Joji John Varghese

Passionate Electronics Engineer with expertise in Design and Realization of RADAR/SDR/RF/Embedded/SATCOM Systems.

LinkedIn https://www.linkedin.com/in/joji-john-varghese-62291883/

Address Thejas, Alayamon P.O
Anchal, Kollam 691306
Kerala INDIA

Mobile +91-8547274758

Email ID thejasjoji@gmail.com

Website https://joji-john.github.io/

PROFESSIONAL EXPERIENCE

Indian Institute of Space Science & Technology , ISRO

Project Engineer
December 2017 - PRESENT

I am currently working with Small Spacecraft Systems and Payload Centre (SSPACE Lab), IIST for design and development of :

- Software Defined Radio design using GNURadio Ecosystem
- SDR based VHF/UHF/S/Ku-Band Satellite TTC Ground Station
- Fault-Tolerant SoC FPGA based On-Board Computer Design
- Satellite On-board Telemetry/Telecommand Modem Design
- SDR based Ionospheric RADAR System Design
- Reliable Avionics System Design using COTS Components
- HF/VHF/UHF Antenna Design & Development

Space Physics Laboratory, VSSC/ISRO

Contract Engineer
June 2016 - December 2017

I was responsible for design and development of :

- FPGA based Digital Receiver & Controller For HF Ionospheric Pulsed Doppler Weather Radar Situated at Thumba Equatorial Rocket Launch Station , VSSC
- Software Defined Radio based Telemetry Receiver for Weather Balloon Experiments carrying iMet UHF Radiosonde and Ozonesonde
- SDR based Riometer for Ionospheric Studies

EDUCATIONAL BACKGROUND

MBCET, University of Kerala, India— *Bachelors Degree in Electronics Engineering*

June 2012 - June 2016

Specialized in Electronics & Communication Engineering , CGPA: 8.1
B.Tech. Thesis: 12 Lead ECG Monitor using ADS1298

VVHSS, Kerala State Board, India — *Intermediate Studies*

March 2010 - April 2012

Specialized in Computer Science, Physics, Chemistry, Maths,98.25%.

Central Board of Secondary Education, India — *AISSE*

March 2000 - March 2010

Specialized in Physics, Maths, English,GPA: 9.8

TECHNICAL SKILLS

* Embedded System Design
* Software Defined Radio
* RF System Design
* Analog/Digital System Design
* Ionospheric RADAR Design
* SATCOM Earth Station Design
* FPGA Design & Board-Bring Up
* Digital Signal Processing
* EDA Schematic/PCB Design
* Embedded C, Linux & Python
* Project Management
* Antenna Design & Testing
* Nano Satellite System Design
* SMD Fine Pitch Soldering
* Automated Checkout Design
* EMI/EMC/Vibration/TVAC
* Technical Documentation
*Avionics Testing/Qualification
* Strong Hardware Design, Prototyping & Debugging Skills
* System Engineering for Satellites & Launch Vehicles

PERSONAL DETAILS

Gender : Male
Marital Status : Unmarried
Date of Birth : 28 Sept, 1993
Nationality : Indian
Languages : English,Malayalam
Interests : Listening Music

