Arab Republic of Egypt Ministry of Defence Military Technical College



### International Undergraduate Research Conference, IUGRC

July 25 – 28, 2016



## **Conference Activities Guide**



### Contents

Preface	5
Contributors	7
IUGRCProgram	11
Plenary Talks	17
Invited Lectures	17
Workshop	17
Scientific Sessions	19-93

Military Technical College, Cairo, Egypt July 25 –28, 2016





### Preface

In order to motivate the spirit of innovation and scientific research among the engineering students, the Military Technical College has the pleasure to organize the first international undergraduate research conference (IUGRC-2016) in July 25-28, 2016, sponsored by the Egyptian Ministry of Defence. The IUGRC activities are intended to be a forum that facilitates, and promotes communication and cooperation among participants. We hope that participating in this event will help you expand your knowledge, network, discuss challenges, and share ideas during technical sessions and networking breaks.

The IUGRC aims to provide undergraduate engineering students from various specializations and majors with the opportunity to present their research work on the latest engineering applications. Evaluations will be based on the originality of the work presented, the quality of the analytical and experimental work as well as the level of technical presentation. The conference is organized in 16 sessions in the following fields:

First International Undergraduate Research Conference, IUGRC Military Technical College, Cairo, Egypt July 25 – 28, 2016



- Antenna and Microwave Circuits
- Architecture Engineering
- Chemical Engineering
- Computer Engineering
- Electronic Engineering
- Material Science
- Process Automation
- Robots and Unmanned Systems

- Applied Mechanics
- Biomedical Applications
- Circuits and Systems
- Data Communication and Computer Security
- Localization and Navigation
- Perimeter Security
- Propulsion, Energy, and Power
- Wireless Communications

In addition to the scientific sessions, the conference program includes fourplenary talks, two invited lectures, and one workshop. The talks and workshop are tailored to provide the participants with some of the skills that will be of a great use in their future career as researchers. The lectures are focused on the novel topics of nano-materials and renewable energy.

Finally, we would like to express our sincere appreciation to all contributors of the conference from all Egyptian and foreign universities and firms. The effort of the scientific committee is highly appreciated.

**IUGRC** General Chairs



### Contributors

### Egyptian Universities & Institutes:

- Ain Shams University.
- Alexandria University
- Arab Academy for Science, Technology and Maritime Transport.
- Benha University.
- Cairo University.
- Heliopolis University
- Helwan University.
- High Institute of Engineering, Elshorouk Academy.
- Mansoura University
- Menoufia University.
- National Telecommunication Institute
- Pharos University.
- Tanta University.
- The British University in Egypt.
- Zagazig University
- Zewail City of Science and Technology.

### Foreign Universities and Firms:

- Al-Mustansirya University, Iraq
- Beirut Arab University, Lebanon
- Kyushu University, Japan
- National University of Defense Technology, China
- NISSAN Shatai Co.,Ltd., Japan.
- University of Technology, Iraq

Military Technical College, Cairo, Egypt July 25 –28, 2016





## Program of Scientific Sessions, Plenary Talks, Invited Lectures, and Workshop

Military Technical College, Cairo, Egypt July 25 –28, 2016





	00:60	09:30	10:00	10:30 11	:00 11:30	12:00	12:3	-	3:00 13	30 1	4:00	14:30	15:00	15:30
		-	-	ee	-					S01: Co	mputer	Engineerin	0	
25 July		Registra	tion	aunch	PT 1				PT 2	IL1	S02:	Material Sc	cience	
				г юо						S03: Lo	calizatio	n and Navi	igation	
			S04: (	Circuits and S	ystems	1			IL 2	S07: Pro	opulsion	I, Energy, a	nd Power	100
26 July		PT 3	S05: 1	Perimeter Sec	urity	ā	eak	PT 4	S08: Elect Engineerii	ronic	<b>S</b> 09:	Process Au	utomation	
			S06: J	Antenna and N	Aicrowave Circuit	92			S10: Biom	edical Ap	plication	IS		
				S11: Arch Engineeri	itecture ng	[ ]		S14: Ch	emical Eng	ineering				]
27 July		SW		S12: Appl	ied Mechanics		14.1.12	S15: Ro	bots And U	nmanned	System	60		
				S13: Wire Communi	less cations	Ī	1	S16: Da	ta Commun	lication an	d Comp	uter Secur	ity	
28 July	"Scie and t	nce and Inn he Internatio	ovation Fair	r" of the Milita raduate Reser	ry Technical Coll	ege incluc (IUGRC)	ling awa	ards of t	he Unmann	ed Ground	d Vehicl	e Competit	tion (UGVC	0
IL: Im	ited Lectur	e		PT: Plei	nary Talk			S: S	cientific Ses	sion			WS: Wo	rkshop

### **IUGRC Program in a Glance**

Military Technical College, Cairo, Egypt July 25 – 28, 2016



	00:50	06-50	10:00	030	OU:	190	N.7L
_	Ę	Registration rary Hall-10th Ramadan Buildin	g, Ground Floor	Conference Launch (Main Hall,-10th Ramadan Building, Top Floor)	Plenary Roo "Monitorin Mostafa S	y Taik1 m A ig the Spy" iaad, MSc.	
					Military Technica	al College, Egypt	
	12:30	13:00	13:30	14:00	430 45	5:00	15:2
			S01: Computer Eng	gineering		R	A mod
		Dienary Talk2	PHY-1: "Java Applet and EJS to Learning and teaching Harmonic Oscillation"	CMP-1:" "You say, and I understand" mobile equipment sign language recognition system"	CMP-7: "Using a Laser Pointer to Measure the Data Track spacing on CDs and DVDs"	CMP-6: "Arabic Language Trans ArSLT"	Sign lator,
		Room A	Omer A. Y. Al-Azzawi and HayfaG.Rashid	X. Hao, Z. Xuanhan, and S. Hao	Omer A. Y. Al-Azzawi and HayfaG.Rashid	I. Nabil, K. Mago Ayman, M. Fareed Sadek	by. M.
			Univ. of Technology, Al-Mustansirya Univ., Iraq	NUDT, China	Univ. of Technology, Al- Mustansirya Univ., Iraq	Helwan Univ., E	gypt
_			Invited Lecture 1	S02: Material Scienc		R	oom B
			Room B "Education for Innovation and	MAT1:"Tensile Properties of Fiber	MAT-2: "Graphite-on-	Mat-3: "Preparati Characterizatio Novel Compo Material Based	on and site 1 on
_	"Socia Resea	I Networks for Technology Irchers and Professionals"	V Discovery in Nano-materials"	Reinforced Laminate with Ply Splice"	raper urcurt (home Made)"	Strong Polyamide and Epoxy Re Applied in Bullet	Fibers sin
0			Iteration CI			Vests and Shie	"de
			Sherbiny, PhD. Zowail City, Ecunt	H. Wu, B. Ma, D. Chen, and S. Jiang	Safaa I. H. Al-Saedi and Hayfa G. Rashid Al-Mustansirval/hiv.	Remon A. S.Man and Mostafa Ra	dwan
	Moha	mmad Ibraheem Ahmad. MSc.	WIGHT INIO HEMAT	NUDT, China	Iraq	BUE, Egyp	t
_			S03: Localization a	and Navigation	The second se	R	Dom C
	2	Alexandria Univ., Egypt	RAD-2: "FMCW Software Defined Radar for Range and Speed Estimation"	ECE-6: "Radio Directional Finder"	ECE-15: "Indoor Positioning System Using BLE "	RUS-7: "Design implementatio implementatio based on arting intelligence of rotor UAV helicop Global Position System"	and n of System coal trad- tter and ning
			A. Sherif, M. Mosaad and M. Hassan	H. Mostafa, M. Elmonsy, R. Elmergawy, A. Mohamed and H. Elbadawy	A Ibrahim, E. Fekry, H. Ahmed, R. Darwish and R Sadek	X. Yao and L. G	bug
			Benha Univ., Egypt	AASTMT. Egypt	HelwanUniv, Egypt	NUDT, Chin	

### IUGRC Program (Day 1)

Military Technical College, Cairo, Egypt July 25 – 28, 2016



60	500	9-30	0:00	0:30 11:	00 11:	8
			S04: Circuits and S	ystems	8	Room
	i		ECE-11: "MEMS IR gas sensor "	ECE-27: "Design and Implementation of CO2 Laser System for Optical Components Maifunction"	ECE-18: "KABLAWY (Detection underground cables (Elephone) and pipes (Gas, Water and Sanitation) "	ECE-25: "Design and Implementation of Su Tracking System"
	Plena	ry Talk3 om A	M. Abbas, A. Salah, A. Essam, N. Mohamed, D. Khalil, Y. Sabry, M. Erfan, G. Albert and A. Anr	Mahmoud Salah Zehairy and Ahmed Elbeih	M. Abdel-Aziz, S. Sheair and A Abo Elazm	E. Mohamed, M. Adel A. Gamal, A. Hamdy and S. Rashad
			Mansoura Univ., Egypt	MTC, Egypt	HelwanUniv., Egypt	Heliopolis University. Helwan University. Egypt
			S05: Perimeter Sect	urity		Room
	" Engineering Aspiring	Management for Engineers"	ECE-14: "Security System "	ECE-13: "Vehicular Checkpoint System "	ECE-7: "Car Anti-Theft Security System"	
	Tamir	Z. Wafy,	H. Elalkamy, M. ELgezawy, M. Shawara, A Nasef, S. Nassar and R. Sadek Helwan Univ., Egypt	E. Hassn, B. Ahmed, M. Maher, M. Mohamed and R. Sadek Helwan Univ., Egypt	M. Ramadan, E. Abdel Mabod, A. Ibrahim, A. Omara and H. Elbadawy AASTMT, Egypt	
	BSc (Eng.), MSc (E Cert (	cng.), PhD (Eng.) and (PCEM)	S06: Antennas and	Microwave Circuits		Room (
	Military Technic	cal College, Egypt	RAD-3: "X-Band Low Noise Amplifier for Ground Rader Applications"	RAD-4: "Design of a 2.4 GHZ High Gain Helical Directional Antenna"	RAD-5: "High Gain Planar Array Antenna For X Band Radar Applications"	
			T. Ahmed and A. Gameel MTC, Egypt	M. Ali and M. Abdalla MTC, Egypt	M. El-Sewedy and M. Abdalla MTC, Egypt	

### IUGRC Program (Day 2- AM)

Military Technical College, Cairo, Egypt July 25 – 28, 2016



0	3:00	3:30 14	4:00 14:	30 150	8
	Invited Lecture 2	S07: Propulsion, En	lergy, and Power		Room
	Room A "Renewable Energy Teaching and Research;	PEP-4: "Parametric study on taper-ended tubular solid propellant grains"	PEP-2: "Enhancement of Hydrogen Engine with Mixed Fuel"	PEP-5: "HHO Generation application on vehicle"	PEP-6: "Design & Simulation of a New Renewable Energy Plant for the New Egyptian Capital"
Plenary Talk4 Room A	Challenges and Possible Solutions" Ibrahim Ismail, PhD.	Hady A. Abdel-Wahab, Mohamed O. Mostafa and Mahmoud Y. Ahmed	Ahmed S. Emam, Ahmed R. Eid, Yasser M. Abdelradi and Mohamed R. Gomaa	Nada O. Badr. Basma Omar. Zuhair EL Sheshtawy. Ibrahim Elbougdady. Mohamed Bayouny and Tarek Belal	A Abdel-Salam, Y. Gamal, A Abdo, Z Mokhtar, M. Nady, B Sobhi, A.Zaher, H Mosalam, and H. Habi
	Zewail City, Egypt	MTC, Egypt	BenhaUnicersity, Egypt	Pharos Univ., Egypt	Heliopolis Univ., HelwanUniv., Egypt
	S08: Electronic Eng	gineering (Room B)	S09: Process Automa	ation	(Room E
"Development in Teaching and Learning Technologies	ECE-21: "A General Power Coupling Branch-Line for Wireless Applications"	ECE-23: "Down Conversion Mixer for X-Band Applications"	GNC-2:" UAV Flight Control System Reconfiguration Control with Intelligent Diagnosis"	ECE-17: "MMGA Meter (Manage, Monitor and Govern Appliances)"	ECE-5: "Intelligent Wireless Sensors Network for Industria Automation Applications"
for Engineering Students"	A. Elkady and M. Abdalla	T. Ahmed and A. Gameel	S. Cheng and L. Kehong	M. Ahmed, M. Adel, A. Amer G. Mohamed and R. Sadek	A Mustafa, O. Abubakr, and B. Mokhtar
	MTC, Egypt	MTC, Egypt	NUDT, China	Helwan Univ., Egypt	Alexandria Univ., Egypt
	S10: Biomedical Ap	oplications			Room
Ashraf Badawi, PhD. Dean, Student	ECE-4: "Electrical Nerve Blocker"	RAD-1: "Wireless Bio- Radar Sensor for Respiration Detection"	ECE-26: "MediT-Medical Electronic Drug Infusion Therapy for Cancer Treatment"	CMP-2: "controlling receptorsw pathways in cells in the human body using programming"	ECE-16: "Computer Aided Diagnosis System for Medical Laboratory Investigation "
Zewail City, Egypt	A. Ebada and A. Abo Elazm	A. Nassr and El-Sayed M. EL-Rabaie	M. Moaid, M. Elsharkawy, M. Eldkoony and M. Karar	Mohamed E. Elsakhawy and M. El- dosuky	Mustafa A. Razek, A Gemiez, A. N. Said, C Ahmed, M. Mokhtar A Abdel Tawab, A. Bad and G. Ahmed
	Menofiya Univ., Egypt	Menoufia Univ., Egypt	Menofya Univ., Egypt	Mansoura Univ., Egypt	Helwan Univ., Egypt

