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Biosensors Journal

E-ISSN: 2090-4967
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Open Access, Peer-reviewed

Research Interests of Prof. Dr. Tarik Ozkul

American University of Sharjah UAE

Biosensors Journal

E-ISSN: 2090-4967
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Prosthetic device for activation of dysfunctional eustachian tube patients

Thousands of people and animal suffer from dysfunctional Eustachian tube problems,

The only known surgical cure is intentional rupturing of ear drum which lasts about 6 months.

I am part of a team who designed a prosthetic device designed to cure the problem.

M.H. Ozkul, T. Ozkul, "Recent promising technological developments on hearing restoration" J. of Biomedical Sci.& Eng., Vol.4, No.3, 147-232 (2011), 158-163.

Biosensors Journal
E-ISSN: 2090-4967
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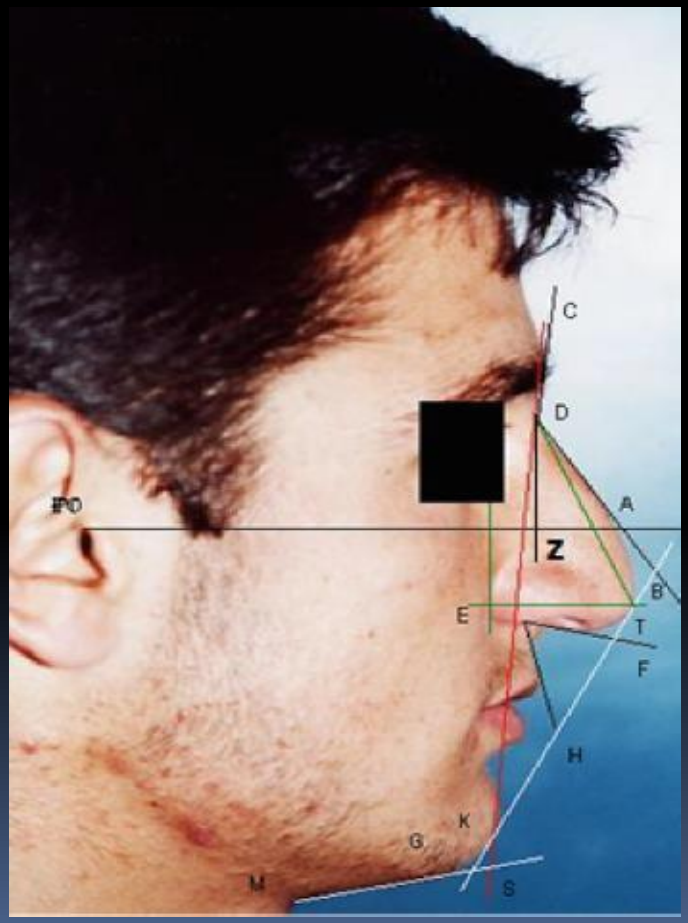
Researching facial standards of beauty

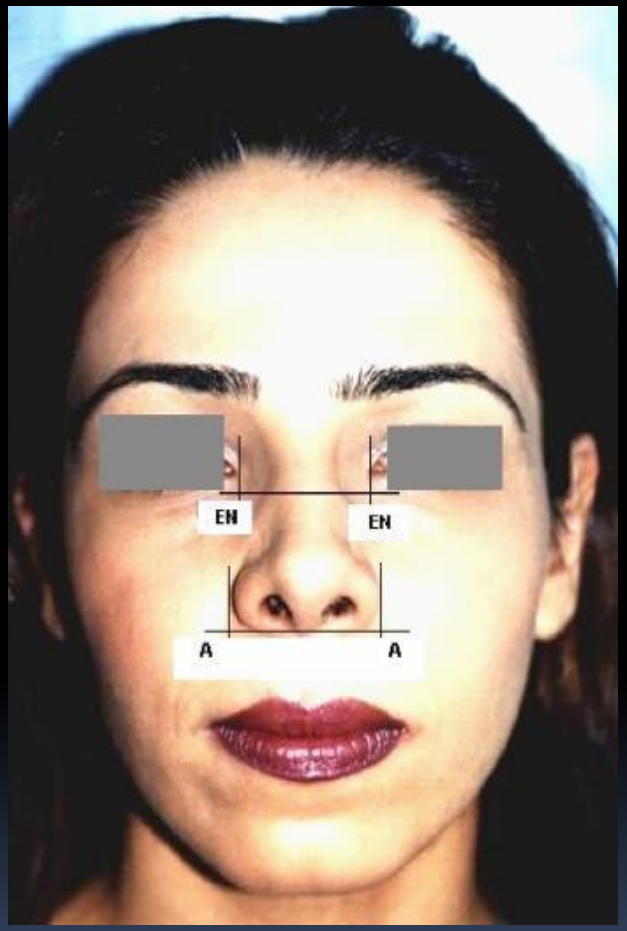
- Measurement of facial beauty is a non-exact science,
- An objective way of measurement is necessary in order to avoid litigation,
- Part of a team to find beauty standards for different race and nations



Ozkul, T. Ozkul, M. H. " A study towards fuzzy logic-based assessment of nasal harmony of rhinoplasty patients" Journal of the Franklin Institute, Vol. 343, Issues 4-5, July 2006, pp 329-339.