PROJECTS / SYSTEMS DEVELOPED & INSTALLED at SPL/IIST

- FPGA based Digital Receiver and Controller for **SPL HF RADAR** .
  (18.1MHz pulsed coherent monostatic doppler radar with 50kW peak power for EEJ/ESF study)
- SDR Based 150/400 MHz **Digital Beacon Receiver** for ionospheric TEC measurement.
- Software Defined Radio based **RIOMETER** for Ionospheric studies .
- Passive **Oblique Mode Digital IonoSonde Receiver** using modern USRP X310 SDR.
- Low power **Coded CW Spread Spectrum Active IonoSonde** using SDR.
- Multimode VHF/UHF **Satellite Telemetry TeleCommand Ground Station** for cubesats.
- PrimeFocus **Parabolic Dish Antenna** S/Ku band System for GEO Satellites.
- Low Cost Satellite Onboard VHF/UHF 1200bps **AFSK TM/TC Communications Module** (TRL-6).
- Microsemi SmartFusion-II based **Radiation tolerant SoC FPGA Cubesat OBC** (TRL-7).
- Satellite modem using analog devices **AD9361 Transceiver & Zynq7000 FPGA** .
  (70MHz to 6GHz, CCSDS , AM/FM/PM/ASK/FSK/GMSK/BPSK/QPSK Modes with
  FEC-viterbi/RS/Turbo/LDPC Ethernet TCP/UDP Interface)
- Miniature Reception system for balloon borne **UHF Radiosonde Telemetry**.
- Low Cost Modular **RADAR Tx waveform/Control Signal Generation** using REDPITAYA board.
- Azimuth/Elevation **Antenna Tracking System** for TLE based LEO satellite auto tracking.

MODULES / SUB-SYSTEMS DEVELOPED, TESTED & INTEGRATED

- LDMOS based **1kW HF RF SSPA** (Solid State Power Amplifier) for pulsed radar.
- **Broadband Terminated Folded HF Dipole Antenna** for 2-30MHz .
- Low cost **Broadband Active HF Magnetic Loop Antenna** for low noise reception.
- Mast Mounted **VHF & UHF LNA** with integrated BPF, Limiter & DC Injection.
- PIN Diode High **Power RF TR Switch** with builtin receiver blanking & protection.
- High Gain Multistage **S band LNA Module** with Filter & DC Injector.
- High Power Wilkinson Balanced **Power Combiner / Divider**..
- Switched delay line phase shifter for radar **beam steering module.**
- VHF/UHF High power harmonic suppression **low pass cavity filter.**
- Circularly polarised high **gain Yagi-Uda antenna** for 145 & 436 MHz.
- **Helix feed assembly** with integrated amplifier for 2250MHz.
- Custom FPGA board using **Microsemi & Xilinx FPGA** for DAQ / Control.
- Miniature **HF Transmit Receive Module** for Phased Array RADAR Prototype.
- Distributed Control & Monitoring System using **CAN/RS485 & Ethernet**.

ACADEMIC TRAINING/PUBLICATIONS/PROJECTS/ACHIEVEMENTS

- Attended the Course "Integrated Design of Space Vehicle" at IIST by Dr. B. N. Suresh, ISRO .
- Published IEEE Paper "UPASANA: Diagnostic Toolkit for ASHA Worker".
- *Bachelor's Degree Main Project:* ADS1298 Based 12 Lead ECG Monitor Design.
- *Bachelor's Degree Seminar Topic:* ADS1298 Based ECG System.
- *Bachelor's Degree Mini Project:* Automatic College Bell.
- Received Academic Proficiency Prize for year 2012-13.

REFERENCES

1. **Prof. S. Viswanatha Rao** , *HoD Electronics Department , MBCET*. Mail ID : rao-sv@hotmail.com
2. **Nazeer M**, *Engineer 'SD', Space Physics Laboratory, ISRO* . Mail ID: mohammed_nazer@vssc.gov.in
3. **Dr. Priyadarshnam**, *Associate Professor, Dept. of Avionics, IIST*. Mail ID: priyadarshnam@iist.ac.in
4. **Dr. Raveendranath** , *Adjunct Professor, Dept. of AeroSpace*, IIST. Mail ID: raveendranath@iist.ac.in

INDUSTRIAL VISITS

- ***IISU*** - ISRO Inertial Systems Unit, *Kerala, INDIA.*
- ***TERLS*** - Thumba Equatorial Rocket Launching Station, *Kerala, INDIA.*
- ***ISTRAC*** - ISRO Telemetry, Tracking and Command Network, *Bangalore, INDIA.*
- ***LPSC*** - Liquid Propulsion Systems Centre, *Kerala, INDIA.*
- ***VSSC*** - Vikram Sarabhai Space Centre, *Kerala, INDIA.*
- ***URSC*** - U R Rao Satellite Centre, *Bangalore, INDIA.*
- ***ISITE*** - ISRO Satellite Integration and Test Establishment, *Bangalore, INDIA.*
- ***INMCC*** - Indian Mission Control Centre, *Bangalore, INDIA.*
- ***BSNL*** - Bharat Sanchar Nigam Limited, *Kerala, INDIA.*