### IUGRC Program (Day 2- PM)

26-Jul

Military Technical College, Cairo, Egypt July 25 – 28, 2016

2



# IUGRC Program (Day 3- AM)

8	00-6	06:50	ŧ	0:00	10:30	41:	8	#	30	12:
	2	-			S11:	Architecture En	gineering			Room A
					Assee Build Stud	CVA-6: "Green ssment for Heritage lings in Egypt Case ly: ZeinabKhatoun House"	CVA.8: " L Live For	.et Water rever"	MQC For a better the assessm planning sy sustaina developm	l: future!— eent and stem of eont"
					Khan	Abdel-Razek, A nis, M. Zwail and M. Mahdy MTC, Egypt	H. Ning. H. Z unxia NUDT, (	Zhang and hou China	Z. Lv, F. Wu, and D. W NUDT, C	A Zhou, ang hina
					S12:	Applied Mechan	lics			Room B
		Works	shop Hall		Me B	C-1: "Design and ementation of Anti- ravity Treadmil"	ARM-1: " Performs 155mm V Enhanced Lu Artillery Pr	Ballistic ance of elocity ong-Range rojectile	RUS-1: "Rese design of the wing" super r stealth unn aerial rob implement decapitation	"flapping miniature nanned oct in nting
	An Intro	"Think S oductory Worksho Wael El-r	cience! op to Sci nayyah,	entific Think	Mahr M.H.	A Mohamed, E. moud, M. Mabrouk, I. Mahgoub, and A. AbdElrazek	A. Sayed ar	nd A. Zaki	JinsiDai and I	HuiminLu
		BSc (Eng.), MSc (I	Eng.), PhI	) (Eng.)		MTC, Egypt	MTC, E	Egypt	NUDT, C	hina
		MIIILARY LECTINICA	II COIIEGE,	cgypt	S13:	Wireless Comm	unications			Room C
					ECE	8: "Beamforming or MIMO-OFDM reless Systems"	ECE "Heterog Wireless Netwo	:9: eneous Sensor ork"	ECE-22: " Circular ( Wideband An Wireless appl	A Half Jitra- tenna for ications"
					-	A. Elrefy and M. Eldessoki	A Essa Eldes	and M.	A Moham Mahran, a Abdall	ed. A.
24					Men	oufia Univ., Egypt	Menoufiya U	Iniv., Egypt	MTC, Eg	iypt

27.J

July 25 – 28, 2016



Al-Shorouk Academy. Egypt

1 Eng	3:00 to	3:30	14:	30 150 Room A
nd nd field fr MoS2	CHM-3: "A Method of Bio Macromolecule Sol Processor to Prepare Graphene Aerogel"	CHM-4: "Battery Recycling"	CHM-6: "Sensitivity and Detonation Characteristics of Plastic Explosive based on BCHMX"	CHM-7: "Preparation and Characterization of 3-nitro-1,2,4-triazole-5- one (NTO) Explosive"
ng. J. and Q.	L. Di, L. Gengyuan, Hexiaotong, W. Xiaojie, and J. Zhenhua	Salem, A.A. and Metwally Moussa	Abd-ElazizHamed and Ahmed Elbeih	Mahmoud Salah Zehairy and Ahmed Elbeih
and UI	nmanned Systems	MIC, Egypt	MIC, Egypt	MIC, Egypt Room B
aroid: bile sing acist	RUS-4: "Design and Manufacturing of A Mini-Uav Quad Carrier"	RUS-5: "Design and Implementation of FPGA-Based Robotic Arm manipulator"	RUS-11: Stealth boat with satellite control system for military applications	
and, and	Mohammed A. A Soliman and Aly M. El- Zahaby	Mohammed I. M. Ali, Ahmed S. Bahgat, Mahmoud S. Hamed and Ahmed M. Yousef	A Hassan, Y. Badawy, I. Azab, M. Ismail, A. Abd-alkader, S. Tawfeik, S. Mesbah, and M. El-hofey	
ypt	Tanta Univ., Egypt	MTC, Egypt	AASTMT, Egypt	
unuuu	lications and Compute	er Security		Room C
ved ion ngs"	ECE-24: "Statistical Analysis of Different Chaotic Sequences Code Using Logistic Chaotic Map"	CMP-3: "Malicious DHCP Starvation Attack - SPECTRA"	CMP-4:" A New Method to Evaluate Bug Severity by using the Crowd-based Knowledge "	CMP-8: "XOR operation and Rice codes based two-stage method for lossless telemetry data compression "
nd Z.	O. Mohamed, M. Elbatawy and H. Abdel Hameed	Muhammed Saleh, Ahmed Hesham and Emad S. Othman	W. Yiwen and Z. Yang	Rewase R. Ragei, Sherif A. Refaat, Mohamed A. Shouaib and Mohamed A. T. Elshafey
PL	MTC, Egypt	Al-Shorouk Academy, Edvot	NUDT, China	MTC, Egypt

### IUGRC Program (Day 3- PM)

27-Jul

Military Technical College, Cairo, Egypt July 25 –28, 2016



### **Plenary Talks**

- "Monitoring the Spy" Mostafa Saad, MSc. Military Technical College, Egypt Monday, 25th, 11.00-12.00, Room A
- "Social Networks for Technology Researchers and Professionals" Mohammad Ibraheem Ahmad, MSc Alexandria Univ., Egypt Monday, 25th, 12.30-13.30, Room A
- "Engineering Management for Aspiring Engineers" Tamir Z. Wafy, BSc (Eng.), MSc (Eng.), PhD (Eng.) and Cert (PCEM) Military Technical College, Egypt Tuesday, 26th, 09.30-10.00, Room A
- "Development in Teaching and Learning Technologies for Engineering Students"
  Ashraf Badawi, PhD., Dean, Student Affair Zewail City, Egypt Tuesday, 26th, 12.30-13.00, Room A

### **Invited Lectures**

- Education for Innovation and Discovery in Nano-materials Ibrahim El-Sherbiny, PhD. Director, Center for Material Sciences, Zewail City, Egypt Monday, 25th, 13.30 - 14.00, Room A
- Renewable Energy Teaching and Research; Challenges and Possible Solutions Ibrahim Ismail, PhD. Director, Renewable Energy Engineering Program, Zewail City, Egypt Tuesday, 26th, 13.00 – 13.30, Room A

### Workshops

• "Think Science!- An Introductory Workshop to Scientific Thinking" Wael El-mayyah, BSc (Eng.), MSc (Eng.), PhD (Eng.) Military Technical College, Egypt Wednesday, 27th, 09.00- 10.30, Main Hall

Military Technical College, Cairo, Egypt July 25 –28, 2016





**Date:** Monday, 25July 2016 **Time:** 13.30 – 15.30 Session:S 01 Room: A

### **Computer Engineering**

#### Coordinator: Col. Ass. Prof. Tarek A. Mahmoud MTC, Egypt

PHY-1	Java Applet and EJS to Learning and teaching Harmonic Oscillation	Omer A. Y. Al-Azzawi and Hayfa G.Rashid Univ. of Technology, Iraq Al-Mustansirya Univ., Iraq
CMP-1	"You Say,and I Understand" Mobile Equipment Sign Language Recognition System	X. Hao, Z. Xuanhan, and S. Hao NUDT, China
CMP-6	Arabic Sign Language Translator; ArSLT	I. Nabil, K. Magdy, M. Ayman, M. Fareed and R. Sadek Helwan Univ., Egypt
CMP-7	Using a Laser Pointer to Measure the Data Track spacing on CDs and DVDs	Omer A. Y. Al-Azzawi and Hayfa G.Rashid Univ. of Technology, Al-Mustansirya Univ., Iraq



PHY-1

### Java Applet and EJS to Learning and Teaching Harmonic Oscillation

Omer Ali Yaseen Al-Azzawi

University of Technology- Department of Applied Science ,Iraq, omar.aal84@yahoo.com

Supervisor: Prof. Dr.Hayfa G.Rashid, Al-Mustansiryah University, College of Education, Iraq, hayfa\_gh\_rasheed@yahoo.com

To deepen the professional practice of physics educators, I seek to highlight the Java Applet and Easy Java Simulation (Ejs or EJS) community of educators that engage, enable and empower teachers and student to learn physics,

especially Mechanical Oscillation. That is to say, I present here from existing library of simulations models through the java applet and Ejs toolkit into suitable learning environments for inquiry of physics.

Military Technical College, Cairo, Egypt July 25 – 28, 2016





### "You say,and I understand" mobile equipment sign language recognition system

Xie Hao, Zhou Xuanhan

China PLA National University of Defence Technology, China, Zhou Xuanhan@gfkd.mtn., Xie Hao@gfkd.mtn

*Supervisor:*Sun Hao, China PLA National University of Defence Technology,China,Sun hao@gfkd.mtn

According to statistic, there are nearly 500 million deaf-mutes who are suffering from the communication barriers around the world. Sign language makes the communication among deaf-mutes much more convenient. However, the communication between a normal person and a deaf-mutes is still a problem remained to be solved. Sometimes we may encounter such an embarrassing situation in daily life: we can't understand the sign language of the deaf-mutes, and the words said by us can't be heard by deaf-mutes either. In this case, we can only turn to a public platform—text. At present, we just need a voice converting software if normal people want to pass on a message to a deaf-mute. But where is the way in which the gestures can be translated into words?

So the sign language recognition technology seems very necessary. —Sign language recognition" means learning the meaning of the sigh language by obtaining the data of sigh language through the collecting device, using pattern recognition algorithm and combining with context. Then the sign language can be translated into voice or words and conveyed to normal people who don't know sign language, achieving —understanding sign languagell.

Today, the mainstream sign language recognition is based on data gloves and computer camera, which measures the tracks and timing information when the hands move in the space through data gloves and position tracker. Apparently, this product is expensive, complex and difficult to be carried. For this purpose, our team designed a set of sign language recognition which is easy to be loaded on mobile portable devices such as mobile phones and tablet. It can analyze the sign language and translate it into words or voice, then outputting the words or voice. This product is equal to a synchronous translator, solving the problem of communication barriers of deaf-mutes. Using a mobile phone app in real-time deaf sign language translation, is definitely a great reform in the development of the deaf-mutes' communication. Furthermore, this product can promote the development of the human computer interaction research. The platform is excellent and the prospect is broad.

**First International Undergraduate Research Conference, IUGRC** Military Technical College, Cairo, Egypt

July 25 —28, 2016



CMP-6

### Arabic Sign Language Translator "ArSLT"

Ibrahim Nabil, Karim Magdy, Mohamed Ayman, and Mohamed Fareed Helwan, Egypt, ibrahimn94@hotmail.com, karimfcih.swe@gmail.com, mohamed\_swe@yahoo.com, muhammed.fareed.94@gmail.com

Supervisor: rowayda sadek, associate professor Computer and information helwan university, Egypt, rowayda\_sadek@fci.helwan.edu.eg

The missing link in communication between deaf-mute people and the others in their daily routine is a serious and important issue especially in our societies, unfortunately there is no many working and mobile solutions to ease this issue out. Our proposed system offers a multiple input cross platform mobile application for Arabic Sign Language Translation "ArSLT", with an offline Text To Speech "TTS" component, the system works on many input methods (Camera, Sensor Glove, and Signs Keyboard) and has many outputs compared to existing systems available now.



