

ALPER ÜLKÜ

Electrical & Electronics Engineer, B.Sc, M.Sc, Ph.D.Candidate in Mat.Sci&Eng.

General

Name: **Alper ÜLKÜ**
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LinkedIn: <https://www.linkedin.com/in/alperulku1970/>
Birth: **Ankara-Turkey, 1970**
Marital Status: **Married, one daughter (aged 12)**
Driving Licence: **B Class**
Citizenship: **Republic of Turkey**



Language Skills

Besides Turkish, Alper ÜLKÜ speaks:

- English (excellent), TOEFL = 607
- French (average)

Professional Skills	Experience
Cockpit Display Systems Design	+12 years
Avionics Systems Design	+20 years
Technical management of projects, teams of engineers; mentoring young engineers	+20 years
Nanotechnology processes, specially on displays fabrication	+10 years
Design, manufacturing & testing according to different standards (STANAG, MIL-STD, DO, EN, ISO, IEEE etc.)	+20 years
Software development (Python, R, ADA-83, C/C++, Fortran77, Basic) (latest learned first)	+30 years
Automatic Control Systems Design (Matlab modelling and simulation, Hardware-in-the-Loop Simulation)	+3 years
Microcontroller/DSP board design, digital design, assembly languages, embedded software, RTOS, PCB design	+5 years
Display Metrology	+15 years
Multiple subcontractor management: Local and international companies	+15 years
Office tools / management tools (MS Office, MS Project, Oracle Primavera, SAP, Jira, Doors)	+25 years
Systems Engineering (From requirements stage to specifications, S/W design, algorithm design, implementation, integration, testing and qualification – the complete “V” curve)	+20 years

Work Experience

Company / Department	Title
ASELSAN Ind. Inc., Ankara (2000-present) (www.aselsan.com) Microelectronics Guidance and Electro-Optics Business Sector, Avionics Systems Design Directorate, Avionics Systems Design Dept.	Display Technologies Team Leader Sep.2014–Present
ASELSAN Ind. Inc., Ankara Microelectronics Guidance and Electro-Optics Business Sector, Airborne and Naval Systems Design Department	Manager Jul.2004–Sep.2014
ASELSAN Ind. Inc., Ankara Microelectronics Guidance and Electro-Optics Business Sector, Image Processing Department	Chief Engineer Oct.1998–Jul.2004
TUSAS Aerospace Ind. Inc., Ankara (1996-2000) (https://www.tusas.com/en) Dept. of Design and Development	Senior Project Engineer Mar.1996 – Oct.1998
TÜBİTAK Information Technologies Research Institute (BİLTEN) (1990-1996) (https://uzay.tubitak.gov.tr/en) Dept.of Electrical and Electronics Eng.	Embedded System Engineer Mar.1990–Mar.1996

Note: In addition to the above work experience, I am also a part-time lecturer for the technical elective course “Display Technology and Design” at three university’s EEE departments: Ankara TOBB-ETU (on-site), Ankara University (online) and Karadeniz Technical University (online). See latest page for course outline.

Academic Studies

Degree	School / Department	Major / Minor / Thesis	Graduation Degree	Dates
Graduate Studies (Ph.D.)	Gebze Technical Univ. (GTU), Dept. of Material Science & Eng., Gebze	Thesis Work: “Junctionless TFT Design for OLED Display Devices” (Ongoing)	3.67 / 4.00 Ph.D. candidate (Qualification exam pass and all courses complete)	2019 – 2024
Graduate Studies (M.Sc.)	Gazi Univ., Dept. of Electrical & Electronics Eng., Ankara	Thesis: “Automatic Control System Design For an Unmanned Aerial Vehicle	3.50 / 4.00	1996 – 1999
University (B.Sc.)	Middle East Technical Univ. (METU), Dept. of Electrical & Electronics Eng., Ankara	Computer / Telecommunication	2.49 / 4.00	1987 – 1991
High School	TED Ankara College, Ankara	Math / Science	9.0 / 10.0	1984 – 1987