SOFTWARE TOOLS

- ***FPGA EDA Tools*** : Xilinx Vivado HLS / ISE, Microsemi Libero SoC, Altera Quartus Prime, Modelsim.
- ***Embedded System IDEs*** : Atmel AVR Studio, Microchip MPLAB IDE, Arduino IDE, TI Code Composer Studio.
- ***Programming*** : VHDL, Embedded C, C++, Python, FreeRTOS, MBED Online.
- ***PCB EDA Tools*** : Kicad, Altium Designer,Eagle , Proteus.
- ***Simulation*** : MATLAB, Simulink, LabView, GNU-Radio, ADS, NEC.
- ***OS*** : Windows, Linux, Android.
- ***Documentation*** : Microsoft Office Tools, Google Docs, Latex.
- ***Misc Utilities*** : WireShark, Putty, TeraTerm, WinSCP.

HARDWARE TOOLS

- ***FPGA*** : Xilinx Zynq 7000 APSoC, Spartan 6, Virtex 6, Artix 7, MicroSemi SmartFusion 2, ProASIC 3.
- ***Microcontrollers*** : 8051, AVR, PIC, STM32,MSP430, ARM-Cortex M4, ESP32, Renesas RX63 ,Tiva C series.
- ***Protocol Bus*** : UART, I2C, SPI, CAN, RS232. RS485, RS422, Ethernet, Mil-Std 1553
- ***Prototyping*** : Bread board, Dot/Line PCB Wiring, SMD Soldering, PCB Etching, 3D Printing,PCB Engraving.
- ***Test Equipments*** : Digital Oscilloscope, Function Generator,Digital Multimeter,Programmable Power Supply, Electronic Load,Source Measure Unit, Arbitrary Waveform Generator, Digital Logic & Protocol Analyser, Spectrum Analyser, RF Power Meter, Vector Network Analyser, RF Vector Signal generator & Analyser, RF Vector Voltmeter.
- ***Development Boards*** : Intel Galileo, Intel Curie, Intel Edison, Intel Joule, NVIDIA Jetson Nano,TI BeagleBone Black, Raspberry Pi 4, Raspberry Pi Zero, Raspberry Pi Compute Module, Arduino Uno/Nano/Micro/Mega/101, ESP8266, ESP32, FreeScale FRDMKL25Z, PSOC6, TMS320C5515, STM32 IoT Node,TM4C123G,TM4C1294,MSP430G2,TI C2000, TI CC3220, TI CC2640R2-LAUNCHXL.
- ***SDR*** : ADALM Pluto SDR, REDPITAYA SDR, USRP X310/USRP N210/USRP 1 with UBX160,TwinRX, LFRX/TX, Analog Devices ADRV9361-Z7035/ ADRV9364-Z7020 PicoZed SDR on ADRVBOB/ADRVFMC, FmComms3.

CERTIFIED ONLINE COURSES

- Introduction to FPGA Design for Embedded Systems - *University of Colorado Boulder.*
- Model-Based Systems Engineering - *University at Buffalo.*
- Introduction to Embedded Systems Software and Development - *University of Colorado Boulder.*
- Introduction to Power Electronics - *University of Colorado Boulder.*
- Classify Radio Signals from Space using Keras - *Coursera Project Network.*
- Introduction to Satellite Communications - *Institut Mines-Télécom France.*
- Architecting a Real-Time Radar Recorder - *Keysight Technologies.*
- Essential RF Power Measurements - *Keysight Technologies.*
- Network Analyzer Fundamentals - *Keysight Technologies.*
- RF Field Testing Basics 101 - *Keysight Technologies.*
- Signal Analyzer Fundamentals - *Keysight Technologies.*
- High-Density EW Threat Simulation from Lab to System - *Keysight Technologies.*
- Rapid Prototyping , Innovation & Entrepreneurship Course - *Massachusetts Institute of Technology.*