#### CMP-7

# Using Laser Pointer to Measure the Data Track Spacing on CD's and DVD's

Omer Ali Yaseen Al-Azzawi University of Technology- Department of Applied Science ,Iraq, omar.aal84@yahoo.com

Supervisor: Prof. Dr.Hayfa G.Rashid, Al-Mustansiryah University, College of Education, Iraq, hayfa\_gh\_rasheed@yahoo.com

We have probably noticed the colourful patterns "reflecting" from the shiny surface of a CD and DVD disk. What we are seeing is actually diffraction of white light, and the rainbows of colour are diffraction patterns. In this project, we will learn about how diffraction patterns are generated when CD and DVD disk are used as reflecting and transmitting diffraction grating . Further, the microscopic spacing of data tracks on a CD and DVD disk can be measured using a red laser pointer. AFM (Atomic Force Microscope) images indicates how close the track spacing to that macro-scale data that (optically measured).



**Date:** Monday, 25July 2016 **Time:** 14.00 – 15.30 Session:S 02 Room: B

### Material Science

#### Coordinator

Ibrahim El-Sherbiny, PhD.

Zewail City, Egypt

MAT-1	Tensile Properties of Fiber Reinforced Laminate with Ply Splice	H. Wu, B. Ma, D. Chen, and S. Jiang NUDT, China K. Arakawa, S. Jiang, and Y. Shen Kyushu University, Japan
MAT-2	Graphite-on- Paper Circuit (Home Made)	Safaa I. H. Al-Saedi and Hayfa G. Rashid Al-Mustansirya Univ., Iraq
MAT-3	Preparation and Characterization of Novel Composite Material Based on Strong Polyamide Fibers and Epoxy Resin Applied in Bulletproof Vests and Shields	Remon A. S. Mankarious and Mostafa Radwan BUE, Egypt



MAT-1

### Tensile Properties of Fiber Reinforced Laminate with Ply Splice

Han Wu, Bin Ma, Dingding Chen College of Basic Education, National University of Defense Technology, China, 18874985105@163.com, 739524201@qq.com, dingding.mail@163.com

Supervisor: Dingding Chen1, lecturer Kazuo Arakawa2, professor Shiyi Jiang3 Yueyao Shen4 1 College of Basic Education, National University of Defense Technology, China, dingding.mail@163.com 2 Research Institute for Applied Mechanics, Kyushu University, Japan, k.arakaw@riam.kyushu-u.ac.jp 3 Interdisciplinary Graduate School of Engineering Science, Kyushu University, Japan, yiyueyaoshen@yahoo.co.jp 4 NISSAN SHATAI CO.,LTD., Japan, jiannshiyi@yahoo.co.jp

Due to high strength and low density, fiber reinforced plastics (FRP) have been used widely, and FRP structures with large size are required by more and more applications. When the FRP structure becomes large, only one reinforcement ply may not large enough. In this case, it is required to splice two or more plies to meet the size requirement. However, the ply splice structure will play like a defect in a FRP structure and decrease the mechanical property. In order to use the FRP product with ply splice structures safely, it is necessary to master its mechanical properties. In this paper, tensile properties of five kinds of ply splice structures are studied througth experiments. FEM method using ABAQUS is adopted to analyse the stress situation of the ply splice structures under tensile loadings, expecting to find out the key factors leading to the failure of the structures. The results show, inducing ply splice into CFRP materials, the tensile strength decreases evidently. Due to the ply splice, stress concentration occurs, and the tensile stress component in througth-thickness direction seems the key factor leading to the failure.

Military Technical College, Cairo, Egypt July 25 – 28, 2016



MAT-2

### Graphite-on-Paper Circuit (Home Made)

Safaa Ied Hamed Al-Saedi

Al-Mustansiryah University, College of Education – Physics Department, Iraq, safaa\_ied@yahoo.com

Supervisor: Prof. Dr.Hayfa G.Rashid, Al-Mustansiryah University, College of Education, Iraq, hayfa gh rasheed@yahoo.com

The present work investigate , construct our own potentiometer and emergency resistance with graphite that they draw on paperand be able to operate a potentiometer and understand what it is measuring. Also, correlate the resistance with conductivity of the circuit. Further using x-ray diffraction to study the crystal structure of graphite.



#### MAT-3

### Preparation and Characterization of Novel Composite Material Based on Strong Polyamide Fibers and Epoxy Resin Applied in Bulletproof Vests and Shields

Remon Ashraf Sabry Mankarious The British University in Egypt, Egypt, Raymond.ashraf@gmail.com

Supervisor: Mostafa Radwan, Professor The British University in Egypt, Egypt, mradwan@bue.edu.eg

Protection against weapons goes back to ancient ages. Fiber reinforced plastics (FRP) have arisen as a main class of structural materials having high strength and light weight implemented in a large scale of different applications including: protective clothes and ballistic shields. This paper discusses the enhanced physical and mechanical properties of Kevlar 49 fiber against Twaron CT 704 reinforced with epoxy resin to obtain an efficient body armor capable of resisting high speed projectiles (9mm bullets). The response of the two different fiber materials was studied by using a ballistic gun for the penetration test. In addition, indentation and tensile test are also applied to compare between the mechanical response of both fabrics and determine which fabric is better for life protection applications. The final results showed that Twaron is much better than Kevlar in resisting bullets with very small number of layers.



Date:Monday, 25July 2016Time:13.00 - 15.30

Session:S 03 Room: C

### Localization and Navigation

#### Coordinator

#### Lt. Col. Dr. Bassem Sheta

MTC, Egypt

RAD-2	FMCW Software Defined Radar for Range and Speed Estimation	A. Sherif, M. Mosaad and M. Hassan Benha Univ., Egypt
ECE-6	Radio Directional Finder	A. Hamdi, H. Mohamed, M. Magdy, R. Ashraf, and H. ElBadawy AASTMT, Egypt National Telecommunication Institute, Egypt
ECE-15	Indoor Positioning System Using BLE	A. Ibrahim, E. Fekry, H. Ahmed, R. Darwish and R Sadek Helwan Univ, Egypt
RUS-7	Design and implementation of Location Tracing System based on artificial intelligence of quad-rotor UAV helicopter and Global Positioning System	X. Yao and L. Geng NUDT, China

Military Technical College, Cairo, Egypt July 25 – 28, 2016

RAD-2



### FMCW Software Defined Radar for Range and Speed Estimation

Ahmed Metwally Hegazy Sherief Senior Student, Benha University, Benha, Egypt <u>Ahmed1101335@feng.bu.edu.eg</u> Mustafa Mohammed Mosaad Senior Student, Benha University, Benha, Egypt <u>mostafa11792@beng.bu.edu.eg</u>

*Supervisor: Dr. Ayman Mustafa Hassan, Lecturer* Benha University, Egypt, <u>ayman.mohamed@bhit.bu.edu.eg</u>

This paper demonstrates the design and implementation of a 2.4 GHz FMCW radar system to be used as an anti-collision radar for automotive applications, first we examine the theoretical foundation behind the FMCW radar then the system components, specifications and tools used to build it. And finally we introduce the result of the system simulation and testing.

Military Technical College, Cairo, Egypt July 25 –28, 2016



#### ECE-6

### **Radio Directional Finder**

Amira Hamdi, Hadeer Mohamed, Mie Magdy, Reem Ashraf <u>amira.hamdi@hotmail.com,hadeermohamed\_93@hotmail.com</u>, <u>mie.magdy@hotmail.com</u>,

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Arab Academy for Science and Technology and Maritime Transport, Cairo, Egypt

Supervisor: Prof. Hesham ElBadawy, IEEE Senior Member, National Telecommunication Institute, Egypt, heshamelbadawy@ieee.org

This project has been prepared to investigate the vehicle radio direction finding techniques, methods of implementation, and the design and execution of a prototype VRDF system. The purpose of using VRDF is to be able to detect and locate the source of an enemy (Fox) or unknown signal. The full paper has several details about different techniques, including time difference of arrival, Doppler, angle of arrival, and triangulation. The programs Matlab and Arduino were concurrently used in the implementation process. Our target is to implement a VRDF system based on angle of arrival to determine the location of a transmitter at a given angle. The accuracy of position finding/tracking is enhanced by adding more receivers, and after that to include the option of frequency scanning, so that the implanted prototype can determine the location of the unknown transmitter (fox) as well as its operating frequency.

Military Technical College, Cairo, Egypt July 25 – 28, 2016



ECE-15

### Indoor Positioning System Using BLE

Ahmad Mohamed Ibrahim, Esraa Mohamed Fekry, Hassan Ahmad Ali, and Reem Abd ElMoneam Darwish Helwan University, Egypt, engahmedibrahim1994@yahoo.com, e.mohamed1994@yahoo.com,

hassan20102016@gmail.com,reemdarwish421@yahoo.com

Supervisor: Rowayda Sadek, Professor Helwan University, Egypt, rowayda\_sadek@yahoo.com

An indoor positioning system (IPS) is a system to locate objects or people inside a building using radio waves, magnetic fields, acoustic signals, Bluetooth, or other sensory information collected by mobile devices.



RUS-7

### Design and implementation of Location Tracing System based on artificial intelligence of quad-rotor UAV helicopter and Global Positioning System

#### Xiangdong Yao

National University of defense technology, China, <u>1152423637@qq.com</u>

Supervisor: Li Geng, National University of Defense Technology, China, dfao@nudtl.edu.cn

Confirm the enemy or searching target is always the crucial link no matter in military struggle or emergency rescue and disaster relief. So intelligent position searching system which can not only enter complex region for searching but also feedback the real time position information is urgently needed in dangerous cases of military and life. According to the conditions that quad rotor unmanned aerial vehicle can take the place of man to enter dangerous region for exploring and its action is smart, in addition, the aerial photography technology of quad rotor unmanned aerial vehicle is more and more perfect; GPS can mark position information such as images and items. The above two advantages are combined perfectly: Search and take photos of real time images recording the position information through the quad rotor unmanned aerial vehicle with GPS , then lock the target intelligently and take photos, feedback and rescue staffs can confirm the position of the enemy(affected people) according to the photo information and take action in time, which is sure to reduce blindness and enhance the efficiency.

To perform tasks, four shaft aircraft must be remote artificially for control or cruise independently .Artificially remote control can only complete the task within sight, If want to perform tasks in the place that human inaccessible, Such as disaster area, polar, etc, you must use independent cruise. For civilian use independent cruise vehicle executable to the disaster investigation rescue mission such as flood, fire or earthquake; poisonous gases concentration monitoring in chemical factories: Important facilities continuous monitoring; Oil pipelines and transmission line search; Regional air-to-ground, air-to-marine communication relay; The farmland and forest pesticide sprays; if we need get to specific areas for daily environment monitoring, Also can use this aircraft. Automatic return after be automatic search and automatic record store data, greatly reduce the manpower cost. This paper puts forward a method of simple four shaft vehicle navigation system design and implementation which based on GPS. The system can receive and analyze GPS positioning information that we need ,and storage positioning coordinate easily, and autonomous navigation, simulate and then display on the screen. It also can measurable flight distance and get accurate satellite time. Introduces the composition, positioning error, data receiving of GPS system, and method of parameter extraction, and the establishment of the LCD screen fonts, and the application of characters I2C bus practical the serial transmission technology.



**Date:** Tuesday, 26July 2016 **Time:** 10.00 – 12.00 Session:S 04 Room: A

### Circuits and Systems

### Coordinator Col. (Ret.). Ass. Prof. Ahmed H. Zaki MTC, Egypt

ECE-11	MEMS IR Gas Sensor	M. Abbas, A. Salah, A. Essam, N. Mohamed, D. Khalil, Y. Sabry, M. Erfan, G. Albert and A. Amr Ain Shams Univ., Egypt
ECE-18	KABLAWY (Detection underground cables (Electric and Telephone) and pipes (Gas, Water and Sanitation)	M. Abdel-Aziz, S. Sheair and A. Abo Elazm Menoufiya Univ, Egypt
ECE-25	Design and Implementation of Sun Tracking System	E. Mohamed, M. Adel, A. Gamal, A. Hamdy and S. Rashad Heliopolis Univ., Helwan Univ., Egypt
ECE-27	Design and Implementation of CO2 Laser System for Optical Components Malfunction	M. Helmy, A. Gamal, S. Ghoneimy, A. Mokhtar, and A. AbdAllah MTC, Egypt

Military Technical College, Cairo, Egypt July 25 – 28, 2016



#### ECE-11

### MEMS IR gas sensor

Mahmoud Abass, Ahmed Salah, Abdullah Essam, Nada Mohamed

Supervisors: Prof. Diaa Khalil, Dr. Yasser Sabry, Mazen Erfan, George Albert and Ahmed Amr Ain Shams University, Egypt

A MEMS IR based gas sensor exceeds market need for compact miniaturized gas sensor that able to detect and estimate the concentration of wide range of gasses in a lot of applications.

In this project we are focusing on two main applications

- 1. Environmental sensing: detection of air quality and early detection for fire in hotels, public places and detection of toxin gasses in militaries application.
- 2. Breath analysis: Accurate detection of specific VOCs (volatile organic compounds) in exhaled breath, known as biomarkers, provides essential information for diagnosis of specific diseases.

