Editor's Message

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EMU Research Newsletter is published quarterly through the office of the Research Advisory Board. The information presented in the *News Highlights* and *Recent Publications and Presentations* sections are as they are submitted by faculty members.

Cover Design:
Ersev Sarper

Published by:
Eastern Mediterranean University
March 2011

Dear colleagues,

Welcome to the last issue of the year 2010. In this issue, we highlight and summarize some of the research activities at EMU in October, November and December 2010. You will also find information on the research papers EMU academics have published and presented at conferences.

In our Research Spotlight section, we find out about Prof. Dr. Alagar Rangan's research leave at the Los Andes University in Bogota, Colombia, where he was not only involved in collaborative research but also offered a short term course.

Alireza Lajevardipour is pursuing his PhD degree in the Department of Physics at EMU. Alireza is working on 'Graphene', a relatively new research field, which he says "has limitless potential to impact on our lives". Alireza has kindly shared his research with us in the 'Student Research Profile' section.

Our alumni in this issue, Sonay and Mohammad who are now away from Cyprus, remember their days at EMU fondly, and emphasize how much their education at EMU has benefitted them.

We would like to remind you again that you can reach us through e-mail, and through our website. We are looking forward to your comments and suggestions regarding the EMU Research Newsletter. Here is our e-mail: research.newsletter@emu.edu.tr, and our website address: http://researchnewsletter.emu.edu.tr/

I would like to express my sincere gratitude to all the contributors in this issue for providing us with valuable material. Please remember that without your contributions, the EMU Research Newsletter would cease to exist. As usual, I am extremely grateful to the members of the Editorial Team for their feedback, comments, and ongoing support.

With my very best wishes,

Asst. Prof. Dr. Nilgün Hancıoğlu
Editor-in-Chief

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Research @ EMU

EMU ranks as the Top TRNC University in Eduroute Website Based Rankings

Eduroute, which evaluates and ranks higher education institutions throughout the world in accordance with set criteria, has announced Eastern Mediterranean University (EMU) as the top university in the TRNC. Based on the 2010 ranking methods by Eduroute, EMU was evaluated as the top university throughout North Cyprus, 47th university throughout the region and 158th university throughout the world. Eduroute obtains information about higher education institutions and evaluates them annually through analysing their official webpages. and provides web based rankings. Ranking methods of Eduroute are based on the following: Research activities and publications of the university (20%), online academic publications of the university (10%), quality of the university webpages (30%) and quality and content of the links on the university's webpage (40%). Rankings by Eduroute reflect the quality of the Eastern Mediterranean University as an institute of higher education.

News adapted from: www.emu.edu.tr

OIKODOMOS: a virtual campus to promote housing studies at European scale

EMU Faculty of Architecture HERA Center has become a new partner for the second stage of the OIKODOMOS Research Project. This pedagogic research project has been co-funded by the Lifelong Learning Programme of the European Union started on November 1st 2010. OIKODOMOS (www.oikodomos.org) is a pedagogic research project financed by the Lifelong Learning programme carried out by higher education institutions and research centers from Belgium, France, Slovakia, Spain, Switzerland, North Cyprus and the United Kingdom. The goal of OIKODOMOS -a Greek word for "the builder of a house", is to create a virtual campus to support and promote housing studies at a European scale. The first phase of the project was carried out from 2007 to 2009. During this period we set up a virtual campus that has allowed architecture and urban planning schools to carry out seminars, design studios and workshops on housing issues which European societies face nowadays: ageing population, sustainability, mobility, work at home, citizen participation. The pedagogic model which supports these activities is based on the collaborative design and implementation of sequences of learning activities. The blended learning approach adopted in OIKODOMOS combines learning activities carried out in virtual environments specifically developed for the project with seminars and design studios taking place at the participating universities. The second phase of the project started on November 1st, 2010 and will last one year. The main objectives for this second period are:

- to consolidate the virtual campus methodology and technological platform
- to expand the application of the pedagogic methodology to other institutions
- to disseminate the results among the academic and research communities, as well as among local communities