MANAGERIAL CONTRIBUTIONS

- Indented & Procured Equipments/Components worth 1.5 Crore INR.
- Managed a Team of Students, Engineers & Technicians for RADAR / Ground Station Installation.
- Configuration Document / Technical Report Generation.
- SSPACE LAB Equipment Layout & Floor Planning.
- Satellite Ground Station LAB Layout & Floor Planning.
- Lab Inventory Management.
- Training / Project Guidance for UG/PG Students.

AWARDS & ACHIEVEMENTS

- **2021** : Shortlisted among Top-100 in Swadeshi Microprocessor Challenge by MeitY for the project "Fault Tolerant Reliable Integrated Avionics System for Drones".
- **2020** : National Winner for the Defence India Startup Challenge 3 for a project titled "Portable Spoof Emitter for Radiations" in the DEFEXPO 2020.
- **2019** : Co-founded a hardware start-up company AiDrone Private Limited along with Ani Sam Varghese for multipurpose high endurance Search & Rescue Drone Development.
- **2018** : Recognized as Distinguished Alumni from MBCET.
- **2017** : People Choice Award for the project "LEOTIS: Low Earth Orbit Thermal Imaging Cubesat" in NASA INTERNATIONAL SPACE APPS CHALLENGE 2017.
- **2017** : Project titled "PEACHSAT: A CubeSat Technology Demonstrator" won the Second prize in Renesas National Embedded Design Contest.
- **2016** : As part of Nypunyam 2015, organized by Kerala Government, got selected as Most Skilled Electronics Worker & is selected to represent Kerala in National Skill Fest 2016 to be held at New Delhi.
- **2016** : The project "UPASANA, A Diagnostic Tool Kit for ASHA workers" received funding of 500$ as part of All IEEE Younger Engineers Humanitarian (AIYEHUM) Challenge 2015.
- **2015** : The project "UPASANA, A Diagnostic Tool Kit for ASHA workers" Won the MARIAN Award of Technical Excellence 2015 instituted by Marian Engineering College.
- **2015** : Selected for sponsored Singapore Industrial Visit as part of Yuva Mastermind 2015 organized by Malayala Manorama , IBS & Amal Jyothi College of Engineering & Technology for winning the best project prize in the category "Making Life Easy for Women". The visit was held in July 2015.
- **2015** : The project titled "UPASANA, A Diagnostic Tool Kit for ASHA workers" won the First prize in Renesas National Embedded Design Contest 2015 .
- **2014** : The project titled "NEOSYNC: -Low cost EEG Development Platform" was selected for Texas Instruments Innovation Challenge India Design Contest 2015 and qualified for the Quarter finals.
- **2014** : Got People Choice Award for the project "ROVINO: Mars Rover Prototype" in NASA INTERNATIONAL SPACE APPS CHALLENGE 2014 .
- **2013** : Won first prize for the project, "Electrical Safety System", in SPECTRUM 2013, A National Level Project Competition organised by MBCET.
- **2012** : Won State Level First Prize in Kerala State Science Fair (Working Model) Category for the Project " Electrical Safety System".
- **2011** : Won State Level First Prize in Kerala State Science Fair (Working Model) Category for the Project " Train Security System".

CONFERENCES & WORKSHOPS

- Participated in MIT-TATA Center workshop on Innovation, Fabrication & Entrepreneurship , organised by **MIT Media Lab** .
- Participated in the 17th National Conference on "E-Governance" , held at Ernakulam as being selected from MIT Workshop.
- Participated in a workshop on Designing Robots for a Better Living organized by IEEE SB, Amrita Vishwa VidyaPeetham.
- Participated in 2012 International Conference on Green Technologies jointly organized by Mar Baselios College of Engineering & Technology & University of Dayton Held at Trivandrum.
- Participated in Kerala Road Safety Hackathon held at Techno-park, Trivandrum.