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ECE-18

# KABLAWY (Detection underground cables (Electric and Telephone) and pipes (Gas, Water and Sanitation)

Mo'men Mohamad Ahmed Abd El-aziz and Safaey Atef Ragab Sheair Menoufia University, Egypt, moamen.1637@el-eng.menofia.edu.eg, <u>safaeyatef@gmail.com</u>

> *Supervisor:* Atef El-Sayed Abou El-Azm, professor Faculty of Electronic Engineering, Egypt, atef\_abuelazm@menofia.edu.eg

KABLAWY is a unique technological solution based on the idea of detecting the underground cables (Electric and Telephone) and pipes (Gas, Water and Sanitation). The technology is based on Microwave surveillance (GPR system) which will be loaded on Quad-copter to survey any excavation site before excavation process making a detailed map of the cables and pipes places showing this map on LCD screen in front of the excavator driver to avoid infrastructure damaging.

Military Technical College, Cairo, Egypt July 25 – 28, 2016



ECE-25

### Design and Implementation of Sun Tracking System

E. Mohamed, M. Adel, A. Gamal and S. Rashad Heliopolis University, Egypt, <u>essam.hashem@hu.edu.eg</u>,Mohamed.AbdelKarim@hu.edu.eg, <u>amr13307@hu.edu.eg</u>, <u>sara.rashad@hu.edu.eg</u>

Supervisor: Alaa Hamdy, Associate Professor Faculty of Engineering, Helwan University, Egypt, alaa.hamdy@eng.asu.edu.eg

This paper presents the design and implementation of a semi-autonomous system device capable to move the solar cell in a rotational motion via light dependent resistor (LDR) sensors that sense the sun light and control the motor using a microcontroller. The sun tracker also has a temperature sensor that senses and monitors the temperature. This work is based on 16F877A PIC microcontroller that controls the sun tracker to obtain the best location for the solar cell.

The sun tracker uses only one stepper motor, two LDR sensors, temperature sensor LM35 and LCD that displays the measured values. In this work, simulation programs "Proteus" and "Solid works" are used to test the electrical and mechanical parts of the system. The proposed system achieve the high efficiency of sun tracking system with low cost compared to other systems.
Military Technical College, Cairo, Egypt July 25 – 28, 2016





# Design and Implementation of CO2 Laser System for Optical Components Malfunction

Mostafa Helmy, and Ahmed Gamal

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Supervisors: Samy Ghoneimy, Ayman Mokhtar, and Adel AbdAllah Department of Optoelectronics, Military Technical College, Egypt, adelmtc39@email.edu

Optoelectronic systems have a great role technically and tactically in the Military fire control systems. Optical components malfunction is essential to blind and reduce the effectiveness of these systems. In this paper the design and implementation of a CO2 laser system to disrupt and/or damage the optical components is proposed. Firstly, according to the specifications of the optical components such as the threshold damage, the free running CO2 laser system is designed and realized to meet these requirements. This includes the design of the laser tube, the power supply according to the required pump power to provide with the desired output power, and the cooling unit to remove the generated heat. Active media specification and resonator design are adapted to match one of the commercially available units. Design of power supply for optical pumping leads to an electronic circuit that is designed, and implemented using Proutus software. The simulated schematic diagram is tested and used to generate the layout using the same software. The layout is used for the hardware processing of the high voltage printed circuit board starting with the mapping of the layout on the board and ending with the pad drilling. Electronic components are soldered and the board is coated with green mask to prevent high voltage sparks.



Date:Tuesday, 26July 2016Time:10.00 - 12.00

Session:S 05 Room: B

#### **Perimeter Security**

#### Coordinator Col. Ass. Prof. Mohamed M. Fouad, MTC, Egypt

ECE-7	Car Anti-Theft Security System	M. Ramadan, E. Abdel Mabod, A. Ibrahim, A. Omara and H. Elbadawy AASTMT, Egypt
ECE-13	Vehicular Checkpoint System	E. Hassan, B. Ahmed, M. Maher, M. Mohamed and R. Sadek Helwan Univ., Egypt
ECE-14	Security System	H. Elalkamy, M. ELgezawy, M. Shawara, A. Nasef, S. Nassar and R. Sadek Helwan Univ., Egypt

Military Technical College, Cairo, Egypt July 25 – 28, 2016



#### ECE-7

### Car Anti-Theft Security System

Ahmed Mohamed Omara, Eslam Osama Hamed, Mustafa Fares Aburamadan and Abdallah Fayez Mohamed

Arab Academy for Science and Technology and Maritime Transport, Cairo, Egypt <u>ahmadomara933@gmail.com</u>, <u>e.osama1993@yahoo.com</u>, <u>mustafa.aburamadan@hotmail.com</u>, <u>abdallahfayez7@yahoo.com</u>

> Supervisor: Prof. Hesham ElBadawy, IEEE Senior Member, National Telecommunication Institute, Egypt, heshamelbadawy@ieee.org

Car theft has been a persisting issue around the world and the issue comes mainly from educated and high skills thieves. In this project a vehicle security system is presented to protect and disable an automobile and inform the owner aboutwhathadbeen happenedtohis/hercar.Ithencedecreasesthievesfrom committingtheir job. It also effectively monitors any disaster thatmay occur inside the car bymeans of many sensorssuch as: Temperature,Humidity, Car Location ...etc. The details of system design and implementation are described in the report. The experimental results show that our system is feasible and the owner can securely his vehicle within a few seconds via automatic notifications via the cellular data interface short messaging system.

Military Technical College, Cairo, Egypt July 25 – 28, 2016



ECE-13

## Vehicular Checkpoint System

Ebrahim Hassan, Badr Ahmed, Mahmoud Maher, Mahmoud Mohamed Helwan, Egypt, <u>ebrahimhassan107@yahoo.com</u>, <u>badrahmed346@yahoo.com</u>,

mahmoud\_maher12345@yahoo.com, mahmoudfcih2012@gmail.com

Supervisor: Prof. Rowayda A. Sadek, Faculty of Computers and Information, Egypt, <u>rowayda\_sadek@yahoo.com</u>

As there's a connection between the checkpoint and the vehicle, then the communication between the car and checkpoint can execute even before the car reach the checkpoint, so we will use this communication to reduce the waiting time that cars spend while waiting in checkpoints. Also help to make the check operation itself more easy, fast and mostly automatic. Minimize the high traffic jam around checkpoints. Also provide a methodology to identify the property to cars, so recognize the stolen ones.

Military Technical College, Cairo, Egypt July 25 – 28, 2016



#### ECE-14

## Security System

Mohamed Ramadan Elgezawy, Hady Gaber Elalkamy, Mahmoud Elbendary Shawara, Ahmed Mohamed Nasef, Said Refaat Nassar. Helwan, Cairo, <u>melgezawy95@gmail.com</u>, <u>eng.hady13@gmail.com</u>, <u>mahmoudshawara106@yahoo.com</u>, <u>Ahmednasef\_fcih54@yahoo.com</u>, <u>snssar24@yahoo.com</u>

> Supervisor: DR. Rowayda Sadek Computer and information, Cairo, Rowayda\_sadek@yahoo.com

Security System is essential for part for safe Places. This Project aims to develop a lowcost and intelligent security system. The main goal of this project is to design and implement a security system based on GSM (global system for mobile communication) and RFID (radio frequency identification) and Camera technology which can be organized in bank, secured offices and homes. Where crime becomes increasing and everyone wants to secure they asset at their places. In that situation user must have system with advance technology so person do not worry when getting away from their places and properties



Date: Tuesday, 26July 2016 Time: 10.00 - 12.00 Session:S 06 Room: C

#### Antenna and Microwave Circuits

#### Coordinator Col. Dr. Ehab K. Aboseif MTC, Egypt

RAD-3	X-Band Low Noise Amplifier for Ground Rader Applications	T. Ahmed and A. Gameel MTC, Egypt
RAD-4	Design of a 2.4 GHZ High Gain Helical Directional Antenna	M. Ali and M. Abdalla MTC, Egypt
RAD-5	High Gain Planar Array Antenna For X Band Radar Applications	M. El-Sewedy and M. Abdalla MTC, Egypt

Military Technical College, Cairo, Egypt July 25 – 28, 2016



RAD-3

# X-Band Low Noise Amplifier for Ground Radar Applications

Taher Sayed Ahmed

Radar Department, Military Technical College, Egypt, tahersayed92@gmail.com

Supervisor: Dr. Ayman Gamil Sobih Military Technical College, Egypt, ayman\_sobih@yahoo.co.uk

In this paper, the design and implementation of an X-band low noise amplifier (LNA) for ground radar applications have been introduced. A high performance (2-16 GHz) GaAs Schottky-barrier-gate FET has been employed in this design. The designed and fabricated LNA circuit satisfied all of the required specifications at 9.4 GHz with gain of 7 dB and noise figure of 1.2 dB with very good stability and IN/OUT reflection coefficients.

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#### RAD-4

### Design of 2.4 GHZ High Gain Helical Directional Antenna

Mohamed Sayed Ali

Military Technical College, Cairo Egypt, m.sayed.mtc@gmail.com

Supervisor: Mahmoud A.Abdalla, Electronic Engineering Department Military Technical College, Cairo Egypt, maaabdalla@ieee.org

This paper presents the design of a high gain helical directional antenna. The antenna was designed to operate at 2.4 GHz .The antenna is implemented in cylindrical dielectric which made of the Teflon with diameter 3cm and it is only about 46 cm long and can easily be constructed from ordinary and inexpensive parts. The proposed antenna design is simulated on CST STUDIO SUITE. The antenna is fabricated and tested. Good agreement is achieved between the simulated and measured results. The antenna parameters are discussed in this paper. this antenna is useful for extending the range of small 2.4 GHz wireless cameras and for reducing interference of Wi-Fi networking signals.

Military Technical College, Cairo, Egypt July 25 – 28, 2016





# High Gain Planar Array Antenna For X Band Radar Applications

Mohamed Fawzy El-sewedy

Radar Department, Military Technical Collage, Cairo, Egypt; m.fawzi2016@gmail.com

Supervisor: Col. Assoc. Prof. Mahmoud A. Abdalla Electronic Engineering Department, Military Technical Collage, Cairo, Egypt; 2maaabdalla@ieee.org

In this paper, a high gain planar array antenna is introduced. The proposed antenna is a 8x4 microstrip antenna operating in X-Band at 9.4 GHz. The antenna has been designed to introduce 15 degrees HPBW and 30 degrees HPBW in both azimuth and elevation planes. The proposed antenna has been designed and performance is examined using full wave electromagnetic simulations and experimental measurements. The design and development also focus on different type antenna such as rectangular and circular patch antennas. Microstrip antennas have the attractive features of low profile and light weight. However the antennas may be too large for practical applications at the lower microwave frequency range and may offer only a few percentage of bandwidth. A parallel or corporate feed configuration is used to build up the arrays. In parallel feed, the patch elements were fed in parallel with the transmission lines. The transmission lines are divided into two branches according to the number of patch elements. The objective of this project is to develop the antenna that has high gain, directivity and efficiency. Many factors are considered such as operating frequencies, bandwidth requirements and directivity, all of which affect its efficiency. The analysis on performance will be based on the obtained result especially in radiation pattern, bandwidth and return loss.



**Date:** Tuesday, 26July 2016 **Time:** 13.30 – 15.30 Session:S 07 Room: A

#### Propulsion, Energy, and Power

Coordinator

Ibrahim Ismail, PhD.

Zewail City, Egypt

PEP-1	Parametric study on taper-ended tubular solid	Hady A. Abdel-Wahab, Mohamed O. Mostafa and
	propellant grains	Mahmoud Y. Ahmed MTC, Egypt
		Ahmed S. Emam, Ahmed R. Eid,
	Enhancement of Hydrogen Engine with Mixed Eyel	Yasser M. Abdelradi and
FEF-2	Emancement of Hydrogen Engine with wixed Fuer	Mohamed R. Gomaa
		Benha Univ., Egypt
		Nada O. Badr, Basma Omar,
		Zuhair EL Sheshtawy,
	IIIIO Concretion annlication on vahiala	Ibrahim Elbougdady,
PEP-5	HHO Generation application on vehicle	Mohamed Bayoumy and
		Tarek Belal
		Pharos Univ., Egypt
PEP-6		A. Abdel-Salam, Y. Gamal,
		A. Abdo, Z. Mokhtar, M. Nady,
	Design & Simulation of a New Renewable Energy	B. Sobhi, A. Zaher, H. Mosalam,
	Plant for the New Egyptian Capital	and H. Habib
		Heliopolis Univ., Helwan Univ.,
		Egypt

**First International Undergraduate Research Conference, IUGRC** Military Technical College, Cairo, Egypt July 25 –28, 2016



PEP-1

### Parametric Study on Taper-ended Tubular Solid Propellant Grains

Hady A. Abdel-Wahab and Mohamed O. Mostafa Department of Rockets, Military Technical College, Cairo, Egypt

*Supervisor:* Mahmoud Y. M. Ahmed, PhD. Department of Rockets, Military Technical College, Cairo, Egypt, <u>mym141101@yahoo.com</u>

The design of the solid propellant grain is a decisive aspect of the solid propellant rocket motor performance. Tubular grain design is a favorable design since it produces a high neutral thrust profile. However, neutrality of tubular grains deteriorates as the aspect ratio of the grain deviates from an optimum value that is dependent on the web thickness. In some cases, the undesirable phenomenon of erosive grain burning may take place. One simple solution to restore neutrality is to add taper to the ends of the grain. Loss of motor filling comes as penalty for adding these tapered ends. The grain should thus be tailored to simultaneously satisfy both desired design objectives namely, neutrality and filling.