In Newsletter 5 (http://www.oikodomos.org/newsletter/5_eng.html) you can find out about the different ways to participate in the project.
Eastern Mediterranean University, Faculty of Architecture
HERA-Center: Housing Education Research Advisory
http://www.oikodomos.org/newsletter/5_tur.html
hera-c@emu.edu.tr http://arch.emu.edu.tr

News submitted by: Dr. Beril Özmen Mayer and Dr. Hıfsiye Pulhan, OIKODOMOS Project Coordinators

EMU Seed Money funded research paper continues to be among the 10 most frequently read in the Journal of Business and Technical Communication

The research paper published in the Journal of Business and Technical Communication by Assoc. Prof. Dr. Valerie Priscilla Goby, who worked at the Faculty of Communication at Eastern Mediterranean University in North Cyprus and is now at Zayed University, Dubai, has been among the 10 most-frequently read in the Journal of Business and Technical Communication since its publication in October 2007. The underlying research reported in the paper entitled 'Business Communication Needs: A Multicultural Perspective' was funded by Research Seed Money Award from EMU. The paper, after being the most frequently read in JBTC for a long time, is now the seventh most frequently read article in the journal. The Journal of Business and Technical Communication is among the elite periodicals ranked in Journal Citation Reports (JCR) by Thomson Reuters (formerly ISI).

News submitted / provided by: Assoc. Prof. Dr. Valerie Goby / Sage Journals Online

MY Academic Sojourn in Los Andes University, Colombia

By Prof. Dr. Alagar Rangan
Department of Industrial Engineering

Alagar Rangan

Prof. Dr. Alagar Rangan, from the Department of Industrial Engineering, was granted research leave in summer 2010. He was at the Los Andes University in Bogota, Colombia during this time, where he not only was involved in research activities but also participated in lectures and conferences and offered a short term course.

Collaborative and multi-disciplinary research are two pillars of the edifice of active research. This made me accept immediately an offer of a visiting Professorship from the Los Andes University, Bogotá Colombia. The Research Advisory Board of EMU was gracious in granting sabbatical for a month for the years 2008-2009 and 2009-2010 which enthused me further. In this sequel, I will try to briefly present my academic activities and the benefits from the academic sojourn.

Los Andes University is a private university, located in downtown Bogota, the capital city of Colombia. It was founded in 1948. The University has nine schools including Medicine, Management, Architecture and Design, Engineering, Science, Law, Economics and Arts, offering undergraduate and postgraduate programs. It has student strength of 15,000 and prides itself with visits by luminaries including Albert Einstein. The official language in Colombia is Spanish but the medium of instruction is only through English. My academic activities fall under the categories as listed below:

- **Lectures:** One of the highlights of the visit is the exchange of ideas through research lectures. These lectures included the ones at Industrial Engineering Department and Mathematics Department of Los Andes University as well as the lectures in the Mathematics Department of the National University, Bogota, a State University. The faculty of Industrial Engineering, Civil Engineering and Mathematics Department with common interests in stochastic modeling and Applications has initiated a forum. I was invited to deliver the inaugural address of the forum. The forum aims to bring stochastic modelers under one umbrella and arrange exchange of ideas amongst them.

- **Conferences:** The two visits in 2009 and 2010 gave me an opportunity to participate in a few International Conferences. They were the 19th and 20th Colombian Statistics Symposium held in Medellin and Santa Marta respectively. The latter is a scenic Caribbean island. I was also invited to deliver a lecture in the 17th Colombian Mathematics Congress. These visits were sponsored by the National University and the Conference Organizers. During the Conference, many delegates were interested in knowing about EMU and its working. The conference also gave me an opportunity to interact with active researchers in Probability and Statistics.

- **Short Term Course:** In order to effectively and profitably utilize my visit, Los Andes University conducted a short term course on 'Reliability and warranty Modeling and Applications', offered by me. The participants were students from the University as well as practicing Engineers who paid a stiff fee to enroll. The course consisted of three capsules Reliability, Warranty and Applications in Industry and was spread over 40 hours duration.

