enough to venture into researching and writing a scientific paper." He was thankful for the experience and gave his thoughts on the entire process. "I went on to submit this as my final year project. I achieved the line following robot and submitted the methodology for achieving the completely autonomous delivery robot. That research gave me an edge in getting my current job and I am glad I did it."

Leanne entered the

// Teamwork is important. We had different backgrounds and didn't always see eye to eye ...but when we started focusing on the tasks more we did much better.
-Leanne

"Teamwork is important," says Leanne as she was asked about her most important takeaway from the competition. "We had different backgrounds and didn't always see eye to eye so that did cause some complications but when we started focusing on the tasks more we did much better."



Microcontrollers: Miniature Computing Wonders

by: Mohammed Haseeb

A surprising number of products have microcontrollers hidden in them, your microwave oven with the screen and the keypad, cell phones, a laser printer, anti-brake system or cruise control in a car – all microcontrollers. Essentially anything that is user interactive has a microcontroller working behind the scenes.

So, what is a microcontroller? one word – computer, in comparison to a desktop which is ‘general purpose computer’ a microcontroller is a ‘special purpose computer’, its dedicated to one task and to run one specific program. they are embedded into devices and are extremely low powered in comparison to a desktop computer. (software) (cpu)

Micro-controllers significantly scale down the size and build time of traditional electronics, it often takes too many logic gates to implement simple devices, a digital clock for example takes almost 15 to 20 chips, a simple code executed on a microcontroller can replace those gates or chips, and if desired you can have an added feature to notify for low battery.

With a micro-controller like raspberry-pi you can design your own Roomba (cleaning robot) or build a drone as good as a DGI drone; the possibilities are endless.

Most people are familiar with the CPU acronym which refers to the central processing unit. The core of a microcontroller is also a central processing unit

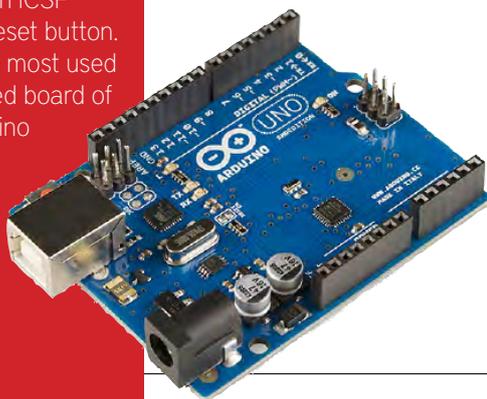
From the atomic level to the CPU architecture, here is an overview of how microcontrollers work:

- 1.Semiconductor Physics: silicon is doped to create semiconductor properties.
- 2.Transistors: semiconductor material is arranged to form transistors
- 3.CMOS: transistors come together to form circuits that perform boolean algebra
4. Logic: both combinational and sequential logic used to form the major building blocks of a CPU
- 5.Microcontroller Architecture: digital logic circuitry comes together to execute instructions

Learning to incorporate a code into a circuit undoubtedly makes it interesting and fun to learn. I think a basic education on the subject in schools would give an elemental insight of the vast subject and might help some students shape a better decision. This approach to technology teaching was highly encouraged and successful in Finland. Trying new ways to solve problems and pitching new ideas adds to creativity, structuring the code to a specific circuit also enhances problem solving skills.

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Arduino Uno is a micro-controller board based on the ATmega328P (data-sheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. The UNO is the most used and documented board of the whole Arduino family.



HYPER REALITY

Taking the Next Logical Step for Augmented Reality

by: Allen Mathew

Hyper Reality is a term coined by James Bruton from Southampton, UK, a technology enthusiast who invests his spare time developing videos on creative engineering projects ranging from functional sci-fi props and costumes to experimental electronics and 3D printing designs.

In one of his recent videos, he defines Hyper Reality as a technical proof of concept to show how we can mix physical and virtual reality in the same physical space. Hyper Reality, in a sense, is the next logical step beyond the increasingly popular AR technology that's being employed by several commercial apps in this day and age.