The present paper aims to address the dependence of these two design objectives on the design of a taper-ended tubular grain. The designs that are likely to yield erosive burning are also addressed. A parametric study is conducted involving the aspect ratio of the grain, its web thickness, and the taper angles on both ends.

Military Technical College, Cairo, Egypt July 25 – 28, 2016



PEP-2

### Enhancement of Hydrogen Engine with Mixed Fuel

Yasser Mahmoud Abdel Radii, Ahmed Reda Mohamed Benha University, Egypt, <u>y3shoosh@gmail.com</u>, ahmed.reda31@yahoo.com

Mohamed R. G. Behiri:Benha Faculty of Engineering, Ph. D. Benha University, Egypt, <u>Behiri@bhit.bu.edu.eg</u>

Making the possible best ways of production of hydrogen cheap, not harmful for environment and easy to applied for hydrogen engine application by using a combined way for production of hydrogen fuel from electrolysis, solar cells, thermal decomposition and displacement of natural gas and coal.

In fact, no one can deny that hydrogen engines are one of the most important matters. Hydrogen internal combustion engine (HICE) presents much of the same promise as hydrogen fuel cell and other sources of extracting it, reduced reliance on imported oil and reduced carbon dioxide emissions. Theoretical studies on the methods of cavitation treatment that result in engine cylinders with hydrogen fuel. This study in this research includes modification on the last hydrogen engines to introduce a new method more successful and safe. Advisors will be using a new and innovative method in the fossil-fuel mixing and minimized to a great extent compared with hydrogen gas, as well as new and distinctive in a research addition to added water vapor as a component of this mixture. The ways to make the process of hydrogen mixing safer are studied.

Military Technical College, Cairo, Egypt July 25 – 28, 2016



PEP-5

# **HHO** Generation Application

Nada Oman Badr, Basma Omar Abd EL-Hameed,Zuhair EL Sheshtawy,Ibrahim El bougdadiy, Mohamed Bayoumy

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Supervisor: Dr.Tarek Belal, tarek.belal@pua.edu.eg Supervisor: Dr.Sameh tawfeek, sameh\_tawfeek@hotmail.com Yasser Mahmoud Abdel Radii, Ahmed Reda Mohamed Benha University, Egypt, <u>y3shoosh@gmail.com</u>, ahmed.reda31@yahoo.com

Mohamed R. G. Behiri: Benha Faculty of Engineering, Ph. D. Benha University, Egypt, <u>Behiri@bhit.bu.edu.eg</u>

Alternate fuel is important and it should be used as an assist fuel beside the fossil one. Actually we spend a lot of our income for our vehicle fuelling.

Recently, using hydrogen as a supplement fuel for spark ignition engines is one of the potential solution that is not brand new. Hydrogen is not a fuel that occurs free in nature like fossil fuel so we need electrolyzing procedure, as electrical energy is used to break water into H2 and O2. In principle, an electrolysis cell consists of two electrodes, commonly flat metal or carbon plates, immersed in an aqueous conducting solution called the electrolyte. HHO gas was produced by the electrolysis process is injected into the intake manifold after the carburetor. We create a MATLAB program to calculate the cycle with and without HHO, create the balance equation for H2addition in combustion equation, the saving percentage of fuel reached 5%. This work presents an investigation to the effect of Hydrogen Booster System on fuel consumption of an internal combustion engine and how we achieved it.



#### PEP-6

## Design & Simulation of a New Renewable Energy Plant for the New Egyptian Capital

A. Abdel-Salam, Y. Gamal, A. Abdo, Z. Mokhtar, M. Nady, B. Sobhi, A. Zaher, Heliopolis University, Egypt, first.author@email.edu, second.author@email.com, third.author@gmail.com

Supervisors: Hady H. Fayek, Assistant Lecturer & Heba Mosalam, Lecturer Heliopolis University, Egypt, <u>hady.habib@hu.edu.eg</u>&<u>heba.mosalam@hu.edu.eg</u>

The new Egyptian capital is a smart city which means that it should be supplied through a smart grid. In smart grid the penetration level of Renewable plants are higher than conventional one. This paper presents three proposals for the new plant which its installed capacity is 150 MW. The three possibilities of the plant are chosen to be Wind farm or PV farm or CSP station. The Design and simulation are carried out using System Advisory Model (SAM) software version 2016 for each type with full installed capacity. The power factor correction is taken into consideration by selecting the suitable compensators. A full comparison between the three scenarios will be presented including all the points of differences to get the same desired active power.

First International Undergraduate Research Conference, IUGRC Military Technical College, Cairo, Egypt July 25 – 28, 2016



**Date:** Tuesday, 26July 2016 **Time:** 13.00 – 14.00 Session:S 08 Room: B

#### **Electronic Engineering**

#### Coordinator

Col. Dr. Hossam S. Tork

MTC, Egypt

ECE-21	A General Power Coupling Branch-Line for Wireless Applications	A. Elkady and M. Abdalla MTC, Egypt
ECE-23	Down Conversion Mixer for X-Band Applications	T. Ahmed and A. Gameel MTC, Egypt

Military Technical College, Cairo, Egypt July 25 – 28, 2016



ECE-21

# A General Power Coupling Branch-Line for Wireless Applications

Amr Ahmed Elkady Military Technical College, Cairo Egypt, Amr\_2do@yahoo.com

Supervisor: Mahmoud A.Abdalla, Electronic Engineering Department Military Technical College, Cairo Egypt, maaabdalla@ieee.org

This study presents the design of a general power branch-line coupler .The coupler was designed to cover the band from 1 GHz - 5 GHz at resonance frequency 3 GHz. The coupler is implemented in microstrip configuration and printed on FR4 substrate with dielectric constant of 4.4 and thickness of 1.6 mm and tang loss of 0.02, The proposed coupler design is simulated on electromagnetic simulation software. The coupler is fabricated and tested. Good agreement is achieved between the simulated and measured results. The coupler parameters such as reflection coefficient and coupling coefficient are discussed in this paper.

Military Technical College, Cairo, Egypt July 25 –28, 2016



ECE-23

# X-Band Down Conversion Mixer for Ground Radar Applications

Taher Sayed Ahmed

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Supervisor: Dr. Ayman Gamil Sobih Military Technical College, Egypt, ayman\_sobih@yahoo.co.uk

In this paper, the design and implementation of an X-band down conversion mixer for ground radar applications have been introduced. The single-balanced configuration has been chosen for this design employing a pair of high performance beam-lead Schottkybarrier diodes. The designed and fabricated passive mixer circuit satisfied all of the required specifications at RF frequency of 9.4 GHz with conversion loss about 6 dB over a wide dynamic range of the input RF power with very good isolation between different ports.



**Date:** Tuesday, 26July 2016 **Time:** 14.00 – 15.30 Session:S 09 Room: B

#### **Process Automation**

#### Coordinator Lt. Col. Dr. Hossam M. Hendy MTC, Egypt

GNC-2	UAV Flight Control System Reconfiguration Control with Intelligent Diagnosis	S. Cheng and L. Kehong NUDT, China
ECE-5	Intelligent Wireless Sensors Network for Industrial Automation Applications	A. Mustafa, O. Abubakr, and B. Mokhtar Alexandria Univ., Egypt
ECE-17	MMGA Meter (Manage, Monitor and Govern Appliances)	M. Ahmed, M. Adel, A. Amer G. Mohamed and R. Sadek Helwan Univ., Egypt

Military Technical College, Cairo, Egypt July 25 – 28, 2016





## UAV Flight Control System Reconfiguration Control with Intelligent Diagnosis

Shen Cheng National University of Defense Technology, Changsha, Hunan, P.R.China, shensicheng 1996@sina.cn

Lyu Kehong professor Laboratory of Science and Technology on Integrated Logistics Support, National University of Defense Technology, Changsha, Hunan, P.R. China, <u>fhrlkh@163.com</u>

Unmanned Aerial Vehicle (UAV), with unique fight characteristics of small volume, light weight and small fight loss, has wide application space in both Military field and civil areas such as investigation, patrol, relief and so on. The stability and security of flight control system is the bottlenecks of the application of UAV in all fields. Fortunately, flight fault-tolerant control technology can enhance flying security and stability of UAV after faults. Thus, flight fault-tolerant control technology becomes the current research hotspot. This paper focuses on practically and real-time of reconfiguration control system for UAV application. Focuses on UAV flight control system intelligent diagnosis and repair of autonomous.

Generally, Unmanned Aerial Vehicle (UAV) is designed without redundancy. We can reconfigure control law only based on analytical redundancy when there are faults. However, the traditional identification methods often failed to meet real-time requirements of UAV reconfiguration control and are too complex. It has some limitations.

Reconfiguration control system for UAV. In this paper, multiple linear models are designed to describe the nonlinear dynamic characteristics of UAV caused by diversity of control surface failures. The controller reconstruction is designed off-line and selected adaptively online in actual flight. Dynamic compensation plans are also proposed to ensure the safety of aircraft when there is great disturbance for the reconstruction process.

The main works of this paper are:

1. This paper gives UAV flight control system model using MATLAB, which provides a simulation platform for flight control system performance validation.

2. The UAV control system fault type is analysed. Each fault configurability is researched and reconfiguration strategies are given.

3. This method, focusing on the disadvantages of traditional methods, uses robust false alarm technique. In the model of UAV flight control system, a robust false alarm fault detection technique is built to describe the complex nonlinear dynamic system caused by different faults. Reconstruction can meet stability and safety requirements.

Military Technical College, Cairo, Egypt July 25 – 28, 2016





## Intelligent Wireless Sensors Network for Industrial Automation Applications

Ahmad M. Mustafa and Omar M. Abubakr

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Supervisor: Bassem Mokhtar, Assistant Professor Department of Electrical Engineering, Faculty of Engineering, Alexandria University, Egypt, bmokhtar@alexu.edu.com

Technologies of Wireless Sensors Networks (WSN) and Internet of Things (IoT) are being widely introduced to Industrial Automation field; enabling new aspects in big data analysis, preventive maintenance and crises prevention, which makes industrial processes more efficient and less costly. Introducing these new technologies to industry faces difficulties due to the existence of current irreplaceable automation systems, which requires developing solutions compatible and friendly with the existent systems. This work aims to introduce an efficient, low-cost solution for industrial WSN. The applications of this system include: environmental data collection, industrial hazards alarms, security applications, controlling actuators, etc. The proposed system works cooperatively with the existent Programmable Logic Controllers (PLC) automation systems, which makes it flexible, having advantages of both wired and wireless control systems

Military Technical College, Cairo, Egypt July 25 –28, 2016



#### ECE-17

#### MMGA Meter (Manage, Monitor and Govern Appliances)

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> Supervisor: Dr.Rowayda Sadek, Associate professor, Egypt, rowayda\_sadek@fci.helwan.edu.eg

The smart meter project is one of the most important needs these days. Every home uses electricity with different consumption and different amounts of watts according to the different types and numbers of the appliances they have. Our challenge was to cover most of these types and their consumption to give the customer the ability to choose their favourite ones and monitor their consumption form an Android application that can be easily installed in any Android device and see the appliances consumption form anywhere you are right now just by accessing the internet and let the app fetching data from the server and be an eye on your sweet home wherever you are. Not just monitor the appliances consumption but also control to ON/OFF these appliances



**Date:** Tuesday, 26July 2016 **Time:** 13.00 – 15.30 Session:S 10 Room: C

#### **Biomedical Applications**

#### Coordinator Lt. Col. Ahmed M. Awadallah. MTC, Egypt

ECE-4	Electrical Nerve Blocker	A. Ebada and A. Abo Elazm Menofiya Univ., Egypt
RAD-1	Wireless Bio-Radar Sensor for Respiration Detection	A. Nassr and El-Sayed M. EL-Rabaie Menoufia Univ., Egypt
ECE-26	MediT–Medical Electronic Drug Infusion Therapy for Cancer Treatment	M. Moaid, M. Elsharkawy, M. Eldkoony and M. Karar Menofiya Univ., Egypt
CMP-2	controlling receptors pathways in cells in the human body using programming	Mohamed E. Elsakhawy and M. El-dosuky Mansoura Univ., Egypt
ECE-16	Computer-Aided Diagnosis System for Medical Laboratory Investigation	Mustafa A. Razek, A. Gemiez, A. Al Said, O. Ahmed, M. Mokhtar A. Abdel Tawab, A. Badr and G. Ahmed Helwan Univ., Egypt

Military Technical College, Cairo, Egypt July 25 – 28, 2016



ECE-4

### Electric Nerve Blocker

HamdyMagdy Saleh Shaaban, AmgadSoliman Ahmed Ebada Menoufia University, Egypt, <u>hamdymagdy32@gmail.com,amgadsoliman77@gmail.com</u>

> *Advisor:*Dr: atefabouelazm, professor *Faculty of electronic engineering, Egypt, <u>elazm40@hotmail.com</u>*

A portable medical device that will be used to generate electrical signals that will enter the nerve system of human body. Then will face the pain signal that flows through the nerve cell (which connect the human organ with the brain) then scramble this negative signal, so pain over.