- **Research Activities:** My research coordinator in the Los Andes University was Prof. V.Arunachalam of the Mathematics department. His research interests include Bio Mathematics and Financial Mathematics. Just prior to my first visit, we could collaborate and finalize a research article on the survival of a cell subject to radiation.(A Threshold model for cell survival, Journal of Bio Mathematics, Vol2, No2, 2009). In the two visits we continued our work on cell survival and also initiated work on the firing of a single Neuron which is to be communicated shortly. We also held discussions on the syllabus for an

undergraduate elective course on Financial Mathematics which could benefit our students.

The benefits of such an academic visit are multi-fold some of which are immediate and some are realized in the long term. An Institute grows with the faculty's reputation which is inseparable from the Institute's. The visit gave me ample opportunities of academic growth in terms of multi disciplinary research, interaction with active researchers and working in new environments. Last but not least, the academic visibility of our University was enhanced as the Deans of the Los Andes and National University were keen to know about EMU. The International Conferences that I attended certainly paved the way for more academics to come to know of our EMU. I owe to the Research Advisory Board of EMU for making this visit possible and wish to place on record my gratitude.

About the Researcher

Alagar Rangan is a Professor in the Department of Industrial Engineering at Eastern Mediterranean University in North Cyprus. He received his Ph.D from the Indian Institute of Technology, Madras, India. He worked in the Department of Mathematics of the same Institute for 25 years before retiring as a Professor. His research interests include stochastic modeling of deteriorating systems and biological systems. He has coordinated several projects funded by defense and governmental agencies. He has held brief visiting assignments in ETH, Switzerland, New Mexico State University, New Mexico, USA, State University of New York at Buffalo, USA, and Los Andes University, Colombia. For more information please contact our researcher at alagar.rangan@emu.edu.tr

Student Research Profile

Computational Study on New Nanotechnological Achievement; "Graphene"

By Alireza Lajevardipour
Department of Physics
Faculty of Arts and Sciences

Alireza Lajevardipour

Introduction

A thin sheet of ordinary carbon, just one atom thick, lies behind the recent Nobel Prize in Physics (2010). Andre Geim and Konstantin Novoselov have shown that carbon in such a flat form can be achieved.

We have known everything about graphite since ancient times (1500CE), so graphite is as ubiquitous as the lead in a pencil, but Graphene, a single atomic layer of graphite, was isolated only in 2004 by Geim and Novoselov. Many scientists, however, thought that it would be impossible to isolate such thin material because it would become crinkled or roll up at room temperature.

Graphene is a form of carbon. As a material it is completely new – not only the thinnest ever but also the strongest. As a conductor of electricity it performs as well as copper. As a conductor of heat it shows better performance than all other known materials. Although Graphene is almost completely transparent, it is so dense that not even helium, the smallest gas atom, can pass through it.

On the one hand, its exotic properties empower scientists to test the theoretical foundations of physics. On the other hand, a huge variety of practical applications now can be possible. It has vast potential to be a key part of new devices such as single molecule gas sensors, ballistic transistors, and spintronic devices. In Graphene, one finds a new class of 2D system, with immense potential for applications in future nanotechnology (Fig.1.)

This discovery has become a major topic of research for the Nanoscience community including physicists and chemists, along with electrical engineers and device specialists. Several thousand papers have been written in the past few years that have attempted to shed light on every aspect of Graphene. Also there are many review articles like (Geim and Novoselov, 2007; Allen et. al., 2010; . Ando, 2007; Gusynin, et. al., 2007; Peres, 2009; Geim and MacDonald, 2007; Abergel, et. at., 2010).

Graphene devices

The relatively short life of experimental research in Graphene has limited the number of proposals for devices which might utilize this material. The first application in electronic is that of the Graphene field effect transistor (FET) like the high-frequency performance of Graphene FETs, and single-electron transistors (SETs).