In this video, a Giant 3D printed LEGO Blaster fires AR Lego bricks into target objects in the virtual world which produces tangible effects on targets back in the physical world. In order to accomplish this alignment & merging of the physical and virtual worlds, he used an HTC Vive Tracker along with a miniature display.

He then used 3D Lego Minifigs as targets and placed them both in the virtual and physical world.

A miniature screen attached to the LEGO Blaster acted as a virtual camera which is tracked in space by the HTC Vive handset. From here he was able to create a virtual environment and implement gun physics to the virtual world in order to knock over the virtual targets when fired. Now in the physical world the targets have bases which have servo motors installed with a lever



attached to them. The bases are used to propel the Minifigs in the physical world as a reaction to the virtual targets getting knocked over in order to synchronize the effects between the two worlds. The electronics are based around an Arduino Uno which triggers the lever via unique values assigned to them. The Arduino code is multitasking so multiple levers can be triggered at once. The levers are slightly lifted and knock the Minifigs over in the physical world. These levers are then triggered whenever a Minifig target gets knocked over in the virtual world.

This proof of concept can go further by reversing the process. A Vive tracker could in turn be attached to physical objects in order to produce reactions in the virtual world. In this particular scenario, the Vive trackers attached to the physical targets could be mapped to the spatial positioning of the virtual targets, mimicking any changes in their placement or movement. In fact we could go in and out of the virtual world as many times as we wished for some concepts.

This concept is a small step to becoming something even greater as it creates a platform for inventors to build up upon. Just like Virtual reality it enhances user experience in discovering an entirely new world.

The concept would break barriers when it comes to the gaming industry for it would allow users to experience even more depth in the games environment and characters.

When it comes to the entertainment industry Virtual arenas and theme parks would have a bit more life in them in the since it would provide an illusion to the users making them doubt as to what is real and what isn't. The beauty of the concept is that it limited only to one's imagination.



James Bruton's 3D-printed Hyper Reality hardware

Artificial Intelligence: How an Artificial Neural Network Forms Its Own Memories

by: Maingel Ulep

Clive Wearing is a noted British musician, but he's perhaps best known as the man with a 30-second memory.

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In the 1980s, Wearing contracted a strain of herpes virus that attacked his brain and destroyed his ability to form new memories. He might forget what he's eating before food reaches his mouth. He struggles to frame experiences of the present with conceptions of time and place. Life for him is often akin to waking up from a coma — every 20 seconds. In a certain sense, artificial neural networks are Clive; they operate without working memory, erasing everything they learned when assigned to a new task. This limits the complexity of operations they can accomplish, because in the real world, countless variables are in constant flux.

Now, the team from Google DeepMind has built a hybrid computing system, what they're calling a "differentiable neural computer" (DNC), which pairs a neural network with an external memory system. The hybrid system learned how to form memories and use them to answer questions about maps of the London Underground transit system and family trees.

"Like a conventional computer, it can use its memory to represent and manipulate complex data structures but, like a neural network, it can learn to do so from data" the authors wrote in their paper, *Nature*.

Neural Networks Enhanced

Neural networks don't execute functions with sets of preprogrammed commands; they create their own rules of operation through pattern recognition.

Researchers feed an artificial neural network a training set of solved solutions to a specific task and all the data passes through hierarchical layers of interconnected nodes, or neurons. As more training data is fed through the layers, a simple computation that occurs at each node is automatically adjusted until the output matches the training set solutions. It's sort of like tuning a guitar through trial and error. In this way, neural nets can parse data in images to recognize faces in photos or translate languages from text all on their own, based on patterns we would never recognize. But this skill can only go so far, and if you want that neural net to perform a new task, it needs to reset and

consume another training set to tune itself. With memory, a neural network can keep its knowledge on file and use what it learned for another task.

"Neural networks excel at pattern recognition and quick, reactive decision-making, but we are only just beginning to build neural networks that can think slowly — that is, deliberate or reason using knowledge,"

Getting from Point A to B

Researchers fed the DNC maps of the London Underground system, and the neural net found patterns parameters in its memory — it offloaded its foundational "knowledge" into memory matrices. It built a simple, symbolic representation of the Underground in its memory. And again, it did this all without programmed commands.