An electronic device outputs an electrical signal (pulses) controlled in pulse width, pulse rate and in amplitude. By varying this signal's volt and frequency and applying on the human nerves ... then,The magic will begin. This device solves many current issues:-

1) Body pain

When this device is connected to the body, it starts to generate signals that will stop flowing of pain electric signals in the nerve cells without harming the nerve system so it is fully secure for human body.

Military Technical College, Cairo, Egypt July 25 – 28, 2016





# Wireless Bio-Radar Sensor for Respiration Detection

Ahmed Hussein El-shahat Menoufia University, Egypt, <u>ahmed.1113@el-eng.menofia.edu.eg</u>

Supervisor: El-Sayed M. EL-Rabaie, Professor Faculty of electronic engineering, Egypt, Menoufia, <u>srabie1@yahoo.com</u>

In this paper, a wireless bio-radar sensor was designed to detect a human heartbeat and respiration signals without direct skin contact. In order to design a wireless bio-radar sensor quantitatively, the signal-to-noise ratio (SNR) in the baseband output of a sensor should be calculated. Therefore, we analyzed the SNR of the wireless bio-radar sensor, considering the signal power attenuation in a human body and all kinds of noise sources. Based on these analysis and the measurement results, a compact, low-cost 10.525 GHz (X-band) bio-radar sensor was designed and implemented in a printed circuit board. The demonstrated sensor consists of two printed boards: a control board and an antenna board. Measurement results show that the heart rate and respiration accuracy was very high. Therefore, we verified that a wireless bio-radar sensor could detect heartbeat and respiration well without contact and our SNR analysis could be an effective tool to design a wireless bio-radar sensor.

Military Technical College, Cairo, Egypt July 25 – 28, 2016





## MediT–Medical Electronic Drug Infusion Therapy for Cancer Treatment

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Supervisor: Mohamed Esmail Karar, Ph.D., IEEE Member Faculty of Electronic Engineering (FEE), Menoufia University, 32952 Menouf, Egypt mekarar@ieee.org, Phone: +201020003789, Fax: +20483660716

Drug infusion systems are used to inject intra-venous (IV) anti-cancer chemotherapy drugs inside the patients. These systems are mostly operator-based with very small options to achieve the treatment goals. Furthermore, the infusion systems with advanced options like wireless PC-based is very expensive and is rarely used in Egyptian hospitals and/or medical centers. Hence, this project aims at developing a new advanced medical drug infusion system for cancer chemotherapy, with inexpensive cost.

In this project, the NI-MyRIO as FPGA-based controller is basically used for controlling the drug infusion rates and the performance of the developed system. Moreover, it is possible to connect the developed system with a PC via a USB cable or using wireless communication technology, i.e. Wi-Fi, in order to adjust and monitor the drug infusion rate based on LabVIEW graphical interface during the session of chemotherapy.

Military Technical College, Cairo, Egypt July 25 –28, 2016





# Controlling Receptors Pathways in Cells in the Human Body Using Programming

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> Supervisor Dr Mohamed El-Dosuky Mansoura University

In the 20th century, the world has witnessed a great development in genetic engineering which serves as the next curriculum-based current generation and has proved its proficiency in all fields. One of the most important problems that we confront and is a threat to all of humanity in general and great numbers of world peoples suffer from is cancer.it has an obvious effect on man's body and this is called genetic engineering and controlling DNA and identifying genetic features of each generation. A new method is presented in this paper by using computer language through it, this method will solve the cancer problem.by using controlling recipients pathways in cells in the human body using programming.

In the study and sorting the recipients through them, the cell is satisfied with all what it needs and organizing the movement of these recipients to prevent and uproot the false orders that will be sent falsely outside the cell. This represents a new method. So we direct the scholars to help solving this problem and uproot it.



ECE-16

## Computer-Aided Diagnosis System for Medical Laboratory Investigation

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Supervisor: Ghada Ahmed, PhD, Assistant Professor, Computer Science Dept. Faculty of Computers and Information, Egypt,

This project applies automatic methods for classification and recognition of urine analysis microscopic images. We found that, it is necessary to apply automatization in the field of microscopic analyses of urine solution as detecting particles in the microscopic image is repeated and time consuming. Furthermore, Particles in many medical laboratory analyses have irregular shapes and blur edges. This project applies medical image processing algorithms and pattern recognition to microscopic images. It is composed of three stages: first, original urinary sediment microscopic images are transformed into binary image by image preprocessing including median filtering, color image conversion to gray scale image and image segmentation. Second, we select and extract some objects from images. Third, we classify the extracted images using SVM to recognize recognizes four kinds of urine sediment components: red blood cells, white blood cells, cast, calcium oxalate.



**Date:** Wednesday, 27July 2016 **Time:** 10.30 – 12.00 Session:S 11 Room: A

#### Architecture Engineering

#### Coordinator Col. Dr. Mohamed F. Abdel-aleem MTC, Egypt

CVA-6	Green Assessment for Heritage Buildings in Egypt Case Study: Zeinab Khatoun House	M. Abdel-Razek, A. Khamis, M. Zwail and M. Mahdy MTC, Egypt
CVA-8	Let Water Live Forever	H. Ning, H. Zhang and unxiahou NUDT, China
MQC-1	For a better future!—the assessment and planning system of sustainable development	Z. Lv, F. Wu, A. Zhou, and D. Wang NUDT, China

July 25 –28, 2016



CVA-6

## Green Assessment for Heritage Buildings in Egypt Case Study: ZeinabKhatoun House

Mohamed Ashraf Abdel-Razek Ibrahim Department of Architecture, Military Technical College, Cairo, Egypt.

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The study briefly shades some light on the green architecture concepts through an analytical study for its definition and the different green building rating systems. The study clarifies that implementing green measurements (regardless the total floor area) will results in reducing the energy consumption in buildings, and hence the GHG emissions.

The study introduces the Egyptian Green Building Council (EGBC), which has formulated the Green Pyramid Rating System (GPRS) in 2009 as a tool for the green building assessment through its different categories.

The study mainly focuses on applyingGPRS on ZeinabKhatoun Houseasa case study in old Cairo, in order to specifywhether the house is complied with the green buildings standards which will qualifies it for a green building certificate.

Military Technical College, Cairo, Egypt July 25 – 28, 2016



CVA-8

#### Let water live forever

HuNing, HaoZhang

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Supervisor: Peiguoliu, Doctor National university of defence technology, China, pg731@126.com

This paper aims to measure water scarcity level of a region and make predictions so as to make plans to alleviated water scarcity.

Based on the water supply and demand, we take both social and environment drivers into account and find 5 important indicators. We define two indexes (Physical Scarcity Index and Economy Scarcity Index) to describe physical water scarcity and economy scarcity respectively and Entropy method are used to get their weights. A two dimension evaluation system is built through which we can get comprehensive water scarcity degree and scarcity types which enable us to know main reasons caused water scarcity.

Then the model is applied into Shandong, a province of China where water is heavily overloaded and turns out to reflect the reality well and we find Shandong is both physical and economy scarcity. After analyzing the reasons caused water scarcity in Shandong, social and environment drivers are found. According to the results of GM (1,1) model prediction, Shandong will suffering more serious physical water scarcity while the economy scarcity be alleviated in 15 years.

Focus on the situation in Shandong, we raise an intervention plan with respects to social and environment drivers. The plan involves various measures and its impacts on water ecosystem and surroundings areas are discussed detailed. Adding economy costs into account, AHP method is used to make optimization of our plan. We add the plan into the model built before through introducing control factors and make prediction again. The results are satisfying: with the help of plan, ES is limited below 0.2 which means Shandong is no longer economy water scarcity. Although it will still suffer physical scarcity, things get much better and PS maintains about 0.5. In a word, Shandong can become less susceptible to water scarcity.

Finally, we analysis the sensitivity of our model by change key factors' data. Overall, our model take social and environment factors into consideration and could reflect comprehensive information of water scarcity. It works well in Shandong and with the help our plan, we successfully predict and alleviate water scarcity in future of Shandong



MQC-1

# For a Better Future! —The Assessment and Planning System of Sustainable Development

Zhoudan Lv, Fengling Wu, and Ang Zhou

National University of Defence Technology, China, 1046112727@qq.com, 1163129637@qq.com, zhoushuanshuan@gmail.com.

Supervisor: Dan Wang, Lecturer National University of Defense Technology, China, casablanman@hotmail.com.

Sustainable development is a common goal for all countries. In this paper, we build models to evaluate sustainability of countries and policies, create a 20-year sustainable development plan for Bangladesh, and predict the influences and changes caused by our plan in 20 years.



**Date:** Wednesday, 27July 2016 **Time:** 10.30 – 12.00 Session:S 12 Room: B

## **Applied Mechanics**

#### Coordinator

#### Col. Dr. Ahmed M. Bahgat

**MTC**, Egypt

MEC-1	Design and Implementation of Anti-Gravity Treadmil	A. Mohamed, E. Mahmoud, M. Mabrouk, H. M. Mahgoub, and A. AbdElrazek MTC, Egypt
ARM-1	Ballistic Performance of 155mm Velocity Enhanced Long-Range Artillery Projectile	A. Sayed and A. Zaki MTC, Egypt
RUS-1	Research and design of the "flapping wing" super miniature stealth unmanned aerial robot in implementing decapitation strike	JinsiDai and HuiminLu NUDT, China

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MEC-1

# Design and Implementation of Anti-gravity Treadmill

Abdelfatah N. Mohamed, Eslam M. Mahmoud Military Technical College, Egypt

Mohamed H. Mabrouk, PhD, Hussien M. Mahgoub, Assoc.Prof., Adel AbdElrazek, Assoc.Prof Military Technical College, Egypt

The treadmill is considered one of the most widely used equipment to achieve high standards of physical fitness and rehabilitation. The aim of the work presented in this paper is to choose suitable regular treadmill and transfer it into anti-gravity treadmill. The design procedure depends on calculating the required lift force subjected to the lower part of the human body enough to raise it during the exercise. The source of lift force comes from a blower with variable speed motor. The human wear a special short connected to pressurized elastic rubber container, when the air below it fills the container and thrust force exist which leads to suitable apparent weight to raise the efficiency of the exercise.



ARM-1

# Ballistic Performance of 155mm VelocityEnhanced Long-Range Artillery Projectile

Al-Desoky Ezzat Sayed Military Technical College, Egypt

Supervisor: Ahmed Z. Ibrahim Military Technical College, Egypt

Many types of 155mm high explosive projectiles are used by a large number of powerful armed forces in the world.Some of these projectiles are of short ranges like that one designated by M107 since its range is approximately 18km. In order to make range extension of these projectiles, the drag acting on them should be decreased. Therefore, many methods have been followed to decrease the drag during projectile flight in air. The improvement of the projectile ballistic shape and adding base bleed unitinstalled to its baseare among the drag reduction methods. Moreover, some projectiles are supplied with small rocket motorimparting the projectile with thrust force rather than decreasing the drag acting on it.

In the current study, an analysis is performed to investigate the ballistic performance of a newly developed 155mm Velocity enhanced Long-range Artillery Projectile(VLAP) which is provided with base bleed and rocket assistant units. The internal ballistic solution is obtained using an analytical model. Then, the external ballistic solutionis carried out when the function of the rocket motor and the base bleed are switched on or off. Amaximum range of 41km is obtained when this projectile is fired using a barrel having a length of 39 times the caliber anda maximum range of 55km obtained when it is fired from a barrel having a length of 52 times the caliber.