The adsorption of gas molecules on the surface of a Graphene flake changes the Hall resistivity, and this effect has been used to develop Graphene-based

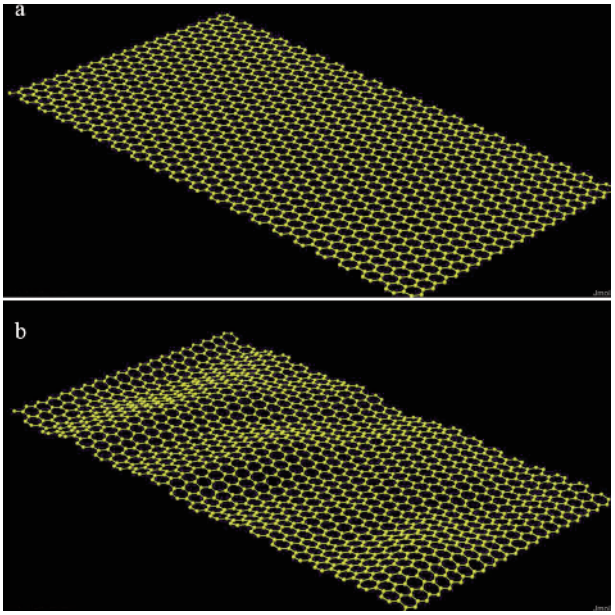

Figure 1. (a) Graphene nanoribbon with 1600 Carbon atoms. (b) The nanoribbon under strain

chemical sensors (Schedin, et. al., 2007).

The mechanical properties of Graphene may also be employed in the creation of devices. For example, Bunch et al. (2008) have created the 'world's thinnest balloon' and claim that it is impermeable to gases. They suggest that this property may be utilized in membrane sensors for pressure changes in small volumes, as selective barriers for filtration of gases, as a platform for imaging of Graphene-fluid interfaces and for providing a physical barrier between two phases of matter.

Graphene may also be used as a novel information storage device, as suggested by Standley et al. (2008). Retention times of over 24h, and operation over many thousands of cycles without significant degradation of the device were reported.

Finally, the high transparency, large conductivity, high chemical and thermal stability and good flexibility make 'Graphene window devices' (Wang, et. al.,2008), a natural candidate for solar cells and other next-generation optoelectronic devices.

Very recently, researchers have started to use Graphene as a sample support for electron microscopy (Meyer et. al., 2008). They try to image light atoms and molecules on Graphene by using a common TEM (Transmission Electron Microscopy). With a thickness of only one atom, it is the thinnest possible continuous material, and owing to its crystalline nature, a Graphene support sheet is either completely invisible or its contribution can be easily subtracted. Graphene is also a good electrical conductor and therefore displays minimal charging effects from the electron beam.

Understanding of interactions and dynamics of light atoms, for example noble gases on Graphene is a matter of great importance that we focused on in our recent paper (Neek-Amal and Lajevardipour, 2010).

The noble gases on a Graphene sheet

We studied the stochastic motion of noble gases in a periodic two-dimensional potential produced by a Graphene sheet. The depth of the potential well of the interaction between noble gases and the Graphene sheet is calculated. The Langevin equation is solved numerically to explain the effects of the binding energy, coefficient of friction and the equilibrium distance to the motion of noble gases on the Graphene sheet.

Carbon atoms in Graphene sheet are densely packed in a honeycomb crystal lattice Fig.2. The carbon–carbon bond length, a_0 , is 1.42 Å. Similarly, if a Graphene sheet is rolled up along one axis, it forms a carbon nanotube and it can be formed into a ball to create a fullerene.

As mentioned above, Graphene is a honeycomb lattice of carbon atoms. It is a lattice with two sublattices A and B (Fig.2.).