Achievements

- Developer of “Junctionless Thin Film Transistor Array Design for AMOLED Display Device” using SILVACO TCAD, ATLAS and Athena Tools (2022 – ongoing).
- My Ph.D. thesis work was entitled as a “TOHUM” (“Seed”) Project and got funded by my company ASELSAN for 50.000 USD. (2022 – ongoing)
- Seasoned lecturer of “Display Technology and Design” course to more than 200 university students, at three Universities: TOBB ETU, Ankara University and Karadeniz University (September 2015 – present)
- Ph.D. Candidate in Material Science and Engineering, Qualified, exam passed in first trial. (2022)
- Now leading design team for 3.2” AMOLED display, world’s first “military ruggedized OLED display”. (2021- present)
- Established infrastructure for Active Matrix OLED Display Development in 10.000-class cleanroom in ASELSAN MGEO. (2017-2021)
- Leded design team to ruggedize 4” PMOLED wrist worn display (2018-2021),
- Leded design team to ruggedize 6”, 12”, 20” LCD modules. (2017-2021)
- Designed Turkey’s first Ruggedized 10”, 1024x768 Color LCD Module, device in production. (2014-2017)
- Designed Turkey’s first near eye, 1”, 160x120 PMOLED Display Module, device in production. (2014-2017)
- Coworked/managed Sabancı University for design of World 1st 160x120, 1” Graphene Anode, small molecule PMOLED display (2014-2017)
- Established infrastructure for LCD Ruggedization in 1000-class cleanroom in ASELSAN MGEO. (2013-2015)
- Established infrastructure for Passive Matrix OLED Display Development in 10.000-class cleanroom in ASELSAN MGEO. (2013-2015)
- Designed from scratch and managed Turkey’s first Multifunctional Display. VMFD-68 successfully delivered to ATAK program, in production, design certified, patented. (2008-2012)
- Managed Airborne and Naval Systems Design Department in ASELSAN MGEO. (2004-2014)
- Designed KDU-44 Control Display Unit. KDU-44 successfully delivered to ATAK program, in production, design certified. (2011-2014)
- Performed Systems Engineering work in ATAK Program. (2008-2012)
- Designed System Architecture for Fighter Modernization Programs for RF-4E, F-4E. (2004-2007)
- Authored, tailored Software Engineering Process, Systems Engineering Process per military/industrial standards (2004 - 2014)
- Designed System Architecture for Helicopter Modernization Programs for S70A, AH-1W, UH-1H Helicopter Modernization. (2001-2005)
- Business development, project management, technical management, subcontractor management and supervision of long-term, multinational and multi-disciplinary defence projects on Avionic Systems with a total budget of more than 500 million USD (2000 – present). Status: More than 95% completed at present.
- Invited Committee member and contributions to the development of 11th and 12th 5-year Development Plan of Turkey (2018, 2023)
- Avionics system architecture design of 5 different airborne platforms AH-1W, UH-60, ATAK, S70A and S70B (2004-2014)
- System design of Command and Control System for naval Frigate ship (2012)
- Design, implementation and qualification of a cockpit simulator completed within 9 months from business development to end of qualification. (2007)
- Embedded Keil-C and assembler code development on Intel 80188, 8031 and PIC16C42 for remote terminal units of a 10kV Mid Range Power SCADA System at TUBITAK BILTEN. (1992-1996)
- Fully architected and designed the Hardware in the Loop (HIL) system for Gain-scheduled Eigenspace Assignment method for pitch, roll, yaw, heading, altitude autopilot for Flight Control System Development for Turna Unmanned Aerial Vehicle. Work presented in European Control Conference, Karlsruhe, 1999.

