Strategic Digital Infrastructure and Content Ecosystem for Materials Scientist Dr. Vishal Kotha

Executive Summary

The digital representation of scientific expertise has shifted fundamentally in the last decade. It has moved from static, curriculum vitae-based web pages to dynamic, interconnected knowledge ecosystems that actively demonstrate technical competency, research impact, and professional adaptability. For a researcher of Dr. Vishal Kotha's caliber—possessing a Ph.D. in Chemistry from IIT Bombay, postdoctoral experience at the Weizmann Institute of Science, and a unique sabbatical focused on societal contribution—the personal website must serve as more than a portfolio. It must function as a centralized hub of professional identity, automating the dissemination of his research while simultaneously framing his diverse experiences into a coherent narrative of innovation and resilience.

This report provides an exhaustive, actionable roadmap for architecting, deploying, and maintaining a high-performance personal research website. It moves beyond generic web design advice to propose a "Docs-as-Code" strategy tailored specifically to Dr. Kotha's proficiency in Python, computational chemistry, and data analysis.[1] By leveraging Static Site Generators (SSGs), GitHub-based version control, and custom Python automation scripts, the proposed infrastructure minimizes administrative overhead while maximizing the visibility of his 11+ peer-reviewed publications and ongoing projects.[1] The analysis explores the integration of his specific technical skills—such as transition metal perovskite synthesis and chiral electrocatalysis—into the site's architecture, ensuring that the platform itself serves as a testament to his technical rigor.

1. Strategic Positioning and Persona Architecture

The foundational step in constructing a high-impact digital presence is the rigorous definition of the researcher's persona. Unlike standard academic sites which often present a dry list of citations, Dr. Kotha's website must synthesize deep technical specialization with his broader humanistic and leadership experiences.

1.1 The "Holistic Innovator" Narrative

Dr. Kotha's career trajectory presents a unique "T-shaped" profile that is highly attractive to both top-tier academic institutions and industrial R&D leaders in the energy sector. However, this profile carries a narrative challenge that the website must solve: reconciling the "hard science" of nanofabrication with the "soft skills" of his recent sabbatical.

The research material indicates a significant pivot in 2024 with a "Sabbatical for Societal Contribution" at the Isha Foundation.[1] In a traditional CV, this might be viewed as a gap. On a strategically designed website, this must be reframed as a "Leadership & Resilience" module. The narrative should position this experience not as a departure from science, but as an enhancement of his capabilities as a Principal Investigator (PI) or R&D Manager. The content strategy must explicitly link the "mental clarity, resilience, and teamwork" honed during the sabbatical [1] to the high-pressure demands of managing complex laboratory operations and multidisciplinary teams.

The website's "About" narrative should articulate a philosophy of "Conscious Science"—the idea that the precision required to synthesize $LaMnO_3$ perovskites or manipulate chiral spin selectivity [1] is mirrored by the internal precision of the researcher. This narrative differentiator sets Dr. Kotha apart from peers who offer only technical metrics.

1.2 Target Audience Analysis and Information Needs

To ensure the website delivers value, we must dissect the specific needs of the three primary audience segments identified from the CV's context.

Audience Segment	**Primary Motivation**	**Key Information Requirements**	**Content Strategy Implications**
Academic Search Committees	Assessing tenure-track potential and funding viability.	Publication impact factors, teaching philosophy, future research proposals (e.g., the "In Preparation" papers on Double Perovskites [1]).	Dedicate a section to "Future Research Directions" that outlines the roadmap for the next 3-5 years, proving vision beyond the postdoc.
Industrial Recruiters (Energy/Semicon)	Finding scalable solutions for battery/green fuel tech.	Scalability of synthesis methods (hydrothermal/mechanochemical), device fabrication skills (MOSFETs), and equipment proficiency (TEM/SEM).[1]	specific "Technical Skills Matrix" that translates academic techniques into industrial competencies (e.g., "Failure

Audience Segment	Primary Motivation	Key Information Requirements	Content Strategy Implications
			Analysis" instead of just "Microscopy").
Collaborators & Peers	Identifying complementar y skills for joint grants.	Access to raw data, specific instrument capabilities (e.g., FEG-TEM expertise), and open-source code/scripts.	Create a "Resources" section hosting Python scripts for data analysis or FullProf refinement control files, establishing Dr. Kotha as a community contributor.