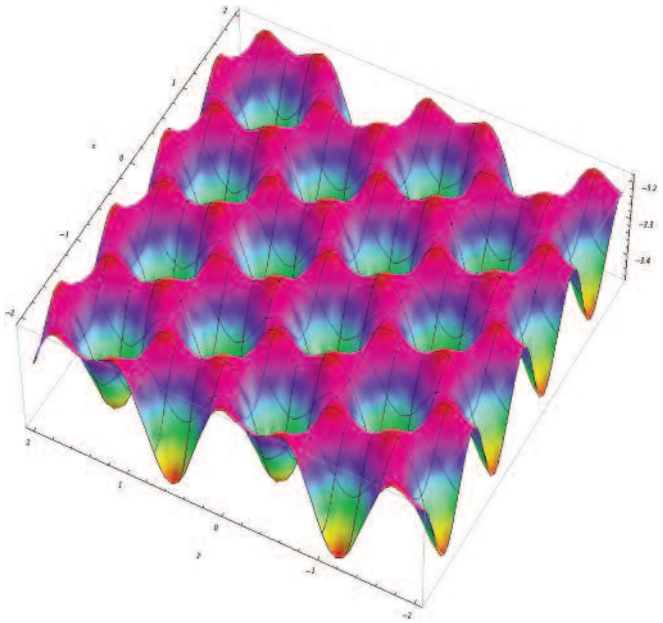

Figure 2. The honeycomb lattice is not a Bravais lattice. Two A- and B-lattices are Bravais lattice separately. Dashed honeycomb is one of favorable path for diffusion of the rare gas atoms on Graphene sheet.

Fig.3 shows the two-dimensional periodic potential energy surface scaled by KBT, U(r) at z = 3.5 Å for an Ar atom above monolayer Graphene. The unit of length is a_1 that equals to $\sqrt{3}a_0$ and a_0 is the carbon–carbon bond length. It is clear that the potential barrier between two neighbor wells is smaller than KBT and goes to zero for higher height.

We have solved the Langevin equations for the stochastic motion of Xe and He atoms because they have the largest and the smallest energy parameter in Lennard-Jones potential respectively. These atoms have the maximum and minimum binding energy to the Graphene sheet too.

The Langevin equation which describes the stochastic two-dimensional trajectory, r, is written as

$$\ddot{\mathbf{r}} = -\frac{1}{m}\frac{\partial U(x,y)}{\partial r} - \gamma \mathbf{r} + \sqrt{\frac{2\gamma K_B T}{m}}\mathbf{dW}(t)$$

where the first two terms refer to the drift velocity, γ is the coefficient of friction, and the term, $dw(t)$, is a collection of Gaussian Wiener processes with the mean and variance given by

$$\langle dW(t)\rangle = 0,$$
$$\langle dW_i(t)dW_j(t')\rangle = 2\delta_{ij}\delta(t-t')$$

In Fig.4 The trajectory of Xe atom above the monolayer Graphene at z = 1.2 forγ = 10 is shown. Close to the surface, higher γ localizes the motion inside the honeycombs having different sizes in comparison to the original monolayer Graphene honeycombs. The honeycomb is shown in the graph of Fig.4. Each side of these honeycombs has unit length (=a1). As can be seen from this figure, it is interesting to note that the atom moves to another honeycomb via the valleys only.

Conclusion

Two-dimensional periodic potentials produced by the monolayer, bilayer and triple-layer of Graphene were studied.

We found that increasing the number of Graphene layers changes infinitesimally the van der Waals interaction between noble gases and the Graphene sheet. The binding energies were calculated in the range of Mev and the equilibrium distances were found to be less than 21/6r. The effects of the damping factor and the type of the elements deposited over the Graphene, on the trajectories of the motion of noble gases on the Graphene were investigated. We showed that the Xe atom with smaller binding energy is trapped in the potential well at high friction coefficients while the He atom with larger binding energy can freely diffuse.

The physics of Graphene is a challenging and intriguing subject. Its impact is already detected both in fundamental scientific research and potential industrial applications. From theoretical condensed matter physics to future nanodevices, Graphene has limitless potential to impact our lives as we look through the magical quantum world at the nanoscale, a world that is not much different from an Alice-in-Wonderland world that plays by its own rules (Hayles, N K. 2004).

