



## Fargham Sandhu

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**FIELD OF INTEREST:** Design of Nonlinear Control Systems using Optimal Control Schemes that use various variables to estimate and control vehicles to achieve optimal performance in Solar Systems. Nonlinear controller design strategy is to use complementary filters in designing linear and nonlinear parts of the controller and cascade them in Composite Controller form.

### EDUCATION: 2013-2016

**UNIVERSITY TECHNOLOGI MALAYSIA (UTM) Johor, Malaysia**  
**PhD in Multivariable Nonlinear Control System**

- Vehicle chassis control to ensure vehicle stability and comfort
- GPS free navigation.
- Suspension System enhancements like magnetorheological dampers.
- Improvements in direct yaw control and Antilock braking system
- Used Altera **Cyclone II EP2C5T** FPGA to interface with HX711 for making a precision weighing balance.
- Design and Development of basic four stroke motorcycle EFI system for **APTTECH Corporation SDN BHD**.

2006-2008

**CENTER FOR ADV STUDIES IN ENGINEERING (CASE) Islamabad Pakistan**  
**Master of Computer Engineering**

- Advanced Computer Architecture.
- Advanced Linear and Robust Control
- Advanced nonlinear control Design
- Advanced topics in Nonlinear control.
- Advanced DSP-I & II.
- Real time embedded systems.
- Industrial Robotics.

1995-1999

**GHULAM ISHAQ KHAN INST OF ENGINEERING (GIK) Topi, Pakistan**  
**Bachelors of Electronics Engineering**

- Electronics, DSP, Signals and Systems.
- Microprocessors and Microcontrollers, Control Engineering
- Analog and Digital Communications
- Microwave Systems

### EXPERIENCE: Sep2012-2018

**FEDERAL URDU UNIVERSITY Islamabad, Pakistan**  
**Assistant Professor**

- Taught courses like Electronics-I and II, Control Systems Engineering & Industrial Electronics
- Taught courses on Digital Communications
- Assisted Students in doing their final year project on the design of a small **ECG monitor** for patients

Oct 2008-Oct 2012

**AIR UNIVERSITY Islamabad, Pakistan**  
**Lecturer of Electronics**

- Teach Electrical Courses like Analog Electronics, Digital Logic Design, Microprocessors and Microcontrollers, Industrial Electronics, Bio-robotics.
- Counseled Final Year Students in their final project on Designing a **CNC Router, Robot welding machine**.

- Assisted in Starting up a robotic society and helped the students in participating in **Line Traking Robot competition**. I was also a referee in fighting robots competition.
- Helping students in competing international and national events like **SHELL ECHO** automobile competition.

#### ON JOB CERTIFICATES/TRAININGS:

- ASIC chip design using Verilog and FPGAs
- RF and Microwave Antenna Design.
- Industrial Process Control Systems using PLC (**CPD points=1**).

#### PART TIME CLIENT BASED PROJECTS (INTERNET BASED PROJECTS AT ELANCE)

- Real time high precision digital temperature monitoring and remote sensing project was completed with good records.
- Sound compression using Wavelet Transform (**WT**) for **FPGA's** was completed and tested using MATLAB-FPGA interface for testing. I used **Spartan-II** from Xilinx FPGA
- PCB design for a multiport switching card was completed.
- Designed and developed Xilinx CPLD **XC9572** CPLD board for client
- **SHA-256** coder for high speed internet using **FPGA** for a client was completed.
- Some Microwave antenna matching problems were solved successfully.

#### ADDITIONAL INFORMATION:

- Proficient in using **Modelsim** and **Xilinx ISE** to develop Verilog code for Xilinx and **Quartus-II** for Altera **MAX10** and **Cyclone II** FPGA's.
- Proficient in **MS Office, Excel** and **Microsoft Project**.
- Proficient in **Matlab, Code Composer Studio (CCS), Keil** and **Pic Basic IDE**
- Proficient in Embedded C/C++ for **8051, PIC, TMS430C28335, TMS320F6701** and **MSP430** projects.
- Good in **Python** for **Beaglebone** and **Orange Pi plus**.
- Proficient in Arduino software and related projects.
- Proficient in Agilent Advanced Design software (**ADS**).
- Proficient in Microwave Office tools (**MWO 2000**).
- Proficient in **SIEMENS PLC** Ladder and sequential logic.
- Proficient in Analog mixed Digital **A/D Pspice**.
- Proficient in using and interfacing **GPS/GLONASS** systems and using them to design a navigation system.
- Proficient in circuit design from scratch to final PCB and automated testing.
- Proficient in real time parameter logging and interface design using **MATLAB, Visual Basic, Visual C/C++**.

#### Hobbies:

- I love to do Athletics and have participated in Relay Races.
- I am intereted in making circuits and learn new tools.
- I love to work in teams and travel sparingly.

#### References:

(1) Reference 1:  
**Dr Zafar ullah Koreshi**  
**Dean Air University Dept of Mechatronics Engineering**  
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## PUBLICATIONS

- [1] Fargham Sandhu, Hazlina Selamat, S.E Alavi, Vahid Behtaji Siahkal Mahalleh, FPGA-Based Implementation of Kalman Filter for Real-Time Estimation of Tire Velocity and Acceleration, In Press, Sensors Journal 2017 (Impact Factor 2.51)
- [2] F. Sandhu, H. Selamat, V. B. S. Mahalleh, "Direct Yaw Control of Vehicle using State Dependent Riccati Equation with Integral Terms," Advances in Electrical and Computer Engineering, vol.16, no.2, pp.101-110, 2016, doi:10.4316/AECE.2016.02014 (Impact Factor 0.529)
- [3] Fargham Sandhu, Hazlina Selamat, Yahaya MD Sam, "Linear Quadratic Regulator and Skyhook Application in Semiactive MR Damper Full Car Model," IEEE Control Conference (ASCC), 2015 10th Asian, DOI: 10.1109/ASCC.2015.7244406
- [4] Fargham Sandhu, Hazlina Selamat, Yahaya MD Sam, "Antilock Braking System using Dynamic Speed Estimation," Journal Teknologi, vol. 72, No. 2, 2014. DOI:<http://dx.doi.org/10.11113/jt.v72.3882>
- [5] Fargham Sandhu, Hazlina Selamat and Yahaya M. Sam, "Nonlinear Complementary SO(3) filters for Parameter Estimation and Navigation of ground Vehicles," Applied Mechanics and Materials Vol. 663 (2014) pp 254-258,(2014 Trans Tech Publications, Switzerland, doi:10.4028/www.scientific.net/AMM.663.254
- [6] Mohammad Kashif Ishaq, Fargham Sandhu, Asim Shahzad, Muhammad Riaz Mughal, "Design of Ku band High Power Solid State Cryosat Transponder", International Journal of Computer Science Issues", vol 9, issue 4, No.3, 2012.
- [7] Nasir Salem, Fargham Sandhu, "Evaluation of Spatial Application Accuracy of SensingSpraying system for variable rate application of Oil Palm Trees," Advances in Environmental Biology, vol. 8, No. 10, 2014.
- [8] Vahid Behtaji Siahkal Mahalleh, Hazlina Selamat, Fargham Sandhu." The effects of distance in dynamic psychological factors of one-dimensional queue." Control Conference (ASCC), 2015 10th Asian, DOI: 10.1109/ASCC.2015.7244455.
- [9] Mahalleh, V. B. S., Selamat, H., Sandhu, F., & Khamis, N. (2016). IMPROVED CROWD PSYCHOLOGICAL MODEL AND CONTROL. Jurnal Teknologi, 78(6-13).