# Research and Design of the "Flapping Wing" Super Miniature Stealth Unmanned Aerial Robot in Implementing Decapitation Strike

JinsiDai, JishenGuo, XinLiu Nation University of Defense Technology, China, 254014319@qq.com, liuliming 19931014@163.com, <u>514805236@qq.com</u>

Supervisor: HuimingLu, Professor

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Super miniature unmanned aircraft is a kind of new concept weapon, which will result "imbalance of war scale" in the future battlefield. once this kind of micro robot was applied to close distance "decapitation", its military and political role and operational effectiveness will be incalculable. In this paper, the micro-electromechanical technology, nanotechnology ,computer technology and other technical groups of current development situation was researched ,trying to use the existing technology optimizing the energy system ,power system, sensor system and flight control system to design a super miniature stealth unmanned aerial robot dedicated to implementation of "decapitation strike".



**Date:** Wednesday, 27July 2016 **Time:** 10.30 – 12.00 Session:S 13 Room: C

#### Wireless Communications

#### Coordinator

Col. Dr. Ehab K. Aboseif

**MTC**, Egypt

ECE-8	Beamforming for MIMO-OFDM Wireless Systems	M. Newir, M. Elrefy and M. Eldessoki Menoufia Univ., Egypt
ECE-9	Heterogeneous Wireless Sensor Network	A. Essa and M. Eldessoki Menoufiya Univ., Egypt
ECE-22	A Half Circular Ultra-Wideband Antenna for Wireless applications	A. Mohamed, A. Mahran, and M. Abdallah MTC, Egypt


#### ECE-8

### Beamforming for MIMO-OFDM Wireless Systems

Mostafa Gaber Saber Newir and Mostafa Mohamed Elrefy Menoufia University, Egypt, mostafanewir70@gmail.com, mostafa.elrefy@gmail.com

Supervisor: Moawad I. Dessouky, Professor Faculty Of Electronic Engineering, Egypt, Dr\_moawad@yahoo.com

The smart antennas are widely used for wireless communication, because it has a ability to increase the coverage and capacity of a communication system. Smart antenna performs two main functions such as direction of arrival estimation (DOA) and beam forming. Using beam forming algorithm smart antenna is able to form main beam towards desired user and null in the direction of interfering signals. In this project Direction of arrival (DOA) is estimated by using MUSIC algorithm. Receive Beam forming is performed by using LMS and LLMS algorithm .In this Paper, in order to perform secure transmission of signal over wireless communication we have used chaotic sequences. This paper evaluates the performance of Beam forming with and without LMS and LLMS algorithm for MIMO-OFDM wireless system. The simulations are carried out using MATLAB

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Military Technical College, Cairo, Egypt July 25 – 28, 2016





#### Heterogeneous Wireless Sensor Network

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Supervisor: Moawad I .Dessouky, professor Faculty of Electronic Engineering, Egypt, <u>Dr\_Moawad@yahoo.com</u>

Heterogeneous network will be the network of thefuture because of the disadvantages of the traditional cellular networks. High power, high mobility traffic, low capacity andlow coverage area are the most important disadvantageswhich face the traditional cellular networks. Also toomany users demanding too much data is a big problem intraditional cellular network. Future networks willsupport huge mobile data traffic, support low mobilitytraffic, interwork efficiently with other radio technologies. Future networks will also be low power andenvironmentally friendly. Another technology will solve most problems oftraditional cellular network. It is Wireless Sensor Network. Wireless sensor networks are made up of number oftiny mobile nodes, which have the capability ofcomputation, sensing and Wireless networkcommunication. All of these techniques help to development of the structure of cellular networks and to construct the fifth generation of mobile service structure.

In this paper the problems that face the cellular network and how to overcome these problems by using Heterogeneous Network and Heterogeneous Wireless Sensor Networkand the structure of these networks.

Military Technical College, Cairo, Egypt July 25 – 28, 2016





# A Half Circular Ultra-Wideband Antenna for Wireless Applications

Abdallah Saieed Mohamed

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Supervisors: Dr. Ashraf Mahran, Avionics Department, Military Technical College, Cairo, Egypt. a.mahran@ieee.org Assoc. Prof. Mahmoud Abdelrahman Electronic Engineering Department, Military Technical College, Cairo, Egypt. maaabdalla@ieee.org

This study introduces the design of half circular structure Ultra-Wideband UWB antenna. The antenna design objective is to cover the complete Ultra-Wideband specified by the FCC. The antenna has been implemented in microstrip configuration and printed on Rogers Ro4350 substrate with dielectric constant of 3.66 and thickness of 1.52 mm. The proposed antenna has a compact structure such that its dimensions are only 40×40 mm2. The proposed antenna design is verified using electromagnetic simulation software package (HFSS). Moreover, measured results have shown good agreement between simulation of the proposed design and the actual implementation. Having wideband characteristic, compact and planar structure, the proposed antenna satisfies the requirements of UWB wireless communication applications.



**Date:** Wednesday, 26July 2016 **Time:** 12.30 – 12.00 Session:S 14 Room: A

#### **Chemical Engineering**

#### Coordinator Lt. Col. Dr. Mohamed M. Kotb MTC, Egypt

CHM-1	High Field Exfoliation and Visible- light Photocatalysis of Two-Dimensional MoS2 Nanosheets	X. Dong, D. Wang, J. Duan, J. Wang, and Q. Wang NUDT, Chnia
CHM-3	A Method of Bio Macromolecule Sol Processor to Prepare Graphene Aerogel	L. Di, L. Gengyuan, Hexiaotong, W. Xiaojie, and J. Zhenhua NUDT, China
CHM-4	Battery Recycling	Salem, A.A and Metwally Moussa MTC, Egypt
CHM-6	Sensitivity and Detonation Characteristics of Plastic Explosive based on BCHMX	Abd-Elaziz Hamed and Ahmed Elbeih MTC, Egypt
CHM-7	Preparation and Characterization of 3-nitro-1,2,4- triazole-5-one (NTO) Explosive	Mahmoud Salah Zehairy and Ahmed Elbeih MTC, Egypt

**First International Undergraduate Research Conference, IUGRC** Military Technical College, Cairo, Egypt July 25 –28, 2016



#### CHM-1

# High Yield Exfoliation and Visible-light Photocatalysis of Two-Dimensional MoS2 Nanosheets

Xin Dong,Dayin wang, Jingshan Duan, Hualei Liu, Jinfu He and Xinzan Chen National University of Defense Technology, China,390669521@qq.com, cuo7791@163.com, 60334600@qq.com

Supervisor: Jing Wang, Associate professor; Qinghua Wang, Associate professor Department of Chemistry and Biology, China, jingwang@nudt.edu.cn

The typical Photocatalytic technology is becoming one of the highlights in the current research of solar utilization for its visible advantages. However, curent photocatalytic material's photocatalytic activity can only be excitated under UV light due to its large band gap width. We found that the band gap of a thin layer of nanostructured MoS2 is 1.9eV which matches the visible light energy. Therefore, it can be selected as an ideal photocatalytic material. To prepare the nanosheets, we put forward an ultrasonic-assisted method of molybdenum disulfide nanoparticles piece exfoliation and examined the visible light catalytic activity by observing the degradation of Rhodamine B.

July 25 – 28, 2016





# A Method of Bio Macromolecule Sol Processor to Prepare Graphene Aerogel

Lu Di, Liang Gengyuan, He Xiaotong National University of Defence Science and Technology, China, 965560416@qq.com, 503896972@qq.com, 153527486@qq.com

Supervisor: Wang Xiaojie, Jiang Zhenhua, National University of Defence Science and Technology, China, 185112105@qq.com

Graphene has an outstanding performance in electrical conductivity and sufficient mechanical strength, practically a three-dimensional graphene aerogel network structure can multiple its extraordinary performance and contribute to the specific application. However, current production technology of graphene aerogel, boiling method highly relies on deoxidization of graphene oxide aerogel which result in a high cost and a waste of energy. Here we introduce a sol-gel approach based on a bio macromolecule predecessor to synthesize a 3D graphene network which consists of cosmically produced graphene decorated by surfactant and be filled in bio macromolecule aerogel. Such a graphene configuration provides a porosity-manageable aerogel, huge accessible surface area and good mechanical elasticity. The 3D graphene network thus avoid the extra cost and waste in energy and start a bright prospect of the industrial application of graphene, for instance, high efficiency porous catalyst, absorption materials, high-energy electrochemical capacitors, as highlighted in our work

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Military Technical College, Cairo, Egypt July 25 – 28, 2016





# **Battery Recycling**

A. A. Salem Military Technical College, Egypt

#### Associate Professor Maj.Gen (Ret.) Metwally Moussa

Military Technical College, Egypt

The typical new lead-acid battery contains 60 to 80 percent recycled lead and plastic. During the recycling process, a battery is separated into three distinct components. The lead is smelted and refined to be used in new batteries. The plastic case is recovered and its material cleaned, and molded into new battery cases. The used acid is even recycled for reuse. Three main stages of lead-acid battery recycling are: battery treatment, smelting and refining.

Military Technical College, Cairo, Egypt July 25 – 28, 2016



CHM-6

# Sensitivity and Detonation Characteristics of Plastic Explosive based on BCHMX

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Cis-1,3,4,6-Tetranitrooctahydroimidazo-[4,5d]imidazole (BCHMX) has been studied as explosive filler to replace pentaerythritol tetra-nitrate (PETN) in EPX 1 explosive. BCHMX with different particle sizes was bonded by thermoplastic binder plasticized by dibutyl phthalate (DBP) to obtain BCHMX-EPX. Sensitivity to impact and friction were determined. The detonation velocity was measured experimentally and the detonation characteristics of the prepared sample as well as the pure explosives were calculated by EXPLO 5 thermodynamic code. For comparison, commercial plastic explosives, EPX-1, Semtex 10, Formex P1 were studied. It was concluded that BCHMX-EPX has the highest detonation characteristics of all the studied plastic explosives and its sensitivity is in the same level of the studied traditional plastic explosives. The mutual relationship obtained from the experimental and calculated results indicates the compatibility of the calculated results with the experimental measurements.

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July 25 – 28, 2016



CHM-7

# Preparation and Characterization of 3-nitro-1,2,4-triazole-5one (NTO) Explosive

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3-Nitro-1,2,4-triazol-5-one (NTO) is an explosive ingredient under investigation as a potential insensitive replacement for RDX in explosive formulations. Although its performance is slightly less than that of RDX, NTO is thermally more stable and less sensitive to hazard stimuli. Explosive compositions based on NTO are therefore more likely to be extremely insensitive detonating substances, and munitions filled with them may meet the criteria of Insensitive Munitions (IM). In this paper, different methods have been studied in order to obtain NTO by a safe method and high yield. The obtained NTO has been characterized; spectral properties by FTIR, thermal analysis by DSC, crystal morphology study by SEM and sensitivity to different stimuli. It was concluded that the characteristics of the obtained NTO are greatly affected by the purity of the obtained product.



**MTC**, Egypt

**Date:** Wednesday, 27July 2016 **Time:** 12.30 – 15.00 Session:S 15 Room: B

#### **Robots and Unmanned Systems**

#### Coordinator Col. Dr. Ahmed M. Bahgat

RUS-3	Pharmaroid: A Smart Mobile Medical Unit using Mobile Pharmacist Robot	Heba I. Hassan, Ahmed M. Magdy, Asmaa A.Eldin, and Sherin Youssef AASTMT, Egypt
RUS-4	Design and Manufacturing of A Mini-Uav Quad Carrier	Mohammed A. A. Soliman and Aly M. El-Zahaby Tanta Univ., Egypt
RUS-5	Design and Implementation of FPGA-Based Robotic Arm manipulator	Mohammed I. M. Ali, Ahmed S. Bahgat, Mahmoud S. Hamed and Ahmed M. Yousef MTC, Egypt
RUS-11	Stealth boat with satellite control system for military applications	A. Hassan, Y. Badawy, I. Azab, M. Ismail, A. Abd-alkader, S. Tawfeik, S. Mesbah, and M. El-hofey AASTMT, Egypt



#### RUS-3

# PHARMAROID: A Mobile enabled Robot Pharmacist

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PHARMAROID is a smart pharmacy enabled with a mobile application that uses modern technology to help pharmacy managers to arrange and store medicine in a smart and easy way to track and access them when needed. The project will apply the technology of the Internet of Things (IoT), a network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. The project can be implemented in public pharmacies, hospitals, healthcare centers, universities, factories and warehouses.

The project helps to manipulate and manage storage systems like a pharmacy. The user can communicate with server to request the desired medicine, through a mobile application. The server can handle the requests and send them to control system that controls a robot pharmacist. The robot pharmacist is designed to receive and respond to orders, move freely to capture images, detect and recognize the correct item and pick it from the smart store to be ready for delivery.