Main Assets

- I am the expert and master of display technology, avionics, have 30+ year career in Turkey, taking part in many engineering design processes that constitute many products, systems and software.
- I am especially and infrastructure builder, problem solver, fast-learner with strong team-working and technical management skills. I am a dedicated learner, I see no limits of technical difficulty.
- I have hands-on experience on design, software/hardware implementation, optics, functionally / optical testing of displays.
- I lecture regularly 14-week in Universities on Display Design and Technology.
- LCD and OLED Displays Technology
 - LCD and OLED Displays Technology
 - Display Ruggedization Process for MIL-STD-810, SAE-ARP-8034, IEC 60945 compliance.
 - LED Backlight Unit Design
 - LCD/OLED display devices architecture design
 - LCD/OLED Production line infrastructure design
- I am Ph.D. Candidate in Material Science and Engineering, Gebze Technical University, ongoing thesis work on “Design and Simulation of Thin-Film-Transistor (TFT) Arrays for OLED Display Devices”. Thesis work ongoing on SILVACO ATLAS and Athena tools.
- Latest research work are:
 - “Investigation of Drain Induced Barrier Lowering and Subthreshold Slope in Junctionless Thin Film Transistor Architectures” (submission process ongoing to IEEE Transactions of Electron Devices.)
 - “Removing crosstalk effect for high efficient polymer light emitting diode display”
<https://doi.org/10.1016/j.sse.2022.108253>
 - “A review of high-end display technologies focusing on inkjet printed manufacturing”
<https://doi.org/10.1016/j.mtcomm.2023.105534>
- I have extensive experience in both technical disciplines (software, materials, system design, technical management) and project management. This has benefited me in managing complex projects involving various risks.
- When necessary, with consent of management, I may push the conditions to the limit and use all available means in order to get the job done in time and complete the project.
- I have always had interests in more than one technical discipline. Instead of focusing on a narrow field, I have preferred to learn more on all related fields as well as the main technical field of focus. Over time, I have developed skills in multiple disciplines. This has benefited me with alternative methods to solve technical problems by using solutions borrowed from other fields of expertise. With the insights of my Ph.D. studies, I feel my problem solving skills improved significantly.
- Learning is a lifelong passion for me and I am always open and eager to learn new skills and develop my existing expertise. In addition to my PhD. Studies, while in global pandemic, as I am keen on maths and coding, I even developed financial skills and successfully finished a 6 months course called Executive Programme for Algorithmic Trading; actually feeling its possible benefits to my life standard. After I finished that course I am now affiliated to World Quant University’s free online programme on Master Science on Financial Engineering, expected completion in 2024 Q4.

Awards

- **Invited Committee member** and contributions to the development of 11th and 12th 5-year Development Plan of Turkey (2018, 2023)
- **ASELSAN** Certificate of Appreciation, for design of world 1st 160x120 pixel, 1” Graphene Anode, small molecule PMOLED display (2017)
- **ASELSAN** Certificate of Commendation, twice (2004, 2014)
- **TMMOB** (Chamber of Architects and Engineers of Turkey) Certificate of Commendation (2016)
- **Turkish University Entrance Exam (ÖSS)**: 1300th place out of 700,000 students (1987)

Selected Trainings Completed - Management

Training	Given by / Place	Date & Duration
Methodologies and Applications in Project Management	İstanbul Kurumsal Gelişim, Ankara (PMI R.E.P.)	Jan. 2013 (2 days)
Finance For Non-Finance Executives	MBH Group	Dec. 2010 (2 days)
Business Management Training	Dr. Tanıl Kılınç	Sep. 2004 (3 days)
Effective Requirements Management	Ian Alexander, Telelogic Academy	Jun. 2004 (2 days)
Negotiation Skills Training	Erkan Tozluyurt	Nov. 2003 (3 days)
Project Planning, Execution and Analysis Using Microsoft Project	Demir Özkaya, Makro Danışmanlık	Mar. 2003 (3 days)

Selected Trainings Completed – Technical (between 2021-2022 in my Ph.D. Programme)

Course	Given by	Grade
Materials Science and Engineering I and II	Gebze Tech Univ. Dept. of Mat.Sci.&Eng	Pass
Structure-Property Relationships In Solids		BB
Advanced Fabrication Techniques in Nanotechnology		AA
Materials Characterization Techniques		AA
Fracture Mechanics		AA
Thermochemistry		AA
Scientific Research Methods and Publication Ethics		AA
Kinetics of Structural Transformations		AA
Scanning Electron Microscope		AA

Display Technology and Design Course Outline (14 weeks)

1. DISPLAY OPTICS

1.1. Human Visual System

- Eye as an optical system
- Human Visual Field
- Display quality terms:
 - Color, Resolution, Flicker
 - Contrast Ratio, Grayscale
 - Viewing Comfort, Visual Acuity
 - Dynamic Range, Display ergonomics
 - Specular and diffuse reflection