Machine assessment of facial standards

- Results of the beauty standards are intended to utilized by medical professionals for assessment of patient.
- Patients condition is assessed before and after surgery by a sophisticated fuzzy logic based tool



M.H. Ozkul, T. Ozkul, “A Fuzzy-logic-based model for assessment of human facial harmony based on theory of averages" Journal of the Franklin Institute, Volume 348, Issue 8, October 2011, Pages 2216-2234.

Fuzzy logic assessment of facial condition

- Software tool is intended to generate objective scoring of overall facial value,
- By generating results before and after surgery, the improvement of the patient is documented by an objective tool,

Parameter	Normal range for male subjects [5]	Patient 1 pre-op parameters	Patient 1 post-op parameters	Patient 2 pre-op parameters	Patient 2 post-op parameters
Nasomental	120–132	125.5	123.8	119.7	120.4
Nasofrontal	115–125	139.7	147.5	146	146
Nasal projection	0.55–0.60	0.56	0.55	0.58	0.63
Nasofacial	30–40	54	43.3	50.3	47.9
Nasolabial	80–95	70.2	109.5	100.8	91
Rule of the third	0.9–1.1	1.35	1.08	0.81	0.81
Rule of the fifth	0.9–1.1	1.42	1.39	1.34	1.15
Nasal base triangle	0.9–1.1	0.57	1.03	0.42	1.1
Mentocervical	90–100	108	108	89	89
Harmony index		3.12	3.49	3.36	3.63

Ozkul, T. Ozkul, M. H. " A study towards fuzzy logic-based assessment of nasal harmony of rhinoplasty patients" Journal of the Franklin Institute, Vol. 343, Issues 4-5, July 2006, pp 329-339.

Surgical planning aid

- Rhinoplasty is a complicated surgery with many parameters to deal with,
- Many parameters are coupled, meaning changing one inadvertently changes others,
- Part of a research team to design a software aid for planning the surgery for best end result

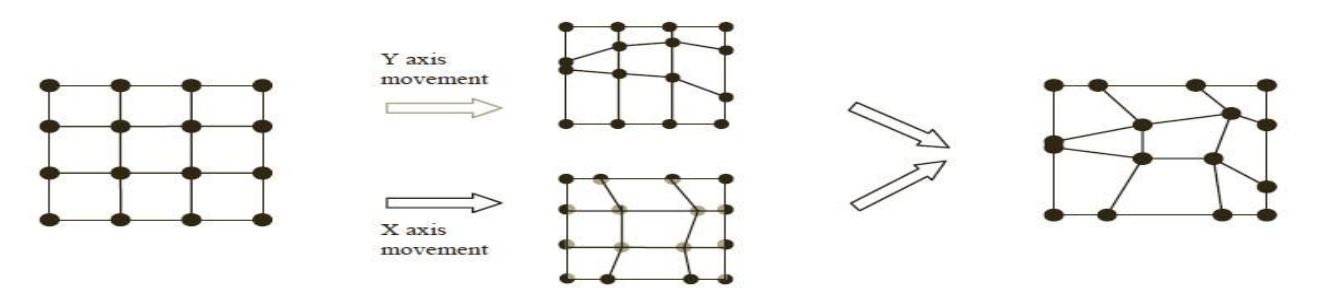
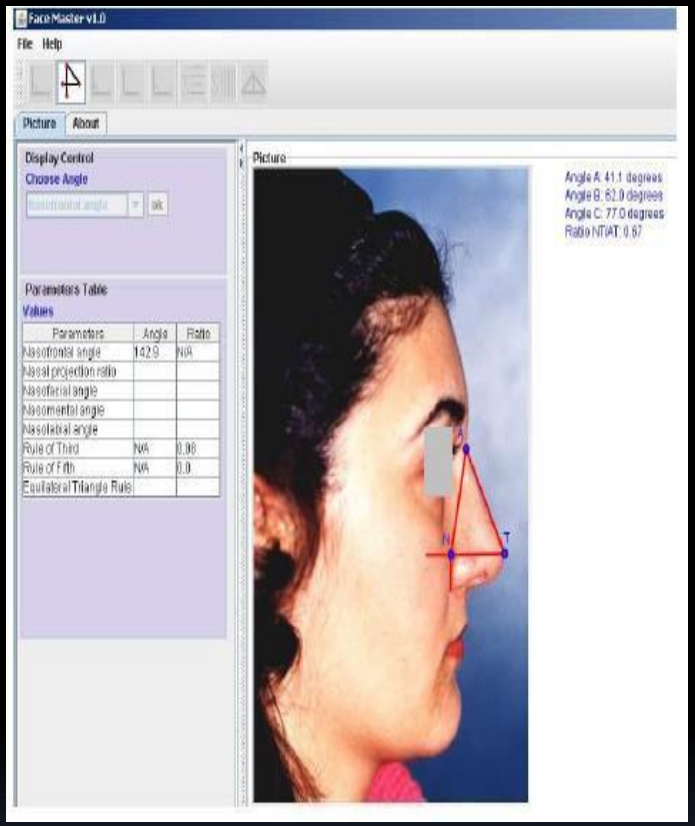