1.3 Visual Identity and Brand Signifiers

The visual language of the website must reflect the materiality of Dr. Kotha's research. The current Wix site [1] likely relies on generic templates. The new site should derive its aesthetic from the science itself.

- **Color Palette:** The palette should be informed by the materials synthesized. The deep, rich blues and blacks of transition metal oxides (Perovskites) can serve as the primary brand colors, signifying stability and depth. Accents of Gold (Au) and Nickel (Ni) colors can be used to highlight calls-to-action (CTAs) and hyperlinks, subtly referencing his work on "Chiral Ni-Au Electrocatalysts".[1]
- **Imagery:** The CV mentions extensive experience with High-Resolution Transmission Electron Microscopy (HR-TEM) and Field Emission Scanning Electron Microscopy (FESEM).[1] These images are often visually striking. They should be used not just as data, but as art—hero backgrounds and section dividers that instantly communicate "Nanotechnology" without a single word of text.
- **Typography:** A pairing of a monospaced font (like *Roboto Mono* or *Fira Code*) for headers and data tables reflects the computational aspect (Python, VASP), while a high-legibility serif (like *Merriweather* or *Lora*) for body text ensures that long-form research summaries are readable, echoing the experience of reading a high-impact journal article.

2. Comprehensive Content Ecosystem

The core of the website is its content. However, simply uploading the PDF CV [1] is insufficient. The content must be atomized—broken down into discrete, interlinked pieces of data that can be indexed by search engines and explored non-linearly by users.

2.1 The "Living" Research Portfolio

The "Key Projects" section of the CV [1] provides the seed for the website's most critical section: The Research Portfolio. Each project listed in the CV should be expanded into a full "Case Study" page. This approach demonstrates the *process* of science, not just the *result*, which is crucial for demonstrating problem-solving skills to industry recruiters.

Project 1: Chiral Ni-Au Electrocatalysts (Green Fuels)

- **Context:** Developed at Weizmann Institute.
- **The Narrative Hook:** Focus on the "10% efficiency improvement" in the Hydrogen Evolution Reaction (HER).[1] This is a metric that business-minded visitors will understand immediately.
- **Visual Strategy:** Use a split-screen layout. On one side, a 3D molecular render of the chiral structure (which can be generated using the `ChemDraw` or `VASP` tools Dr. Kotha uses [1]). On the other side, the polarization curves (LSV data) showing the performance boost.
- **Technical Deep Dive:** Include a collapsible section detailing the "Spin Selectivity" mechanism. This allows experts to verify the science while keeping the main page accessible to generalists.

Project 2: Magneto-electric Catalysis (La_2FeMnO_6)

- **Context:** Postdoc work at IIT Bombay.
- **The Narrative Hook:** "Multiferroic Catalysts for Energy Conversion." This highlights interdisciplinary expertise—combining magnetism with electrochemistry.
- **Integration:** Link this project to the "Hydrothermal Synthesis" skill page. Explain how the "Low-Temperature" route mentioned in his thesis [1] was critical for stabilizing this specific phase.

Project 3: Zinc-Air Batteries ($K-LaMnO_3$)

- **Context:** Ph.D. Research.
- **The Narrative Hook:** "Cost-effective alternatives to precious metals." This is a strong value proposition for the energy storage industry.
- **Data Visualization:** An interactive chart (using a Python-generated Plotly graph) comparing the cycle stability of his K-substituted material versus commercial Pt/C catalysts. The CV mentions "exceptionally stable" performance [1]; the website must *show* this stability through interactive data.

Project 4: MOSFET Fabrication (Nanodevices)

- **Context:** Ph.D. Research.

- **The Narrative Hook:** "From Powder to Device." This project proves that Dr. Kotha is not just a chemist who makes powders, but a materials engineer who can integrate them into functioning electronic devices.
- **Key Asset:** SEM images of the 1D nanorod interconnects.[1] This serves as proof of his lithography skills.

2.2 The Publication Repository: Beyond the List

Dr. Kotha has 11 published papers and several in preparation.[1] A simple list is hard to parse. The website should organize these publications dynamically.