1.2. Radiometry and Photometry

- Radiometry – Photometry
- Radiant flux - Luminous Flux
- Irradiance – Illuminance
- Radiant Intensity - Luminous Intensity
- Radiance – Luminance

1.3. Colorimetry

- Color Basics
- Color spaces and color coordinates
- Color Temperature
- Standard illuminants
- Color Gamut, Color Rendering Index
- CIE Color Matching Functions
- CIE Chromaticity Diagrams

- Color Separation of The Eye

1.4. Display Optical Components

- Glass Types
- Polarizers
- Filters (anti reflection, anti-glare etc.)

2. DISPLAY DESIGN

2.1. Liquid Crystal Displays

- Theory
- Structure
- Driving schemes

2.2. OLED Displays

- Theory
- Structure
- Driving schemes

2.3. Display Interfaces

- Analog Video Interfaces
- Digital Video Interfaces

3. DISPLAY MEASUREMENT AND TESTING

3.1. Measurement Instruments

3.2. Measurement Methods and Evaluation

4. NIGHT VISION DISPLAY FUNDAMENTALS

4.1. Night vision standard

4.2. Night Vision Compatibility of Display Devices

Publications



Solid-State Electronics
Volume 192, June 2022, 108253



Removing crosstalk effect for high efficient polymer light emitting diode display

Rifat Kaçar^{a, b}, Ramis Berkay Serin^{a, b}, Esin Uçar^{a, b}, Alper Ülkü^{a, b}

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<https://doi.org/10.1016/j.sse.2022.108253>

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Abstract

For passive matrix organic light emitting diodes, crosstalk effect is serious problem. This problem adversely affects the image quality of display with driver circuit operation. In this study, 16x16 pixel monochrome green emissive passive matrix (PM) OLED Display Module was successfully fabricated which exhibits high efficiency, high luminance uniformity and MIL-STD-3009 night vision (NVIS) compatibility. Current efficiency, power efficiency and external quantum efficiency has been obtained as 22.79cd/A, 10.23lm/W and 4.61%, respectively. Additionally, crosstalk effect was removed by adjusting spin rate of the hole injection layer so that display image quality optimally has been achieved.

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A review of high-end display technologies focusing on inkjet printed manufacturing

Rifat Kaçar , Ramis Berkay Serin, Esin Uçar, Alper Ülkü

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<https://doi.org/10.1016/j.mtcomm.2023.105534>

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Abstract

Inkjet is the most widespread microfluid based printing technology spreading far beyond its traditional role in the form of desktop home & office printers. It has been regarded as purely additive, non-contact, maskless, rapid, and cost-effective manufacturing tool in many industrial sectors thanks to printable form of functional materials. The current approaches of RGB pixel printing technology has been provide new insights into the current domain of display manufacturing industry. Here, a detailed view of high-end display technologies is provided focusing on inkjet printed manufacturing that unifies the recent R&D trends and breakthroughs. Inkjet printing process was introduced in detail along with its key aspects and current operational limitations which will help researchers to establish a baseline for future studies. This review also provides a synopsis on the primary display schemes to achieve full color. The strengths and shortcomings of each scheme are revealed properly. The recent works concerning printed functional layers incorporated display schemes have also been summarized, followed by an in-depth review of inkjet printed display prototypes. Lastly, an outlook on present & future challenges facing the field are considered and a perspective on possible use of inkjet printing method in display manufacturing is presented.

Research Interests

- Thin Film Transistor (TFT) Arrays for Displays, Junctionless TFTs
- LCD and OLED Display Technology
- Avionics Systems
- Automatic Flight Control Systems

References (searchable and contactable from LinkedIn)

- Özcan Kahramangil, Mechanical Engineer, DADE Technology.
 - Özcan Ertem, Aeronautical Engineer, Portland, Oregon.
 - S.Tarkan Karşıdağ, Electrical Engineer, Department of National Defense of Canada.
 - Reggie Pantig, Professor of Physics, Mapua University.
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