





# EDGAR MENDONCA

Engineering & Sciences | R&D | Consultation & Analysis

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## WORK EXPERIENCE

### Freelance Consultant: Engineering, R&D, Developer

 2019 Aug - Present

Collaborated with cross-functional teams to design, develop, and refine research experiments. Conducted in-depth research, collected and analyzed data, and executed statistical evaluations. Produced detailed reports, theses, scientific articles, datasheets, and presentation scripts, showcasing proficiency in content creation and documentation.

### Research Assistant, Vemana I.T., Bengaluru


 2018 Aug - 2020 Aug

Demonstrates adept collaboration for intricate problem-solving, combining autonomy and teamwork. Consistently injects passion into projects, ensuring successful outcomes. Aligns work seamlessly with organizational values to achieve strategic goals. Exhibits strong organizational skills, efficiently prioritizing tasks. Boasts a distinguished record of success driven by enduring commitment and professional passion.

## EDUCATION


### Visvesvaraya Technological University

BE in Mechanical Engineering

 2014-2018

### The University of Manchester

MSc in Advanced Engineering Materials

 2020-2021

## SKILLS

CAE	HTML	Scientific Writing
FEA	CSS	Design Consultation
DoE	JavaScript	Statistical Analysis
MATLAB	Bootstrap	
Emb. C	Tailwind CSS	
	Python	

## SUMMARY

As a results-driven professional, I bring a unique blend of scientific research, engineering, and analytics expertise, backed by a Bachelor's degree in Mechanical Engineering and a Master's degree in Advanced Engineering Materials. Proficient in Python and MATLAB, I excel in data interpretation, statistical analysis, and Full Stack development, with mastery in HTML, CSS, JavaScript, and Bootstrap. Demonstrating leadership as a team leader, I manage diverse teams and deliver large-scale projects, contributing valuable research data for technological advancements. Committed to excellence, I optimize processes, streamline operations, and ensure client compliance through strategic consultation. Ready to deliver impactful solutions, drive risk management, and support critical decision-making in the dynamic realm of technology and society.

## LANGUAGES

English, Kannada, Hindi, Konkani. Enthusiastic Japanese and German learner.

# PUBLICATIONS

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## THESES

- E. V. Mendonca, R. Dharnish, K. Prashanth, and M. Shreyas, “Studies On Deformation Behaviour and Impact Energy Absorption Of Metal Tubes Under Axial Compression,” submitted to Visvesvaraya Technological University, from Vemana Institute of Technology, Bengaluru, 2018
- E. V. Mendonca, “Effect of prior deformation on slip activity in Nickel alloys,” submitted to The University of Manchester, 2021.

## ARTICLES

- E. V. Mendonca, M. Pasha, R. Dharnish, K. Prashanth, and M. Shreyas, “Strain-Hardening Effects during Plastic Buckling of Axially Compressed Aluminium Tubes,” in *International Journal of Engineering Research in Mechanical and Civil Engineering (IJERMCE)*, 2018, pp. 46–51, [Online]. Available: [https://www.technoarete.org/common\\_abstract/pdf/IJERMCE/v5/i6/Ext\\_98327.pdf](https://www.technoarete.org/common_abstract/pdf/IJERMCE/v5/i6/Ext_98327.pdf).
- E. V. Mendonca, P. B. Shahapur, and T. Y. Reddy, “Elementary Experimental Studies on Stress Wave Propagation in Bars,” in 4th National Conference on “Recent Trends in Mechanical Engineering,” 2019, pp. 127–132, [Online]. Available: <https://www.ijirae.com/volumes/Vol6/iss06/16.SI.JNAE10095.pdf>.
- M. Pasha, B. G. V. Reddy, E. V. Mendonca, and S. Mustaqhim, “Effects Of Strain-Hardening During Plastic Buckling for Axially Compressed Aluminium Tubes,” *Int. J. Mech. Eng. -Kalahari Journals*, vol. 7, pp. 1438–1449, 2022, DOI : <https://doi.org/10.56452/176>