- **Taxonomy & Filtering:** Users should be able to filter papers by:
  - *Application:* Energy Storage, Green Hydrogen, Electronics.
  - *Material Class:* Perovskites, Chiral Metals, 2D Materials.
  - *Role:* First Author, Co-Author.
- **The "In Preparation" Strategy:** The CV lists four papers under preparation, including high-potential titles like "Chiral-induced spin selectivity in electrochemical synthesis".[1] These should be listed on the site with a "Notify Me" or "Request Abstract" button. This turns the website into a lead-generation tool for potential collaborators who are working on similar topics.
- **Altmetrics Integration:** For each paper, integrate the "Altmetric Donut" API. This visualizes the online attention the paper has received (tweets, news mentions, policy documents). It adds social proof to the academic metrics.

2.3 The "Skills Matrix" and Instrumentation Hub

The CV lists extensive technical skills, from "Electron Beam Lithography" to "Rietveld Refinement".[1] These are keywords that search engines and recruiters scan for.

- **Structure:** Instead of a bulleted list, create a "Capabilities" page.
- **Instrumentation Subsection:** Detail the specific models of microscopes or diffractometers used (e.g., "FEG-TEM"). Include a brief statement on his proficiency level—e.g., "500+ hours of operation and peer training".[1] This quantifies his expertise.
- **Software Subsection:** Highlight Python, FullProf, VASP, and Gaussian.[1] For Python, link to a GitHub repository containing sample scripts (e.g., "Automated X-ray Diffraction Data Plotting"). This provides tangible proof of coding ability, which is increasingly rare and valuable in experimental materials science.

3. Technical Architecture: The "Docs-as-Code" Approach

To satisfy the user's requirement for "best tools" and "automation opportunities," we must move away from drag-and-drop builders like Wix. These platforms are "black boxes" that restrict data access and automation. Instead, we propose a **Static Site Generator (SSG)** architecture. This approach treats the website as a software project, perfectly aligning with Dr. Kotha’s technical background.

3.1 The Recommended Stack: Hugo + GitHub Pages

Component	Recommendation	Rationale based on User Profile
Core Engine	**Hugo** (Extended Version)	Hugo is the fastest SSG available. It is built in Go but requires no Go knowledge. It compiles thousands of pages in milliseconds. Crucially, the **Wowchemy (Hugo Academic)** module is the industry standard for researchers, offering pre-built widgets for math ($LaTeX$), code, and citations.
Version Control	**GitHub**	Dr. Kotha likely uses version control for his Python/VASP scripts. Hosting the site source code on GitHub allows for robust backup, history tracking (reverting changes), and collaboration.
Hosting	**GitHub Pages**	It is free, fast, and integrates natively with the repository. It supports custom domains and provides free SSL (HTTPS) certificates, which is essential for security and SEO.
Content Management	**Markdown + YAML**	Content is written in Markdown, a lightweight markup language that supports LaTeX equations natively (e.g., writing `$La_{0.9}K_{0.1}MnO_3$` renders perfectly). This fits the workflow of a scientist accustomed to writing papers.
Editor	**VS Code**	A powerful, free code editor with extensions for Markdown preview and Git management.

3.2 Directory Structure and Logic

A Hugo site for Dr. Kotha would be structured to separate *content* from *logic*, enabling automation.

vishal-kotha-research/

├── content/

│ ├── home/ # Homepage widgets (Bio, Hero, Skills)

│ ├── publication/ # Individual folders for each paper

```
│ │ ├── kotha-2022-acs/
│ │ │ ├── index.md # Metadata (Title, Date, Abstract)
│ │ │ └── cite.bib # BibTeX file for the paper
│ │ └──...
│ ├── project/ # Case studies (Green Fuels, Batteries)
│ │ ├── chiral-her/
│ │ │ ├── index.md
│ │ │ └── featured.jpg # Hero image (Molecular render)
│ └── post/ # Blog/News posts
├── static/
│ ├── img/ # Raw assets (CV.pdf, TEM images)
│ └── files/ # Downloadable datasets
├── themes/
│ └── starter-hugo-academic/ # The design engine
├── config.yaml # Site-wide settings (Title, SEO, Menu)
└── scripts/ # CUSTOM PYTHON AUTOMATION SCRIPTS
├── fetch_citations.py
└── update_news.py
```

This structure is key. Because each publication is a folder, a script can easily create, update, or delete folders based on external data sources (like Google Scholar), satisfying the automation requirement.

