ISLAM ABDUL-AZEEM FOUAD

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Assistant Professor in Biomedical Technology Department , College of Applied Medical Sciences

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Place of Birth Egypt.

Date of Birth 1978.

Marital Status Married.

Religion Muslim.

Education

- **PhD** in Systems & Biomedical Engineering, Faculty of Engineering, Cairo University – "Developing an Automated Quantification System for cDNA Microarray Gene Chips Using Image Processing".
- **Master of Science** in Systems & Biomedical Engineering, Faculty of Engineering, Cairo University – "Automated Retinal Vasculature Tracking in Gray-scale & Color Digital Fundus Images".
- **B.Sc.** of Systems & Biomedical Engineering, Faculty of Engineering, Cairo University.

Languages Arabic & English.

Membership Egyptian Syndicate of Engineers.

Academic Work Experience from October 2009 till Present

"SALMAN BIN ABDUL-AZIZ" University, College of Applied Medical Sciences.

AL-KHARJ

Lecturer, Biomedical Technology Department.

Teaching Experience

I taught the following courses:

The Course Name	Level	Place
Mathematics for Health Sciences	3	College of Applied Medical Sciences Unified Program
Electrical Circuits	4	College of Applied Medical Sciences Biomedical Technology Dept.
Electrical Skills	4	College of Applied Medical Sciences Biomedical Technology Dept.
Introduction to Computer [HW/SW]	4	College of Applied Medical Sciences Biomedical Technology Dept.
Mathematics for Biomedical Technology	4	College of Applied Medical Sciences Biomedical Technology Dept.
Digital Electronics	5	College of Applied Medical Sciences Biomedical Technology Dept.
Mathematics for Biomedical Technology	5	College of Applied Medical Sciences Biomedical Technology Dept.
Biomedical Mechanical Equimpents	6	College of Applied Medical Sciences Biomedical Technology Dept.
Computer Programming	6	College of Applied Medical Sciences Biomedical Technology Dept.
Maintenance of Biomedical Equipment and its Safety	7	College of Applied Medical Sciences Biomedical Technology Dept.
Digital Image Processing	9	College of Applied Medical Sciences Biomedical Technology Dept.
Reverse Engineering in BME	9	College of Applied Medical Sciences Biomedical Technology Dept.
Graduation Projects	9	College of Applied Medical Sciences Biomedical Technology Dept.

Selected Publications

The Paper	Journal/Conference	Date of Publication
Retinal Vasculature Segmentation in Gray-scale & Color Digital Fundus Images	IEEEXplore, 3rd CIBEC	December 2006
An Efficient Fully Automated Method for Gridding Microarray Images	American Journal of Biomedical Engineering	June 2012
Developing a new methodology for de-noising and gridding cDNA microarray images	IEEEXplore, 6th CIBEC	December 2012
A New Method to Grid Noisy cDNA Microarray Images Utilizing Denoising Techniques	International Journal of Computer Applications	February 2013
A Fully Automated Method for Noisy cDNA Microarray Image Quantification	International Journal of Computers & Technology	October 2013
Automated Statistical and Morphological Based Gridding Methods for Noisy Microarray Image Processing	Journal of Bioinformatics and Intelligent Control	December 2013
A New robust and automatic analytical approach for block indexing of cDNA Microarray Images	International Journal of Computer Engineering and Applications	May 2014
Automatic Segmentation of cDNA Microarray Images Using Different Methods	Journal of Biomedical Engineering and Medical Imaging	October 2014
A Method for accurate and Robust Segmentation of cDNA Microarray Images	The 7th Cairo International Biomedical Engineering Conference	In Press
Classifying the Features Based on Statistics and Density of Power Spectrum in Brain-Computer Interface	International Journal of Biomedical Engineering and Technology	In Press

The Book	Publisher	Date of publication
Retinal Tracking using Image Processing	LAP Lambert Academic Publishing.	June 2014

Professional Activities

- Editor in the following journals:
  - "Journal of Biomedical Engineering and Technology", SciePub - USA

- "International Journal of Computer Engineering and Applications", India.
- "International Journal of Emerging Technology and Advanced Engineering", India.

➢ Reviewer in the following journal:

- "American Journal of Biomedical Engineering", Sapub - USA.

Professional Technical Training courses

- Programming Language VC++, IBM, September 2000.
- Maintenance and operation of Patient monitors, Center of Advanced Software and Biomedical Engineering Consultations (CASBEC), April 2003.
- Maintenance and operation of GAS CHROMATOGRAPHY ANALYIZERS, (The Academy of Scientific Research & Technology) , November 2001.
- Maintenance and operation of Ultrasound Imaging ,(Nile Medical Company) , June 2007
- Maintenance and operation of Electrosurgery systems, Tyco Healthcare Company, June 2007.

Managerial Roles

- Member of the Egyptian Engineers Syndicate (Division of Electricity - Biomedical Engineering).