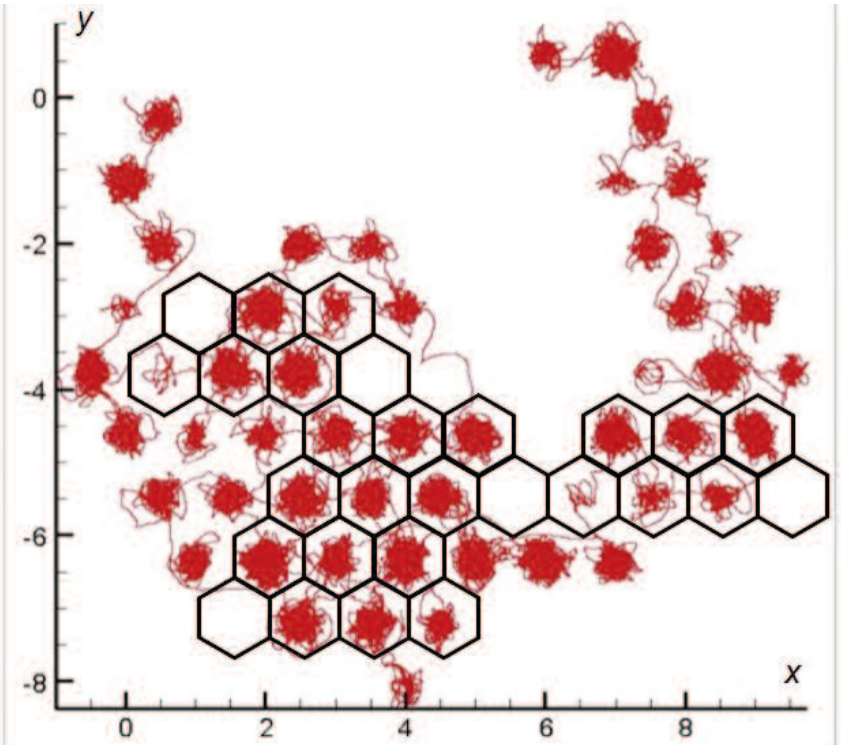

Figure 3. The two-dimensional potential energy surface for an Ar atom above monolayer Graphene. Unit of length is a1 and energy unit is KBT.

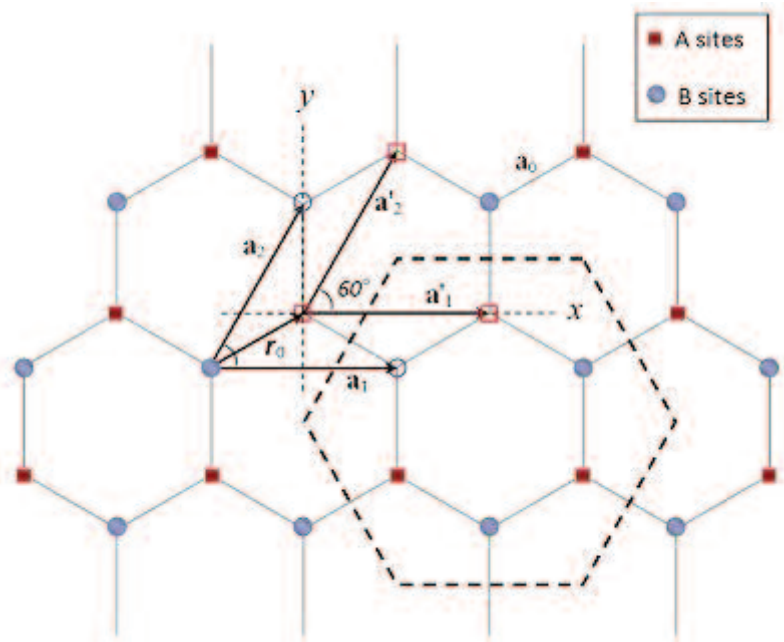

Figure 4. Fig.4 Two-dimensional trajectories of Xe atom on the monolayer Graphene at height of 1.2 Å with the coefficients of friction of 10. Total time of simulations is 5 ns and the unit of length is a1

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About the Researcher

Alireza Lajevardipour earned his MS degree in Physics from Shahid Beheshti Universiry of Tehran. He is now pursuing his PhD degree in the Department of Physics at EMU. Alireza is an outstanding postgraduate student in EMU with an excellent CGPA and two SCI published papers and two abstracts submitted in conferences. His publications are in soft condense matter physics field and he is now working on Graphene for his PhD thesis. E-mail: Ali.Lajevardi@emu.edu.tr