4. Automation and Scalability Ecosystem

The user explicitly requested identifying opportunities to "automate website maintenance and content updates." This is where the Python proficiency mentioned in the CV [1] becomes a superpower. We can deploy a set of "Bot Scripts" that run on GitHub Actions.

4.1 Automated Publication Pipeline

The Problem: Manually updating the website every time a paper is published or a citation count changes is tedious and error-prone.

The Solution: A Python script utilizing the scholarly library.

Implementation Logic:

1. **Trigger:** A GitHub Action (cron job) runs every Sunday at midnight.
2. **Fetch:** The script `scripts/fetch_pubs.py` queries Google Scholar using Dr. Kotha's ID.
3. **Compare:** It checks the fetched list against the existing folders in `content/publication/`.
4. **Update:**
   - If a new paper is found, it creates a new folder.
   - It generates an `index.md` file, populating the Title, Authors, Abstract, and Journal Name automatically.
   - It downloads the BibTeX citation and saves it as `cite.bib`.
5. **Commit:** The script uses the GitHub API to commit these changes to the repository.
6. **Deploy:** GitHub Pages detects the commit and rebuilds the site.

Pseudo-Code for `fetch_pubs.py`:

Python

```
from scholarly import scholarly
import os

# Dr. Kotha's ID would be configured here
author = scholarly.search_author_id('YOUR_SCHOLAR_ID')
scholarly.fill(author, sections=['publications'])

for pub in author['publications']:
    title = pub['bib']['title']
    # Check if publication already exists in the content folder
    if not os.path.exists(f"content/publication/{slugify(title)}"):
        # Fetch detailed info
        scholarly.fill(pub)
        # Generate Markdown content
        markdown_content = f"""---
title: "{title}"
date: {pub['bib']['pub_year']}-01-01
publishDate: {pub['bib']['pub_year']}-01-01
authors: ["Vishal Kotha",...]
publication: "{pub['bib']['journal']}"
abstract: "{pub['bib']['abstract']}"
---"""
        # Save to file
        save_markdown(title, markdown_content)
```

Implication: Dr. Kotha effectively never has to manually add a paper again. The website grows as his career grows.

4.2 Automated News Aggregation

The Problem: Maintaining a "News" section is time-consuming.

The Solution: An RSS-to-Markdown bridge.

Implementation:

1. **Source:** Identify RSS feeds from key journals where he publishes (*J. Mater. Chem. A*, *ACS Appl. Energy Mater.*).[1]
2. **Filter:** Use a Python script with `feedparser` to scan these feeds.
3. **Logic:** If "Vishal Kotha" appears in the author list or title, OR if keywords like "Perovskite" AND "Hydrothermal" appear (for general industry news), generate a draft post.
4. **Review:** Unlike the publication script, these might be set to create a "Pull Request" rather than publishing immediately, allowing Dr. Kotha to add a quick personalized comment (e.g., "Exciting new work from our group at IIT Bombay...") before merging.

4.3 Image Optimization Pipeline

Scientific images (TIFFs from TEMs) are huge.

The Solution: A GitHub Action utilizing ImageMagick.

- Any image dropped into the `static/img/raw` folder is automatically processed.
- The script resizes it to 1920px width (for web), converts it to WebP (for speed), and moves it to `static/img/processed`.
- This ensures the site scores 100/100 on Google PageSpeed Insights, crucial for SEO.

5. Visual Design and User Experience (UX) for Science

The design must bridge the gap between "Academic Rigor" and "Modern Accessibility."

5.1 Typography and Readability

Scientific text is dense. UX choices must mitigate cognitive load.

- **Line Length:** Restrict content width to 65-75 characters per line. This is the optimal length for reading complex text.
- **Math Rendering:** The site **must** enable MathJax or KaTeX. This allows inline rendering of chemical formulas. For instance, writing `$\ce{La_{1-x}K_xMnO3}$` in the Markdown file should render as a proper chemical formula on the screen. The recommended Hugo Academic theme supports this out of the box.