- Coordinator of the "Academic and Psychological Advising Unit" - Department of Biomedical Technology - College of Applied Medical Sciences - Salman Bin Abdul Aziz University.

- Coordinator of the "Laboratories Committee" - Department of Biomedical Technology - College of Applied Medical Sciences - Salman Bin Abdul Aziz University.

- Member of the "Time Tables and Exams Committee"- Department of Biomedical Technology - College of Applied Medical Sciences - Salman Bin Abdul Aziz University.

- Member of the "Development of Teaching Plans and Courses Committee" - Department of Biomedical Technology - College of Applied Medical Sciences - Salman Bin Abdul Aziz University.

- Member of the Scientific Committee of Arbitration innovations presented in the Third Scientific Conference for Students of Higher Education , Saudi Arabia, from 9 to 12 Jumada II 1433 AH

Previous

BIOMEDICAL SYSTEMS ENGINEER with extensive professional experience in Maintenance

Technical Work Experience Summary

and operation technical support for a huge variety of medical equipment types. Specialized mainly in operating theaters Equipment, ICU Equipment, different Outpatient Clinics and Ultrasounds imaging systems. This experience is mainly based on being responsible for Maintenance of all the Operating theater Ward (18 different Operating rooms) **at New Kasr EL-Ainy Teaching Hospital (1200 beds hospital)** for more than 6 years , in addition to the Maintenance of the ICU ward and the outpatient clinics ward for more than two years in the same hospital.

Besides, a solid extensive managerial experience was also gained for being the "head of biomedical engineering dept." **at Sheikh Zayed Specialized Hospital (300 beds hospital)** for more than one year.

As a detailed listing ,my experience covers, but not limited to, the following points :

- Planning and Supervising corrective and preventive maintenance activities and quality assurance programs for the medical equipment in the different hospital wards especially outpatient Clinics, Operating Theaters ICU & Laboratory departments.
- Healthcare facilities planning for medical equipment
- Preparation of tendering documents for medical equipment.
- Preparation of medical equipment technical specifications.
- Supervising Testing and Quality assurance activities for medical equipment.
- Supervising Inspection and handling over activities for medical equipment.
- Very familiar with the applied standards and codes related to medical equipment planning and installation for healthcare facilities.
- Project management skills.
- Performing preventive maintenance, corrective maintenance and quality assurance programs for medical equipment (namely Anesthesia machines, Patient Monitors, Diathermy, Surgical lights, Surgical tables, Laser Equipments, Surgical Microscopes, ECG, Defibrillators, Syringe and Infusion pumps, Auto-refractometer, Air Puff, Fundus Camera and Visual Field…etc).
- End-user training and technical support assisting.
- Up-to-date knowledge in electronic science and modern software applications applied in medical equipment field to be ready to master any new technology introduced to the market.

Work Experience

New Kasr AL-Einy Teaching Hospital , (October 2001 till October 2007)

2006 to 2007 Clinical Engineer for Outpatient Clinics & Lab wards,

2001 to 2006 Senior Clinical Engineer for OR Department,

2007 to 2009

SHEIKH ZAYED Specialized Hospital , (Jue 2007 till Sep. 2009)

Manager of Biomedical Engineering Department,

Computer Skills

O.S.: MS Windows Family.

Main Applications: Microsoft Office (Word, Excel, Access, etc…).

Programming Languages: C, C++, VC++, VB++ and MATLAB.

Other Data

Valid driving license,

References available upon request.

Please refer to the following three slides that show my work done in the field of "Developing a computer- controlled instrument to enhance medical applications" and "Developing an Automated Quantification System for cDNA Microarray Gene Chips Using Image Processing", which qualified me to have M.Sc. and PhD of Science in Systems & Biomedical Engineering from Faculty of Engineering, Cairo University.

Automated Retinal Vasculature Tracking in Gray-Scale & Color Digital Fundus Images.

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Some of the most common blinding conditions are caused by choroidal neovascularization (CNV). The relevant conditions include diabetic retinopathy and age-related macular degeneration. At present, the only proven modality of effective treatment is the application of laser energy to the CNV to cauterize the vessels. The key to effective and lasting treatment is the identification of the full extent of the CNV, complete cauterization of the CNV by accurately aiming an appropriate amount of optical energy while ensuring that healthy tissue is not cauterized. Despite the superiority of laser treatment over other available methods, serious problems remain. The current rate of success of this procedure is less than 50% for eradication of the CNV following one treatment session with a recurrence and/or persistence rate of about 50%. The latter condition requires re-treatment. Each re-treatment, in turn, has a 50% failure rate. The visual recovery declines with each successive treatment. Indeed, several studies indicate that incomplete treatment was associated with poorer prognosis than no treatment.

Because the eye and hence the retina is a moving object, a motion tracking method is required to update the position of laser shots according to the movements of the retina. A new computer-controlled instrument was developed in an attempt to minimize the above-mentioned failure rate.