Fig. 5. Separation of mesh movement into X- and Y-axis components.

Ozkul, T., Ozkul, M. H. " Computer simulation tool for rhinoplasty planning" *Computers in Biology and Medicine, Vol. 34, Issue 8, December 2004, pp. 697-718.*

Software tool for measurement of facial parameters

- Part of a team designed software tool for measurement of facial parameters,
- Practical java based tool for extracting important facial parameters easily,
- Our tool is being used by many researchers all around the world from criminal investigators to medical researchers



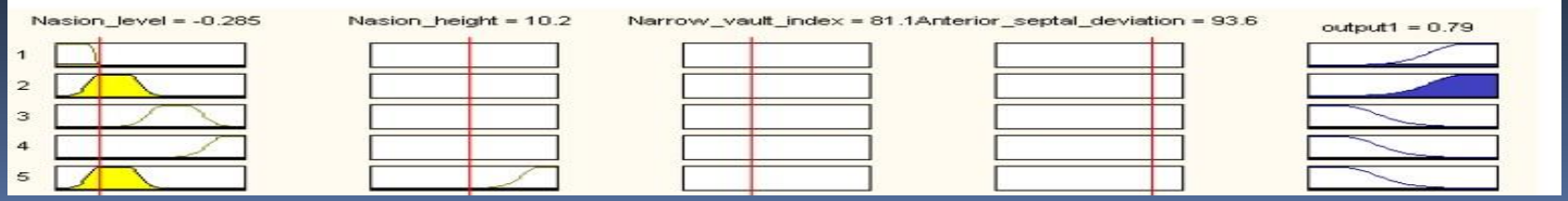
T. Ozkul, M. H. Ozkul, R. Akhtar, F. Al-Kaabi and T. Jumaia, "A Software Tool for Measurement of Facial Parameters" ***The Open Chemical and Biomedical Methods Journal, Vol. 2, pp. 69-74, 2009.***

Estimation of anatomical variants effecting surgical results

- Part of a team searching anatomical variants effecting surgical operations negatively,
- Some patients have certain anatomical features which renders surgical results negatively,
- Designing an smart software aid for surgeons to identify and help surgeons in such conditions.