5.2 Visualization Strategy

- **The "Microscopy Gallery":** Create a dedicated gallery for the best TEM/SEM images. Implement a "Loupe" feature (magnifying glass on hover) to allow peers to inspect grain boundaries. This serves as a subtle flex of his characterization skills.[1]
- **Interactive Plots:** Instead of static PNG graphs, use **Plotly JSON**. Dr. Kotha can export his Python data analysis as a JSON file. The website then renders this as an interactive chart where users can zoom, pan, and hover over data points. This is a massive differentiator from standard PDF CVs.

6. Search Engine Optimization (SEO) & Discovery

For a scientist, SEO isn't about volume; it's about *authority*.

6.1 Academic Schema (JSON-LD)

We must inject structured data that tells Google "This is a Scientist."

In the site config, we define the Person schema:

JSON

```
{
  "@context": "https://schema.org",
  "@type": "Person",
  "name": "Vishal Kotha",
  "jobTitle": "Materials Scientist",
  "alumniOf": "Indian Institute of Technology Bombay",
  "knowsAbout": ["Nanofabrication", "Perovskites", "Electrocatalysis"],
  "sameAs": [
    "https://scholar.google.com/citations?user=...",
    "https://www.linkedin.com/in/vishal-kotha"
  ]
}
```

This increases the chance of a "Knowledge Graph" panel appearing on the right side of Google search results.

6.2 Keyword Strategy

The content must be optimized for the specific keywords found in the CV [1]:

- *Primary:* "Transition Metal Perovskites," "Chiral Induced Spin Selectivity," "Hydrothermal Synthesis."
- *Secondary (Industry):* "Battery Materials R&D," "Semiconductor Device Fabrication," "Green Hydrogen Catalysis."

6.3 Identifier Integration

- **ORCID:** The site must link bi-directionally with his ORCID profile.

- **DOI Linking:** Every publication listed on the site must utilize the `doi.org` permalink. This ensures that citation trackers (like CrossRef) pick up the traffic flow from his personal site to the journal, boosting the paper's "Altmetric" score.

7. Future Horizons: Scalability and Lifecycle Management

The website is not a static object; it creates a platform for future career pivots.

7.1 Scenario A: Tenure-Track Application

If Dr. Kotha pursues a faculty position, the site structure pivots easily.

- **Action:** Enable the "Courses" widget in Hugo.
- **Content:** Upload a "Teaching Statement" and "Diversity Statement."
- **Focus:** Highlight the "Mentorship" experience (mentoring 4 students at IITB) [1] prominently on the homepage.

7.2 Scenario B: Industrial Leadership

If moving to a senior R&D role in the corporate sector.

- **Action:** Reorder the homepage widgets. Move "Skills" and "Impact" to the top; move "Publications" to the bottom.
- **Content:** Rewrite project descriptions to emphasize *Cost*, *Scalability*, and *Efficiency* (e.g., "Cost-effective perovskites for zinc-air batteries" [1]) rather than theoretical novelty.

7.3 Maintenance Plan

- **Weekly:** Automated scripts check for citations and news.
- **Quarterly:** Dr. Kotha reviews the "In Preparation" section. If a paper is published, the status is updated.
- **Yearly:** Update the "Bio" to reflect new roles or major life changes (like the sabbatical completion).

8. Conclusion

By adopting this "Docs-as-Code" strategy, Dr. Vishal Kotha transforms his personal website from a passive digital brochure into an active, automated agent of his career. This infrastructure leverages his existing strengths in Python and data structure, turning the maintenance of the site from a chore into a simplified automated process. The resulting platform will be fast, secure, and deeply informative, perfectly mirroring the precision and innovation inherent in his materials science research. It frames his unique journey—from the atomic precision of perovskite lattices to the human resilience of his sabbatical—as a cohesive narrative of a modern, holistic scientific leader.

Detailed Technical Appendix: Implementation Manual

This appendix serves as the "User Manual" for Dr. Kotha to execute the strategy defined above. It assumes proficiency with the command line and basic Python, consistent with the user's profile.[1]

A.1 Setting Up the Development Environment

Step 1: Install Dependencies

Dr. Kotha uses Python, so he likely has a package manager.

- **Hugo:** The core engine.
  - *Windows (Chocolatey):* `choco install hugo-extended`
  - *Mac (Homebrew):* `brew install hugo`
  - *Note:* The "Extended" version is required to process SCSS/SASS for advanced styling.
- **Git:** Essential for version control.
  - `git config --global user.name "Vishal Kotha"`
  - `git config --global user.email "vishalkotha@gmail.com"` [1]
- **Go:** While not strictly necessary to write content, having the Go language installed helps with troubleshooting Hugo modules.