Mohammad Adnan Badran

I came to EMU in 2003 where I earned both my undergraduate degree in Business Administration and my Master's degree in Banking and Finance. My choice of EMU was through a friend who recommended that I was educated at this university as it had professional academic staff and also a peaceful, quiet and safe environment. Throughout my master's study, I worked as a research assistant at the Economics Department. I was mainly dealing with the arrangements of (MEEA) Middle East Economic association and other related academic duties were assigned. It was a good experience since it meant dealing with the research carried out and publications done by different academics from different countries in the Middle East. I am now working in business, mainly in trade, and I can say that I have gained a lot from my education in EMU, especially from the field of money transfer services on which I conducted research during my master's studies. I am planning to do some of the professional certificates such as CPA, CMA or CIA. I am mostly interested in the CPA program that will benefit me in my daily life and especially my business.

Sonay Ezel

I finished my BA in English Literature and Humanities at EMU in July 2009. I have to say that I have had great times at EMU as all of us had during their undergraduate life! Our department had some problems during my final year but everything turned out well for most of us. Towards the end of my BA I had made a decision of pursuing an MSc degree in Translation Studies. After graduating from EMU, I worked at a couple of different positions. First, I started to work as a part-time translator for a publishing house. I, along with a couple of more people, was doing translations of interviews, advertisements and news for four different magazines of the same publishing house. I worked for the company for a year and I stopped it because I was coming to Edinburgh for MSc. Secondly, I worked as a voluntary translator / interpreter at a bi-lingual medium school in Cyprus. This particular job was and still is my favorite because I made great friends there in addition to being able to combine two of my great desires: teaching and translating. I was functioning as a bridge between the students and foreign teachers for a month. This time period was set by the school administration as the adaptation period for both teachers and students. In addition to my translator / interpreter position at that school, I was also given the duty of teaching Turkish as a second language to native English-speaking students whose age ranged between 6 and 8. Thirdly, I was and still am working as a free lance translator. People contact me either via phone or e-mail for translating their documents. I actually started working as a translator during my BA and am still continuing. All these different jobs related to the same subject areas helped me gain the experience I needed in Translation Studies. As a graduate of English Literature and Humanities, I wanted to gain some practical experience in this field before pursuing an MSc. I applied to the University of Edinburgh for MSc in Translation Studies and to the EU Scholarship program for the financing of my study. Both were long and exhausting application processes but in the end, it was worth all the time spent! I'm proud of being the one and only Turkish speaking student that the University of Edinburgh has ever seen in the MSc in Translation Studies program. One of my program directors is a Turkish lady and she was surprised and very glad to see me get accepted into this program. I'm still working as a free-lance translator for people in Cyprus and am currently in charge of updating and renewing the Turkish Library in the University of Edinburgh and also volunteering as a peer-reviewer for the online newspaper of the university. After finishing my MSc in August 2011, I will be returning to Cyprus partly because it's part of the scholarship contract but mostly because I want to use this strong education for my own country. I'm currently working on specializing in the translation of EU and UN documents and I'm hoping that I will be able to find a job in that area in the future. I also wish to work on something that will enable me to combine teaching and translation. Therefore, I'm planning to write my MSc dissertation on the place and role of translation in education. I would like to thank everyone I met during my BA for the wonderful memories and to Dr. Hancioglu Eldridge for giving me the opportunity of writing for the EMU Research Newsletter.

Journal Publications (SCI, SSCI, AHCI)

The journal publications listed here are those that are listed in Arts & Humanities Citation Index (A&HCI), Science Citation Index (SCI), Science Citation Index Expanded (SCI-Expanded), or Social Sciences Citation Index (SSCI). A search on ISI Web of Science was performed on 14 February 2011 to retrieve articles with at least one author having EMU affiliation. This list may not be comprehensive as some articles could be deposited to ISI after the query date.

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