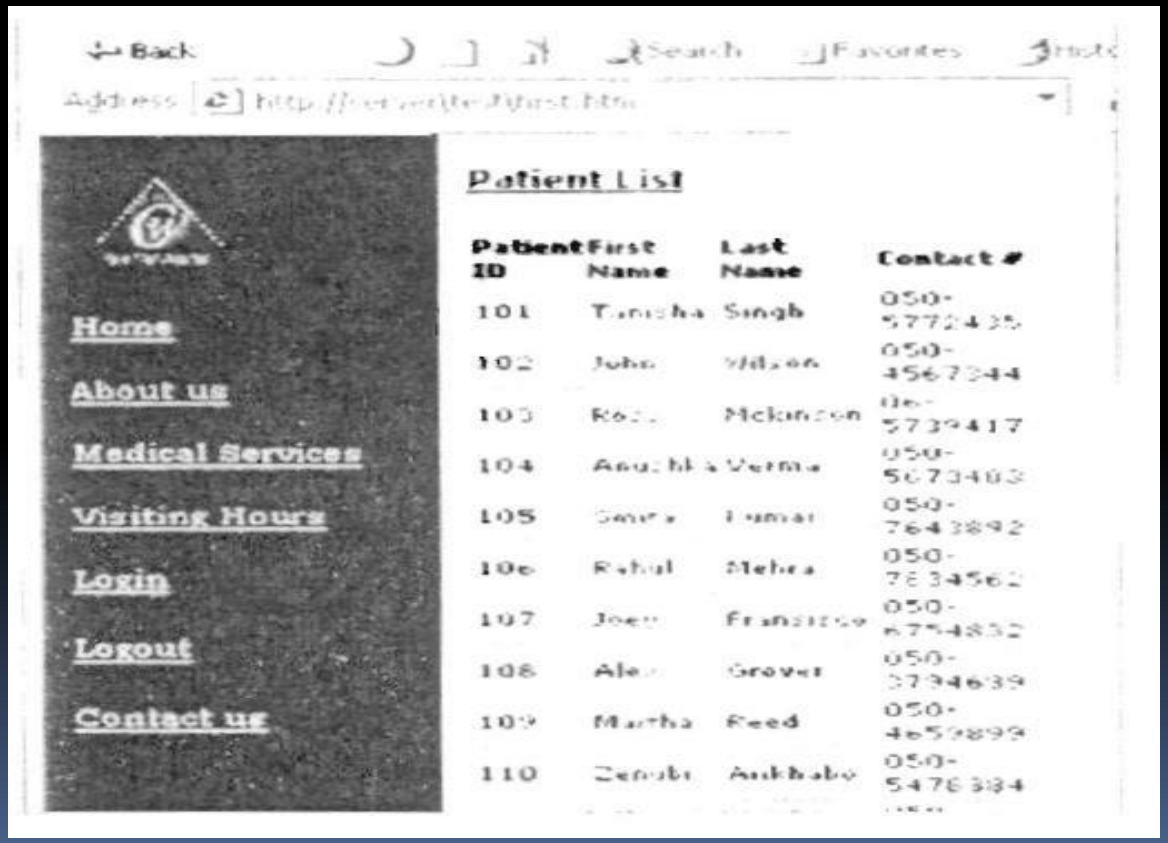
Table 1
Linguistic variables and associated normal value ranges.

Linguistic	Function type	Variable range	Memb. Function "less"	Memb. Function "ideal"	Memb. Function "excess"
Nasomental angle	Gaus-bell	120-132	1, 1.1, 120	1, 0.98, 126	1, 1.1, 132
Nasofrontal angle	Gaus-bell	115-130	1, 1.1, 115	1, 0.98, 119	1, 1.1, 130
Nasal projection ratio	Gaus-bell	0.55-0.6	0.004, 1.1, 0.55	0.04, 0.98, 0.575	0.04, 1.1, 0.6
Nasofacial angle	Gaus-bell	30-40	1, 1.1, 30	1, 0.98, 35	1, 1.1, 40
Nasolabial angle	Gaus-bell	90-105	2.18, 1.1, 90	1, 0.98, 97.5	1, 1.1, 105
Rule of third	Gaus-bell	0.9-1.1	0.004, 1.1, 0.9	0.004, 1.0, 0.575	0.04, 1.1, 1.1
Rule of fifth	Gaus-bell	0.9-1.1	0.004, 1.1, 0.9	0.004, 1.0, 0.575	0.04, 1.1, 1.1
Mentocervical	Gaus-bell	85-100	2.18, 1.1, 85	1, 0.90, 97.5	1, 1.1, 100
Nasal base triangle	Gaus-bell	0.9-1.1	0.004, 1.1, 0.9	0.004, 1.0, 0.575	0.04, 1.1, 1.1
Nasion level (female)	Gaus-bell	ST – LL	LL MP	CM	ST
Nasion level (male)	Gaus-bell	ST – LL	LL MP CM	ST	
Nasion height	Gaus-bell	7-13 mm	7	10	13
Narrow vault index	Gaus-bell	100-70		70	100
Anterior septal dev.	Gaus-bell	100-60	60	90	100