## SOFTWARES

- E. Mendonca, “Python based SHPB Experimental data analysis” *GitHub*, 2024. <https://github.com/Edgar-Mendonca/SHPB-Analysis>.
- E. Mendonca, “Split Hopkinson Pressure Bar Analysis Tool” *GitHub*, 2022. <https://github.com/Edgar-Mendonca/Split-Hopkinson-Pressure-Bar-Analysis-Tool>.
- E. Mendonca, “Stress from Impact of an Elastic Sphere against a Solid Rod,” *GitHub*, 2021. <https://github.com/Edgar-Mendonca/Stress-from-Impact-of-an-Elastic-Sphere-against-a-Solid-Rod>.
- E. Mendonca, “Load deflection characteristics of lateral compression of tubes,” 2021. <https://github.com/Edgar-Mendonca/Load-deflection-characteristics-of-lateral-compression-of-tubes>.
- E. Mendonca, “Mohr’s circle -Graphical representation for 2D and 3D stress tensors,” *GitHub*, 2021. <https://github.com/Edgar-Mendonca/Mohr-s-circle---Graphical-representation-for-2D-and-3D-stress-tensors>.


## VIDEO TUTORIALS

- E. Mendonca, “Split Hopkinson Pressure Bar(SHPB) - Analysis tool and graphical interface,” *YouTube*, 2022. <https://youtu.be/OfWdUWLbv9A>.
- E. Mendonca, “Solution for Impact of a solid sphere on a rod -Hertzian contact theory,” *YouTube*, 2022. <https://youtu.be/wvcG5PlnDu0>.
- E. Mendonca, Playlist of “FEA Analysis – ABAQUS” tutorials. <https://youtube.com/playlist?list=PLod4499QuFwwVLCPQVaAj2OvXKnhIDsVI>

# PROJECTS

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## Bharatiya Nagarika Website - Full Stack Development and Maintenance

 Dec 2023 - Present

*Associated with Bharatiya Nagarika (<https://bharatiyanagarika.com/>)*

- Led full-stack development using HTML, CSS, JavaScript, Bootstrap, and PHP.
- Ensured robust backend functionalities for seamless user interactions and efficient form processing.
- Contributed to visual aesthetics through custom content creation.
- Crafted comprehensive legal documentation for privacy, cookies, and terms of service.
- Conducted SEO optimization and analytics implementation with tools like Google Analytics.
- Managed web indexing using Google Search Console for enhanced visibility and search engine performance.
- Maintained and improved website security, compliance with web standards, and online impact.
- Collaborated with stakeholders, delivering solutions that exceeded expectations and achieved a compelling online presence.

## Advanced Study on Aluminum Tube Deformation: Experimental Design, FEA Analysis, and Comparative Evaluation

 Mar 2022 - May 2023

- Spearheaded research on aluminum tube deformation and impact energy absorption.
- Developed and implemented experimental guidelines for both theoretical and practical aspects.
- Conducted an extensive literature review to inform the theoretical framework.
- Led the formulation of Finite Element Analysis (FEA) guidelines and executed FEA using Abaqus CAE.
- Established experimental characterization techniques for acquiring essential data.
- Standardized experimental procedures and conducted tests for data gathering.
- Applied FEA based on experimental results for analytical comparisons.
- Successfully completed comprehensive comparisons between experimental, theoretical, and analytical results, revealing insightful findings.

