Jithin Bhagavathi

Curriculum Vitae

4-Kalpataru, IUAC,N.Delhi
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Education

2017-2021 **Ph.D at Central University of Himachal**, Development of instrumentation and experiments for nuclear physics education, PhD Thesis .

2015 onwards **Founded CSpark Research Pvt Ltd** , Designs and manufactures indigenous scientific equipment for research and education, https://csparkresearch.in/.

2014 **Masters in Physics from Indian Institute of Science Education and Research**, Mohali, *CGPA at the end of 10 Semesters – 7.5*.

2014 , *Qualified UGC-CSIR National Eligibility Test(NET) Physics*.
Qualified GATE

2009 **Higher secondary school examination (XII), CBSE**, *The Mother's International school*, New Delhi, *Aggregate – 87.8%*.

2007 **Secondary school examination (X), CBSE**, *The Mother's International school*, New Delhi, *Aggregate – 91.4%*.

Awards

2017 Google Summer of Code fellowship . Firmware and software developer for computer interfaced data acquisition instruments

2008 Awarded Kishore Vaigyanik Protsahan Yojana(KVPY) Scholarship

2007 Awarded Junior Science Talent Search Examination(JSTSE) Scholarship. 28th rank , Delhi State

Publications

NIM-A Jithin B.P. and O.S.K.S. Sastri, "Novel coincidence setup using indigenously developed portable USB gamma spectrometer and associated analysis software," *Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, vol. 964, p. 163 793, 2020, ISSN: 01689002. DOI: 10.1016/j.nima.2020.163793

PhysEdu Jithin B.P., V. V. V. Satyanarayana, S. Gora, *et al.*, "Measurement Model of an Alpha Spectrometer for Advanced Undergraduate Laboratories," *Physics Education*, vol. 35, no. Jan-March 2019, 2019. [Online]. Available: http://www.physedu.in/pub/2019/PE18-08-518

PhysEdu Jithin B.P., S. Gora, V. Satyanarayana, *et al.*, "Gamma Spectra of Non-Enriched Thorium Sources using PIN Photodiode and PMT based Detectors," *Physics Education*, no. Apr jun 2020, 2020. [Online]. Available: http://www.physedu.in/pub/2020/PE19-12-600

APT-TUNES Jithin B.P., "SEELablet : A Technological Platform for Development of Innovative Experiments for Undergraduate Education," *APT Tunes*, vol. May 2018, 2018. [Online]. Available: https://aptkerala.org/images/stories/apttunes/APT_TUNES2018.pdf

PhysEdu S. Gora, Jithin B.P., V. V. V. Satyanarayana, *et al.*, "Alpha Spectrum of 212 Bi Source Prepared using Electrolysis of Non-Enriched ThNO 3 Salt," *Physics Education -IAPT*, vol. 35, no. Jan-Mar 2019, 2019. [Online]. Available: http://www.physedu.in/pub/2019/PE18-07-511

AJP A. Sharma, S. Gora, J. Bhagavathi, *et al.*, "Simulation study of nuclear shell model using sine basis," *American Journal of Physics*, vol. 576, 2020. DOI: 10.1119/10.0001041

PhysEdu O. S.K. S. Sastri, S. Aditi, J. Bhardwaj, *et al.*, "Numerical Solution of Square Well Potential With Matrix Method Using Worksheets," *IAPT*, no. Jan - Mar 2020, 2019. [Online]. Available: http://www.physedu.in/pub/2020/PE19-11-590

APL A. Arora, P. Kumar, J. Bhagavathi, *et al.*, "Microscopic modulation of mechanical properties in transparent insect wings," *Applied Physics Letters*, vol. 104, no. 6, 2014, ISSN: 00036951. DOI: 10.1063/1.4865202

CSpark Research . [Github-JithinBP,CSpark Research,]

After graduating with a Masters in Physics, I founded CSpark Research, whose goals include development of instruments to train the next generation of scientists, and which has research interests in radiation physics.
My work at this company deals with almost all tasks necessary for the design to manufacturing cycle. While all designing is done In-House, I have partners for bulk manufacturing such as Injection Moulders, Pick and Place assembly lines, Printing and packaging firms etc. It has enabled me to acquire a wide set of skills as outlined below.