An unaided neural network had trouble charting a course from station to station, and only arrived at the correct location 37 percent of the time after 2 million training examples. But a neural network enhanced with memory reached the correct destination, and found the optimized route, 98.8 percent of the time after only 1 million training examples, researchers say.

It could do similar work with a family tree. Researchers trained the neural net with information about parent,



child, and sibling relationships. It then stored these basic parameters in its memory, which allowed it to answer far more nuanced questions like "Who is Freya's maternal great uncle?" by drawing upon its memory when needed.



Algorithms crafted by AI researchers were already solving these same rational, symbolic reasoning problems back in the 1970s. And other deep learning methods are far better than a DNC at logical data mining tasks. Again, the big difference is the DNC taught itself how to parse the data and how to use its memory, but its practical uses will be limited for now.

"Other machine learning techniques already exist that are much better suited to tasks like this," says Pedro Domingos, a professor of computer science at the University of Washington and author of *The Master Algorithm*. He wasn't involved with the study. "Symbolic learning algorithms already exist, and perform much better than what (DeepMind is) doing."

Flesh and Blood Analogues

It's worth emphasizing here that neural networks are simply crunching numbers, so anthropomorphizing what they do only breeds misconceptions about the field in general. What we might

consider “knowledge” is incredibly fluid, and disputed. Still, DeepMind researchers drew human-computer parallels in describing their work.

“There are interesting parallels between the memory mechanisms of a DNC and the functional capabilities of the mammalian hippocampus,” researchers wrote.

Without prior programming, the DNC compiles information into a set of remembered facts that it can draw upon to solve complex problems — it doesn’t have to reinvent the wheel with each new task. It’s sort of what babies do once they’re about 10 to 12 months old.

Infants younger than 10 months commit the classic “a not be error”: A researcher puts a toy under box A ten times consecutively and the baby crawls to box A for a reward every time. But when the researcher puts the toy under box B, in full sight of the infant, it still goes to box A because it’s executing a learned pattern.



Try that with a 1-year-old, and they won’t be tricked. That’s because they are making connections between their memory and what’s unfolding in front of their eyes. They’re using symbolic reasoning. The toy doesn’t disappear when it’s under box B, you just can’t see it. How, exactly, the human brain stores symbolic representations of the world through electrical impulses alone is still hotly debated. But a DNC, researchers say, may serve as a rudimentary analog for this process. As DeepMind researchers wrote in their blog:

“The question of how human memory works is ancient and our understanding still developing. We hope that DNCs provide both a new tool for computer science and a new metaphor for cognitive

science and neuroscience: here is a learning machine that, without prior programming, can organize information into connected facts and use those facts to solve problems.”

“The problem with a lot of this is, at the end of the day, we know almost nothing about how the brain works,” says Domingos. “No matter what I do I can always make some sort of parallel between what a system is doing and the brain, but it isn’t long before these analogies depart.”

A Long Way to Go

For perspective, building symbolic “knowledge” of London Underground maps and family trees required 512 memory matrix locations. To deal with a flood of dynamic information about the world like even an infant can, researchers say, it would likely require thousands if not millions more memory locations — we still don’t know how the brain does it, so, frankly, this is just speculation.

“We have a long way to go before we understand fully the algorithms the human brain uses to support these processes,” Jay McClelland, director of the Center for Mind, Brain and Computation at Stanford University told IEEE Spectrum.

DeepMind has constructed a very, very preliminary foundation, and hybrid neural networks could eventually be scaled up to, for example, generate commentaries about the content of videos. These are things humans can do with ease, in any situation. A DNC still needs millions of training examples to accomplish a quite narrow task. Right now, it isn’t clear what practical function a DNC could perform that existing deep learning algorithms can’t already do better. A DNC, in other words, is another clever way to accomplish a task in a field that’s awash in clever solutions.

“Adding memory only seems like a big deal in the context of neural networks; for other learning methods, it’s trivial,” says Domingos.

Still, this demonstration serves as proof that memory, or knowledge, can be a powerful thing.