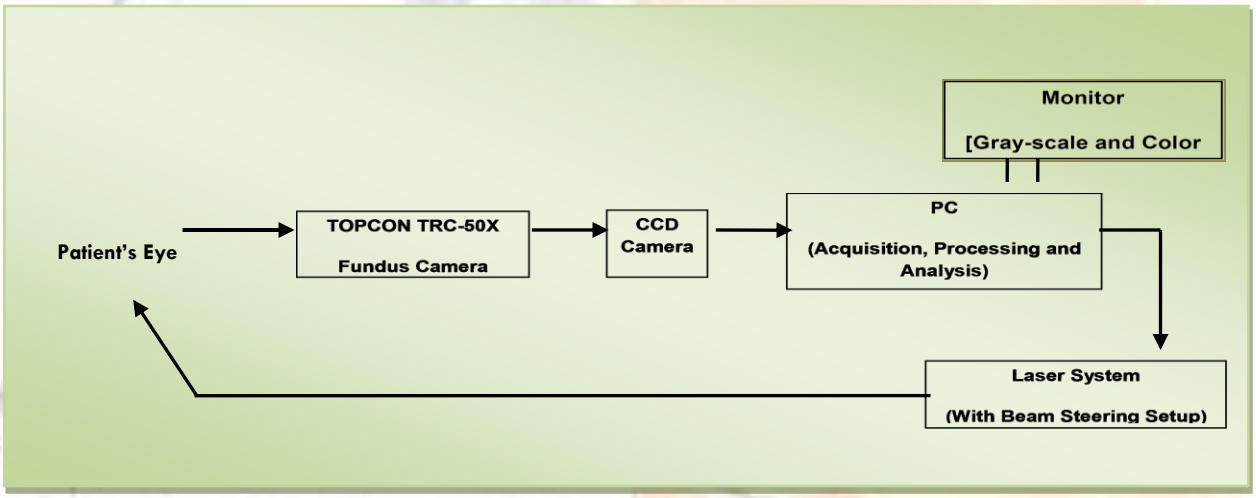
In this work, i designed many of the feature extraction and detection of motion parameters algorithms that may be required in the process of retinal vasculature tracking. Many extraction techniques were applied to discern the retinal blood vessels tree and determine the positions of laser shots in a reference frame.

A comparison between the used algorithms in retinal image extraction was done. First I used the difference operators in the blood vessel tree extraction as Sobel, Prewitt, Roberts and Canny operator that gives the best results in a comparison to the other three operators. Then, I used the image statistics by DBDED, which stands for “Decision Based Directional Edge Detector”, but, it could not detect all edges completely and to obtain the boundaries of small blood vessels, more edges will appear. produces good results. The retinal image extraction using the morphological methods is also tried by both the morphological gradient and morphological reconstruction that give acceptable results.

The blood vessel tree is well extracted using deformable models, in which a grid of seed contours over the whole image is initiated and allowed to deform by splitting and/or merging according to preset criteria until the whole vessel tree is extracted. This procedure extracts the boundaries of the full extent of the blood vessel tree.

Faster extraction can be obtained for subsequent images by automatic registration to compensate for eye movement and saccades. Registration techniques were applied and the results of each were compared to estimate the best one.

A block diagram of the proposed system is shown below:



Developing an Automated Quantification System for cDNA Microarray Gene Chips Using Image Processing.

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Microarray technology is a new biotechnology, which allows the monitoring of expression levels for thousands of genes simultaneously. Image processing is an important aspect of microarray experiments, which will influence accuracy of subsequent analysis such as clustering or the identification of differentially expressed genes. To obtain meaningful information from the massive microarray images, it is needed to develop an algorithm, which can measure the expression levels of each gene. The process of identifying the spots, separating the foreground from the background and estimating the background intensity are known as gridding, segmentation, and quantification. According to the type of noise we use four noisy microarray images.

In this thesis, we present three efficient and simple gridding techniques; 'statistics-based', 'morphology-based' gridding techniques, and a novel gridding method which has a great effect on noisy microarray images. The first and the third techniques are fully automated, while the second is semi-automated. Then we compare the results obtained from applying the proposed gridding techniques. The two fully automated gridding techniques give better accuracy ranges from 94.3% to 100%. While the semi-automated one gives ranges from 70% to 96%

The process of identifying the spots and separating the foreground from the background is known as microarray image segmentation. Two segmentation techniques are explored; they are 'fixed circle', and 'edge-detection' segmentation. Then by comparing the results, it was found that the edge-detection segmentation technique can segment all the four types of the gridded microarray images correctly, and gives better results with higher accuracy than the fixed circle segmentation technique. Since, the fixed circle technique can't satisfy the needs if there's any variation in the spots sizes in the same image.

Finally, a quantification technique is proposed to calculate the gene expression level from the intensity values of the red and green components of the image.