Embedded C Authored firmware for USB interfaced devices such as gamma spectrometer, geiger counter, ExpEYES17 - A Test and Measurement tool, and various others. Usually involve PIC or AVR uCs. ExpEYES17 Source Code. Have interfaced sensors using I2C, SPI, UART.

Python Desktop App developer [PyQt, PyQtGraph, Numpy, Scipy, OpenCV...] . Development of Computer interfaced Data acquisition devices. Interfacing scientific equipment [GPIB, PCI-e, USB and ETHERNET ...]. Example - Point Contact Spectroscopy for measuring band gaps in superconductors, Code . Packaging for Linux/Windows . Author- CNSpec - A spectrum analysis tool, and KuttyPy-A microcontroller learning tool. Authored three packages included in Debian.

Full stack	ExpEYES Remote Access Platform built with python-flask, socketio, sqlite, semantic-ui, jquery which allows remote control of multiple PyQt desktop applications. Also integrates webrtc based voice, video , and P2P data. Have deployed python-flask backends on Heroku, ember.js frontends on surge.sh. I maintain my own DO-droplet for backends.
Mechanical Design	CAD designing with Solidworks used to build moulds for enclosures of ExpEYES, AlphaSpec etc. Circuit stl models from KiCAD are integrated into these designs.
Machining	Experience with Milling and turning metal to develop enclosures.
E-CAD	I have a working knowledge of KiCAD, and have built and manufactured various circuit boards.
Electronics Prototyping	Soldering experience down to 0603 parts, and MSOP packages.
Bulk Assembly	Hands-On Experience with the Pick and Place assembly process. Have manufactured thousands of electronics devices such as ExpEYES17.
Graphics Design	Familiar with Inkscape and GIMP for making designs such as product boxes, stickers, website content etc. Have also used Keyshot to make realistic renders from CAD files
Web development	Built and maintain csparkresearch.in [Jekyll, some jquery]. Also, jithinbp.in [Word-press]. Have worked with Apache, PHP, PHP-gd, DRUPAL CMS, Mod-python, Python-PSP, Python-Flask, CherryPy, JS, Jquery. Frontends - Ember-Js, Semantic-UI, Jekyll, DBMS - Sqlite, MySQL, Postgresql
Android	Published several apps on the Play Store. SCPI TCP logger, USB-OTG connected microcontroller interface, etc.
Presentation	Speaking at Conferences is useful for marketing, and I am familiar with Impress, Google Slides, and Beamer.
BioPhysics	Consultant at IISER Mohali for developing a magnetic tweezer assembly for studying protein unfolding using Piezo actuators, and Image analysis with OpenCV.

Conference Publications

Pycon-India 2021	Speaker. ExpEYES - A Python powered measurement device for hands-on science education.
Scipy-2021	Speaker. Remote access and control of Lab equipment for science education
Scipy-2020	Speaker. Python based portable instrument for Science Experiments
Scipy-2019	Speaker and Workshop organiser . Learning Microcontrollers with KuttyPy
DAE2019	Jithin B.P. and O.S.K.S. Sastri, "Background Gamma Radiation Surveying in the IndianPeninsula with a Portable USB Spectrometer," in *Proceedings of the DAE Symp. on Nucl. Phys. 64 (2019)*, 2019. [Online]. Available: `http://sympnp.org/proceedings/64/G28.pdf`
RINP2	Jithin B.P. and O.S.K.S. Sastri, "Gated MCA technique for demonstration of coincidence phenomena with a set of indigenously developed gamma spectrometers," in *Recent Issues in Nuclear and Particle Physics, Viswa Bharati*, 2019

DAE2019 Jithin B.P. and O.S.K.S. Sastri, "Compact dual-parameter MCA for γâĹŠγ Coincidence Measurements," in *Proceedings of the DAE Symp. on Nucl. Phys. 64 (2019) 920*, 2019. [Online]. Available: http://sympnp.org/proceedings/64/G37.pdf

SCIPY2019 Jithin B.P., "Learning Microcontrollers with Python," in *Scipy India*, 2019

IAPT-2019 Jithin B.P., "Simulation of N-Well Kronig- Penney Potential using Matrix Approach.," in *NACISP-2018*, IAPT, 2018

DAE2018 Jithin B.P. and O.S.K.S Sastri, "Indigenously developed gamma spectrometer," in *Proceedings of the DAE Symp. on Nucl. Phys. 63 (2018) 1072*, 2018, pp. 1072–1073. [Online]. Available: http://sympnp.org/proceedings/63/G19.pdf

RMLL2017 Speaker. Rencontres Mondiales du Logiciel Libre(RMLL 2017), Saint-Etienne, France

EDUCODE Speaker. Educode.be , Bruxelles, Belgium

Scipy-2014 Speaker. Scipy.in for Scientific Computing, IIT Bombay. Enthought, FOSSEE, and MHRD.