“The question of how human memory works is ancient and our understanding still developing. We hope that DNCs provide both a new tool for computer science and a new metaphor for cognitive science and neuroscience”

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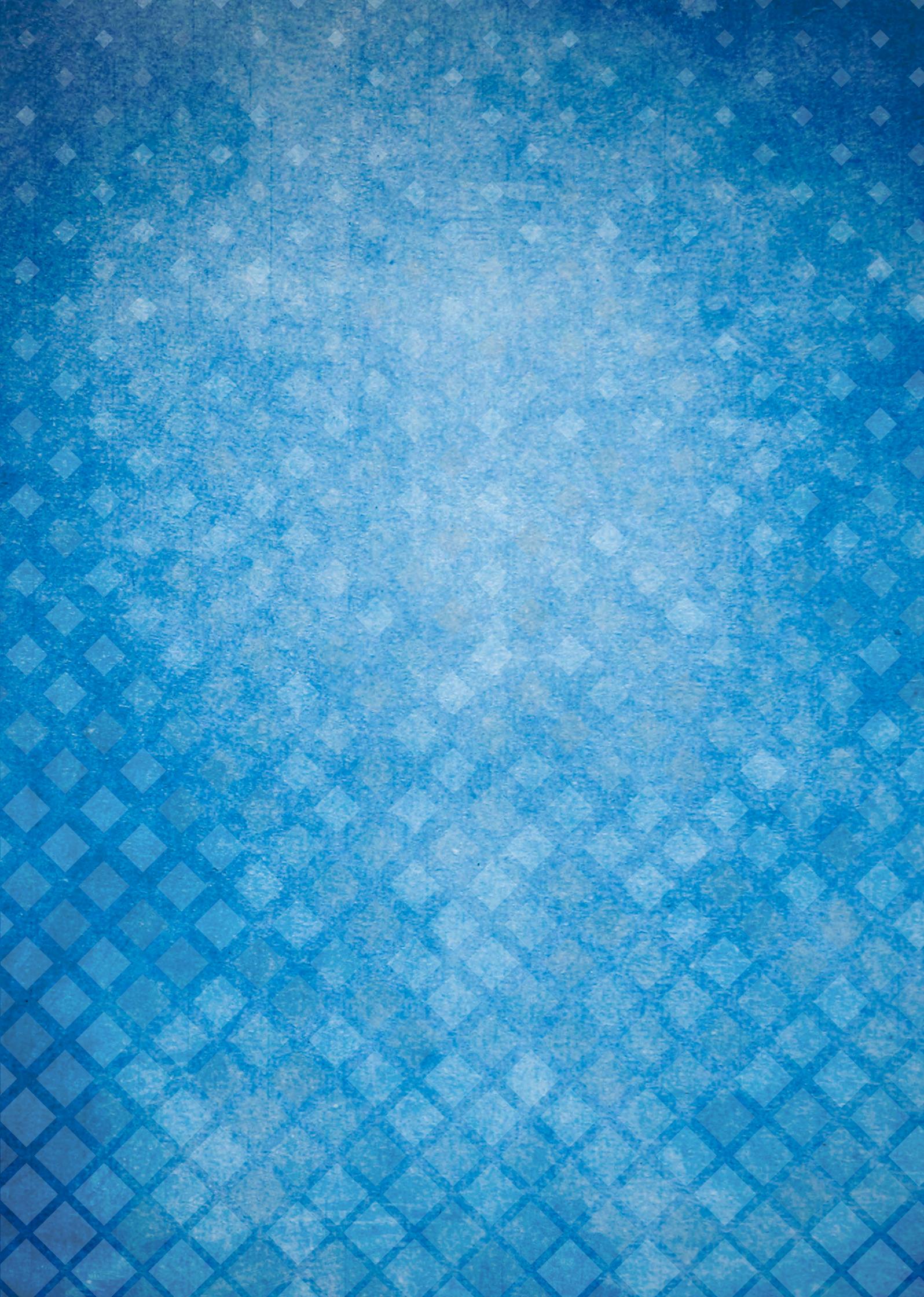
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Academic Calendar 2017-18 Dubai



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