Wireless patient information integration

- Part of a team working toward wireless integration of patient information

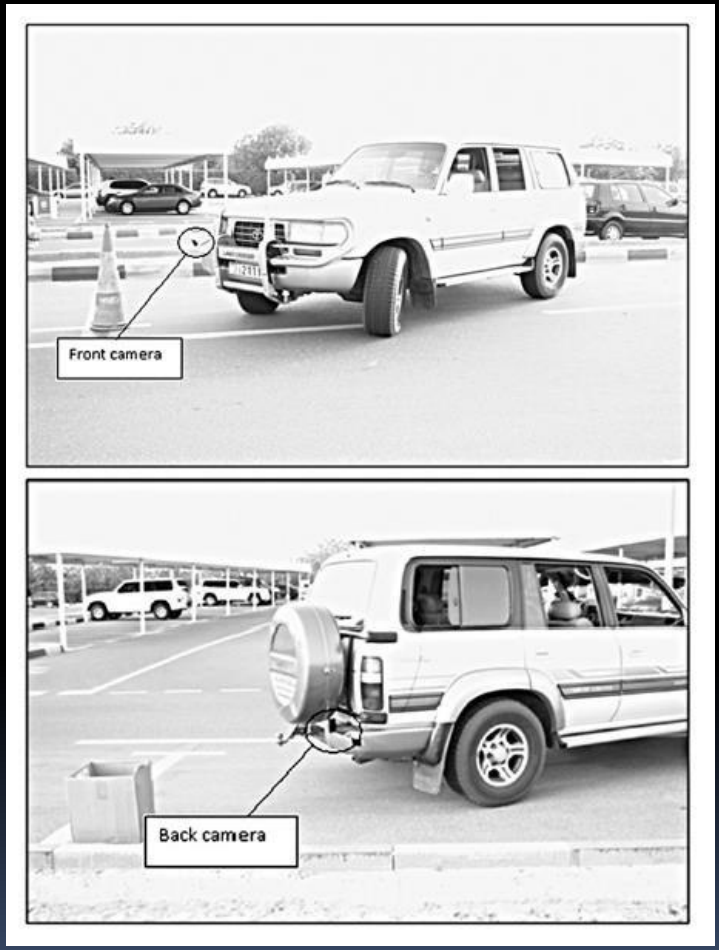


Using fuzzy logic for interesting applications

- Fuzzy logic is a versatile tool for smart applications,
- Fuzzy logic is used for various applications

Fuzzy logic based parking aid

- A tool for self parking,
- Uses front and back cameras and integrated fuzzy logic system for self parking vehicles



Educational experiments

- I am very excited about exploring educational methods increasing motivation of students,
- I am an expert on patents with 20+ patents of my own, and would like to teach this to my students,
- I have experimented with “patent based education” in my classes with stunning results.

Patent Based Education

- This is a term I have coined. In an educational experiment with my senior students we had 11 patent worthy projects generated by the students using this method. (Really - not kidding.)
- This really altered my perception of how we should educate our students

Patented inventions

- I am with industry background and always tried to integrate academia and industry (which I have repeatedly failed)
- Industry has needs and expects these to be addressed in practical and economical manner,
- Academia, unfortunately never addresses these needs satisfactorily which keeps the gap between them.

Patented inventions

- Practical tool for measurement of surface roughness of concrete for carbon fiber applications,

Carbon fiber is an excellent tool for strengthening building structure. Carbon fiber and epoxy stick to the concrete surface very well. But study indicated that there is an optimum roughness of concrete. Above or below that roughness level, carbon fiber does not stick to the surface as much as it is supposed to. This tool uses a practical and quick way of measuring surface roughness.

Patented inventions 2

- Practical tool for measurement of bug hole rating of surface
- Bug holes are imperfections on the finished wall surfaces. Architects desire to have surfaces with minimal bug holes. Bug holes makes surface finishing harder and more expensive.

Measurement of bug hole is a subjective task and source of argument between the contractor and the architect. This tool provides an objective way of measuring this parameter.

Patented inventions 3

Our world is going through difficult times and seems that greed of human being is destroying our world. It is the duty of every sensible scientist and engineer to do something about it. In my opinion unless renewable energy becomes cost wise competitive with carbon based fuel, greed will get the best of us and we will continue to destroy our world altogether. Renewable energy is my passion and I want to reduce price of renewable energy to carbon based fuel. I have several inventions toward this goal.

Patented inventions 4

- What do you see when you look at a classical 3 bladed wind turbine?
- I don't know about you, but I see ugly beasts lacking finesse and beauty. I have designed a kind of wind turbine which is not only effective in medium level winds but also beautiful to look at. I called them "whirling dervish" because they resemble whirling dervishes which rotate serenely with devotion.

Patented inventions 5

- Solar energy is accepted as the most reliable renewable energy. Current classical technology is too expensive and we need to reduce it to 1/10 of its current price to be competitive. My patented solar collector design is radically different than current ones and solves many issues of current solar collectors. Initial data indicates that we may reduce the cost to carbon based fuel costs.

Patented inventions 6

- Deserts are the areas receiving most sunlight. If only we could find a way of covering these vast areas with solar collectors.
- We have come up with a way of converting desert sand to perfectly shaped parabolic solar collectors using automated equipment and an interesting strand of bacteria which binds sand particles. Result is a solar collector with minimal carbon footprint.

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