PyDelhiConf Speaker. PyDelhi Conference, JNU.

Scipy-2011 Scipy.in for Scientific Computing, IIT Bombay. Enthought, FOSSEE, and MHRD.

Projects

Summer 2009 **Electrodeposition and characterization using XRD and AFM of of FeAu thin films**, IIT Delhi, Dr. Ratnamala Chatterjee.

Summer 2010 **Virtual Lab project**, IIT Kanpur, Dr. Anjan Gupta.
Developed a Python-PSP and jquery based framework for remotely conducting resistivity measurement using instruments from Lakeshore and Keithley.

May 2011 **NanoRev Indigenous STM**, Quazar technologies, New Delhi.
Learnt about the design and construction of the instrument from its developers, and obtained atomic resolution scans of HOPG.

June-July 2011 **Development of a multi-channel Analyser(MCA) for Alpha particle detectors**, Inter University Accelerator Centre, New Delhi, Dr. P. Sugathan.
developed firmware for an Atmega32 based Multi Channel Analyzer developed at IUAC for radiation detectors.

Summer 2012 **Instrumentation and radiation detection**, IISER Mohali and IUAC,New Delhi, Dr. Anant Venkatesan.
Characterized crystal oscillators using a network analyser at Ultra low temperature lab, IISER Mohali. Developed electronics for driving a Geiger Muller tube, and also wired and set up a Photomultiplier tube at IUAC. Extracted Thorium from Thorium nitrate .

May-June 2013 **Techniques in condensed matter physics**, IISER Mohali, Dr. Goutam Sheet.
Pulsed laser deposition of YBCO, and SrRuo3 thin films. Sputter deposition of copper on insect wings for piezo response force microscopy.
Developed data acquisition software for superconductivity transition measurements using Lock-in amplifiers.
Compiled RTOS linux kernel a with low latency desktop for running PID loops for stabilizing tunnelling currents in STMs.

July 2013 **Remote access for particle accelerator control system**, *IUAC*, Dr. Ajith Kumar.
CherryPy based web server which hosts a completely dynamic, Jquery and AJAX based website to allow control and monitoring of various parts of the particle accelerator via the control system.

Academic Projects

Master's Thesis **Scanning Tunnelling Microscopy and Transport Spectroscopy at Low Temperatures**, *IISER Mohali*, Dr. Goutam Sheet.
Developed two major instruments for investigating the physical properties of solids down nano-metre length scales at low-temperatures and high magnetic fields.

Computational Physics **Simulation of mixing of ideal gases, and extracting thermodynamic data**, Prof. Jasjeet Bagla.

Non-linear dynamics **Developing interactive software for simulating and viewing 3-Dimensional phase portraits**, Prof. Sudeshna Sinha.

Advanced Instrumentation **Low temperature PID controller** , Dr. Ananth Venkatesan.
25 milliKelvin error tested from 77K to 100K.

Solid state physics **Simulation of Blonder ,Tinkham, Klapwikj theory plots**, Dr. Goutam Sheet.
Simulated ransport phenomena across a metal-superconductor interface by using Python-Numpy and PyGrace

Advanced optics lab **Tracking of sensitive torsion pendulum**, Dr. K.P. Singh.
monitor oscillation plots and video feed with Drupal CMS , Java script and Python-PSP.

Custom diffraction grating using an SLM, Dr. K.P. Singh.
Dismantled a slide projector in order to use the Spatial light modulator(SLM) as a PC controlled diffraction grating.

Other skills and interests

Languages English , Malayalam, Basic French, Hindi

Music Sangeet Bhushan final awarded by Pracheen kala kendra for vocal classical.
Flautist in the Raga symphony Orchestra - Performed at Auroville
Guitarist - Performed at Antaragni, and various cultural evenings at IISER

Sports Football, Volleyball, Badminton