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RUS-4

### Design and Manufacturing of a Mini-UAV Quad-Copter Carrier

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The use of quad-copters has grown and expanded widely because of their mobility and the easy to build and control. However it suffers from the short range and the low speed which limits its wider use as it does not exceed a town limits. The idea is to design a mini UAV that could carry a quad-copter and transport it to far distance by high speed then release it to perform its own mission as a mother plane and a minion plane.

The project concerns mainly with the design of the mother plane and the release mechanism. In time being it does not interfere with the quad mission or control. The autopilot flies the UAV and directs it to its destination which increases the possible range and accuracy. During the design, another goal has put in consideration that the UAV can carry other useful payloads like mini robots or packages as a secondary mission. Also the UAV can be modified for reconnaissance to reach multi-role UAV, which will increase the reliability and reduce the need for much planes.

The final design results a UAV with 1.9 m span, 1.23 m length, 7.51 kg mass, 5 km range, 144 km/h velocity, 20 minutes loiter time and the ability to carry payloads up to 2.5 kg. The fuselage has simple and flexible design to accept various modifications for various missions.





### Design and Implementation of FPGA-Based Robotic Arm Manipulator

Mohammed Ibrahim Mohammed Ali Military Technical College, Cairo, Egypt

Supervisors: Ahmed S. Bahgat<sup>1</sup>, Engineering physics department Mahmoud Safwat Hamed<sup>2</sup>, Electronic engineering department Ahmed Medhat Youssef<sup>3</sup>, Aircraft electric systems department Military Technical College, Egypt, <sup>1</sup><u>a.s.bahgat48@gmail.com</u>, <sup>2</sup><u>mshamid2014@gmail.com</u>, <sup>3</sup>ammyk khater@yahoo.com

Robotic arm manipulators have a wide variety of applications. It is the core of manufacturing process in all factories nowadays. In this paper, the design, implementation and control of modified design of a six degrees of freedom (DOF) LYNX-6 robotic arm FPGA-based controller is introduced. In LYNX-6 arm, the lengths of the arms are modified and we used FR4 material to achieve the lightweight requirements of the arm structure. LYNX-6 arm has 5 DOF plus a grip movement (5+1). It is also similar to human arm from the number of joints point of view. Servomotors are controlled by pulse-width modulated (PWM) signals that control the position of the servo actuator. To position the robotic arm in 3D space, the angle of each joint must be set. A MATLAB GUI is designed to pick the desired (X, Y, Z) coordinates from the user, check the robot domain, perform the inverse kinematics algorithm and send the angles data serially through wireless module to FPGA controller to generate the necessary pulse-width modulated signals for the motors. The controller architecture is implemented on a Xilinx spartan3 FPGA evaluation board using VHDL. FPGA with its large number of I/O pins and parallel processing capabilities is suitable for interfacing and controlling the six motors at the same time. The proposed FPGA-based controller offered flexible, standalone, and compact design with high system reliability [1, 2].



**RUS-11** 

# Stealth Boat with Satellite Control System for Military Applications

Abduallah Al-saeed Hassan, Yahya Badawy, Ibrahim Azab, Mahmoud Mostafa Ismail, Abo-Bakr Abd-alkader

#### Supervisors: Dr. Eng. Sameh Tawfeik, Dr. Saleh Mesbah, and Dr. Mohmed El-hofey Arab Academy for Science and Technology, Egypt

This work details an unmanned stealth boat used for regional coast guarding and for escorting civil and military vessels in order to guard and counter any maritime or air hostility. The proposed boat is capable of performing maritime/aerial reconnaissance and has the ability to rapidly attack threat targets. Aerial reconnaissance is intending to works under a defense system with a range of 9 km in order to deal with warplanes. On the other hand, naval reconnaissance can attack targets on water surface and respond with automatically controlled weapon with the ability to hide using smoke screens to distract and mislead the enemy while contacting the nearest military vessel for backup. This boat features search/reconnaissance drone aircrafts such that there are two aircrafts on the boat each of which is carrying four smaller quadcopter aircrafts (15 x 15 cm length x width) to scan the terrain of the enemy near the coast and drop a ground robot to infiltrate and detect equipment/facilities of the enemy. All this is controlled from the command center by satellite control onboard of the boat and in case the contact was lost drone will return back to starting point automatically.



**Date:** Wednesday, 27July 2016 **Time:** 12.30 – 13.00 Session:S 16 Room: C

#### Data Communication and Computer Security

#### Coordinator Col. Dr. Hesham M. Dahshan MTC, Egypt

ECE-3	Improved RFID Encryption Technology Used in Internet of Things	W. Zhenhua and Z. Peidong NUDT, China
ECE-24	Statistical Analysis of Different Chaotic Sequences Code Using Logistic Chaotic Map	O. Mohamed, M. Elbatawy and H. Abdel Hameed MTC, Egypt
CMP-3	Malicious DHCP Starvation Attack - SPECTRA	Muhammed Saleh, Ahmed Hesham and Emad S. Othman Al-Shorouk Academy, Egypt
CMP-4	A New Method to Evaluate Bug Severity by using the Crowd-based Knowledge	W. Yiwen and Z. Yang NUDT, China
CMP-8	XOR operation and Rice codes based two-stage method for lossless telemetry data compression	Rewase R. Ragei, Sherif A. Refaat, Mohamed A. Shouaib and Mohamed A. T. Elshafey MTC, Egypt



ECE-3

## Improved RFID Encryption Technology used in Internet of Things

Zhenhuag Wang, Dajun Zai

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Supervisor: Zhu Peidong, Professor School of Computer Science, China, zpd136@sina.com

With the fast development of Internet of Things industry, the security of RFID cause concern more than before as a basic part. RFID system plays a vary important part in IoT, which helps people locate ,trace and analyze things .However, when RFID help us gain more useful information, it also increase the risk of privacy leak, may leading to heavy cost. So RFID system will not be widely used without a practical RFID information security technology.

In order to ensure the security of the transport and distribution of electronic tag's key and the communication between reader and RFID tag, we must use encryption technology. Current RFID systems commonly use DES(symmetric encryption),RSA(asymmetric encryption),etc. But size the chip size is limited by the tag, the electronic tag computing power is not strong, which makes the realization of the RSA encryption algorithm and the key generation slower. So DES encryption algorithm often used in the RFID systems which security requirements are not too high.

In this paper there is a RFID tag information transmission encryption method, based on variant DES encryption algorithm, which will lift the security capacity of RFID and lower the cost. In the communication between RFID tags and readers, after a triple mutual authentication system (ISO / IEC DIS9798-2), we will know whether the tags and readers are matching. And then we encrypt the message using a variant DES encryption in order to ensure the secure transmission of data. Even if the data is stolen, as the attacker does not know the rules of encryption and the key, the data is useless to the attacker. Before further study, here is the preliminary result. And further research is ongoing.

Triple mutual authentication method can guarantee RFID tags and readers which communicate with each other is credible. The process is as follows: ①When the tag enter range of the tag reader, the reader issues a query ID and password; ②The tag generate random numbers A1, and sent to the reader; ③After receiving A1,reader generates a random number B1, and uses the same key K and the same key generation algorithm Ek to generate an encrypted data token 1, which includes t random number A1, B1 and additional control data (CD), and sends it to the RFID tag: Token1 = Ek (A1, B1, CD, plaintext 1); ④After receiving token 1, RFID tag decode it and get the random number A1 \*sent before, comparing it with A1 which is generated by itself. If they are consistent, the

First International Undergraduate Research Conference, IUGRC Military Technical College, Cairo, Egypt July 25 – 28, 2016



reader and the RFID tag itself are the same, belonging to the same system. Then RFID tag generates another random number A2, using the same key K and the same algorithm to generate encrypted key data token 2, and sends it to the reader: Token2 = Ek (A2, B1, plain text 2); (5)After receives the token 2, reader uses the same methods to identify the RFID tag. If received B1 \* and B1 are consistent the key K between the reader and the tag is the same. So, the RFID tag and reader are in common system, we can start further communication

After the identification between reader and the RFID tag, we can transmit data. In order to ensure the security of data even when they are stolen. It must match the strength of encryption before data transmission. In this paper, for the shortcomings of this DES symmetric encryption method, here is a variant of DES encryption method, proposing an effective rules to enhance the security of encryption, the process is as follows:

Existing: EPC data, agreed symmetric key Mkey, the receiver also saved a same key, whose security is ensured by the key management mechanisms.

The sender (RFID TAG): ①Jsing the random function to generate a 64-bit (8-byte) random key (Rkey), encrypt Rkey in DES encryption by Mkey and generate a ciphertext DATA1; ②Jsing random key Rkey, encrypt data in a self-defined encryption algorithm to generate DATA2; ③Assemble DATA1 and DATA2 to produce cipher text DATA.

The receiving end (RFID Reader): ①Split the received cipher text DATA into two parts according to the rules, DATA1 and DATA2; ②Lookup key MKey stored in the database and use MKey to decrypt DATA1, getting the random key generated by sender which is also the key to decrypt the cipher text ,Rkey; ③Use Rkey to decrypt DATA2 in a self-defined encryption algorithm to get plaintext data.

Military Technical College, Cairo, Egypt July 25 – 28, 2016



#### ECE-24

# Statistical Analysis of Different ChaoticSequences Code Using Logistic Chaotic Map

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There is no doubt that the spread spectrum technique becomes one of the most important communication techniques in the recent decades. It provides high security, in addition to its resistance to the various interference and fading types. One of the most important parameter of the

spread spectrum is the spreading code used in the spreading process, especially in the direct sequence spread spectrum. Due to the huge increase in the applications and the demanded users, the traditional spreading codes become not sufficient to fulfill the development requirements. As an

alternative solution, the chaotic codes appeared to solve most problems of the traditional spreading codes. Recently, many researches focused on the chaotic codes, due to its attractive security properties, in addition to its availability to generate a huge number of spreading codes. This property is very useful in the multi-access applications. However, as the number of the MAI is increased, the performance of the chaotic codes is degraded. This paper presents a statistical analysis of the Chaotic Spreading Code (CSC) generated from the logistic map. The analysis is performed over the traditional chaotic cod, the self-balanced (SB) chaotic code, the zero mean (ZM)

chaotic code, and the self-balanced zero mean (SBZM) chaotic code. The analysis consists of the balance property, the orthogonality property, the normalized maximum autocorrelation side lobe (NMACSL) property, and the normalized average cross correlation (NACC) property over different code lengths.

First International Undergraduate Research Conference, IUGRC

Military Technical College, Cairo, Egypt July 25 – 28, 2016



CMP-3

#### Malicious DHCP Starvation Attack - SPECTRE

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Dynamic Host Configuration Protocol is a method for assigning Internet Protocol (IP) addresses permanently or to individual computers in an organization's network. DHCP lets a network administrator supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network. DHCP is an unauthenticated protocol :

When connecting to a network, the user is not required to provide credentials in order to obtain a lease.

Malicious users with physical access to the DHCP-enabled network can instigate a denialof-service attack on DHCP servers by requesting many leases from the server, thereby reducing the number of leases that are available to other DHCP clients.





## A New Method to Evaluate Bug Severity by using the Crowd-based Knowledge

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In bug tracking system, the high volume of incoming bug reports poses a serious challenge to project managers. Triaging these bug reports manually consumes time and resources which leads to delaying the resolution of important bugs. StackOverflow is the most popular crowdsourcing Q&A community with plenty of bug-related posts. In this paper, we propose a new method to evaluate bug severity by exploiting available quantitative crowd-based knowledge from the bug-related posts in StackOverflow. Two typical type of projects' bug repositories are studied here, e.g. Mozilla and Eclipse. Our study shows that using crowd-based knowledge is able capture the technical merits as well as the programming solutions and it has the potential to optimize the existing evaluation methods of bug severity by incorporating the crowd-based knowledge from a third-party in future.

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#### CMP-8

## XOR Operation and Rice Codes Based Two-Stage Method for Lossless Telemetry Data Compression

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The article presents results of a study of a proposed lossless compression method for telemetry data. A two stage scheme of lossless compression, consisting of decorrelation and entropy coding, is presented. In experiments a bitwise XOR operation is implemented as a decorrelator and Rice coding method as entropy coder. A comparison is performed between two compression methods: one is based only on Rice coding method, while the other is based on the proposed method. The results are based on estimates of the gain in variance and entropy of the output signal from the decorrelator. In experiments, parameters of telemetry information of automatic control systems are studied, such as temperature, pressure and positioning data. Streams of telemetry frames, with different frame structures: one and two level of commutation, in IRIG-106 standard format, are formed and tested. Based on experimental results conclusions are done for lossless telemetry data compression.