## Split Hopkinson Pressure Bar - Documentation

 Nov 2018 - Apr 2021, Documented & Modified: Nov 2023 – April 2024

*Associated with Vemana Institute of Technology, IISc and Titania Ensayos y Proyectos Industriales*

 [Project Guide, Documentation link](#)

- Led CAD design evaluations for the SHPB experimental setup, ensuring precision and functionality.
- Oversaw manufacturing, ensuring all components met experiment and design standards.
- Designed a sophisticated control system, including a striker launch system, meeting stringent experimental requirements.
- Orchestrated development of the electronics subsystem, implementing precise velocity measurement, gauge amplifiers, robust data acquisition, and a coordinated Power Supply Unit (PSU).
- Developed MATLAB software for post-processing, extracting valid stress-strain results, wave speed, and other dynamic material properties.
- Executed rigorous testing, ensuring the SHPB system's functionality and reliability under diverse experimental conditions.
- Contributed to material testing and impact dynamics in diverse applications, showcasing the system's versatility and effectiveness.

# OTHER ASSOCIATED PROJECTS

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## Multi-Channel Dynamic Strain Gauge Amplifier for SHPB

⇒ [Project link](#)

- Designed high-performance circuit for Multi-Channel Dynamic Strain Gauge Amplifier.
- Executed full PCB development, from schematic design to layout.
- Integrated amplifier with voltage input for gauge interfaces, and BNC output.
- Optimized gain control for accurate signal amplification.
- Developed a robust enclosure for protection in dynamic testing environments and EM interface.
- Ensured seamless connectivity with Digital Storage Oscilloscope (DSO) to record the output signals.
- Conducted comprehensive testing to validate performance under varied strain/dynamic testing conditions.

## Velocity Measurement System for SHPB

⇒ [Project link](#)



[GitHub link](#)

- Designed and developed a Velocity Measurement System for SHPB (Split Hopkinson Pressure Bar) to accurately measure striker velocity in a gas gun setup.
- Engineered the circuit, selecting appropriate infrared barriers for precise time delay measurement between two sensors.
- Implemented a 16x2 LCD display to showcase real-time data, including time difference (in microseconds) and corresponding velocity (in meters per second).
- Executed the entire hardware development process, including PCB design, to ensure seamless integration with the SHPB gas gun system.
- Integrated the system with an Arduino Uno for signal processing, capturing data from the sensors, and providing accurate velocity readings.

## Graphical Interface and Analysis Tool for SHPB Experiment data



[GitHub link](#) (Old)



[GitHub link](#) (New)

- Developed a Graphical Interface and Analysis Tool using MATLAB and MATLAB's App Designer for the Split Hopkinson Pressure Bar (SHPB) experiments.
- Implemented the complete coding and architectural design of the application to facilitate data interpretation from high-velocity impact tests.
- Utilized MATLAB's App Designer for creating an intuitive and user-friendly interface for efficient analysis.
- Integrated features for processing and analyzing signals obtained during experiments conducted on the SHPB setup.
- The new SHPB analysis tool is written in Python and its associated libraries like matplotlib, NumPy, pandas and SciPy. This tool is simple versatile and faster the previous version.

# ACCOMPLISHMENTS

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- Spearheaded research activities, showcasing exceptional independent leadership and contributing significantly to advancements in scientific research, engineering, and analytics.
- Led comprehensive data analysis projects for clients, delivering actionable insights and data-driven recommendations that played a pivotal role in decision-making processes.
- Pioneered the fabrication of a groundbreaking experimental apparatus, the Split Hopkinson Pressure Bar (SHPB). Conducted extensive material research, prioritized safety parameters, and innovated bespoke electronic devices and data analysis software with an interactive dashboard for seamless information extraction and processing.
- Executed the development of “Bharatiya Nagarika” website for a client, showcasing Full Stack expertise in HTML, CSS, JavaScript, Bootstrap, and PHP. Delivered a dynamic and client-focused online solution for an enhanced web presence.
- Demonstrated proactive leadership by conceptualizing and producing tailored MATLAB, JavaScript, and Python scripts, effectively optimizing data processing workflows. Innovatively integrated interactive HTML and CSS elements to create seamless and engaging user experiences, resulting in heightened efficiency and metric.