Step 2: Initialize the Repository

1. Create a new repository on GitHub named `vishalkotha.github.io`. This specific naming convention tells GitHub to serve this repo as a website automatically.
2. Clone it locally:

   git clone https://github.com/vishalkotha/vishalkotha.github.io.git

3. Initialize the Hugo site:

   hugo new site. --force

Step 3: Install the "Academic" Theme (Wowchemy)

This is the most critical selection. The Wowchemy ecosystem is massive.

1. Initialize Go modules (modern way to manage Hugo themes):

hugo mod init github.com/vishalkotha/vishalkotha.github.io

2. Add the theme to `config.toml`:

   Ini, TOML
   ```
   [module]
     [[module.imports]]
       path = "github.com/wowchemy/wowchemy-hugo-modules/wowchemy"
   ```

3. Run `hugo mod get` to download the theme files.

A.2 Configuring the "Brain" of the Site (`config.yaml`)

The `config` file controls the automation and identity. Here are the specific settings Dr. Kotha needs.

YAML
```
# Site Identity
title: "Vishal Kotha | Materials Scientist"
baseurl: "https://vishalkotha.com"
copyright: "© 2025 Vishal Kotha"

# User Profile (Populates the 'About' Widget)
params:
  name: "Dr. Vishal Kotha"
  role: "Materials Scientist & Electrochemist"
  organization:
    name: "IIT Bombay Alumni / Independent Researcher"
    url: "https://www.iitb.ac.in"
  avatar: "avatar.jpg" # High-res headshot

  # Contact Details (From CV )
  email: "vishalkothal@gmail.com"
  phone: "+91-9488659155"
  address:
    city: "Mumbai"
    country: "India"

  # Social Links
  social:
    - icon: envelope
      icon_pack: fas
      link: "mailto:vishalkothal@gmail.com"
    - icon: linkedin
      icon_pack: fab
      link: "https://linkedin.com/in/vishal-kotha"
    - icon: google-scholar
      icon_pack: ai
      link: "https://scholar.google.com/citations?user=..." # Fill in ID
from CV
    - icon: github
      icon_pack: fab
```

```
      link: "https://github.com/vishalkotha" # Assuming he creates one

# Scientific Features
math: true       # Enables LaTeX rendering for chemical formulas
highlight: true  # Enables syntax highlighting for Python code blocks
diagram: true    # Enables Mermaid.js for flowcharts
```

A.3 Content Migration Strategy (CV to Markdown)

This section details how to convert the specific items in the CV [1] into the Hugo file structure.

A.3.1 The "Experience" Widget

Located in `content/home/experience.md`. This file drives the timeline on the homepage.

Experience widget

widget: experience

headless: true

weight: 40

title: Experience

subtitle:

Date format

date_format: Jan 2006

Experiences

experience:

- title: Sabbatical for Societal Contribution

  company: Isha Foundation

  company_url: "

  location: Coimbatore, India

date_start: '2024-01-01'

date_end: '2025-01-01'

description: |

- Engaged in a 7-month residential program focusing on mental clarity and resilience.
- Honed project management skills for dynamic R&D environments.
- Developed adaptability in collaborative settings for multidisciplinary projects.

- title: Postdoctoral Fellow

  company: Weizmann Institute of Science

  company_url: 'https://www.weizmann.ac.il'

  location: Rehovot, Israel

  date_start: '2023-01-01'

  date_end: '2024-01-01'

  description: |

  - **Pioneered chirality induction** in Ni-Au systems for Hydrogen Evolution Reaction (HER).
  - Achieved a **10% efficiency improvement** for green fuel applications.
  - Characterized systems using HR-TEM and XPS.

Note: Notice how we use Markdown bolding ** to highlight the key metrics (10% efficiency) derived from the CV.

A.3.2 The "Projects" Content

Located in content/project/.

For the MOSFET Fabrication project 1, create content/project/mosfet-nanorods/index.md:

---

title: MOSFET Fabrication using 1D Nanorods

summary: Fabricated MOSFET devices using 1D nanorod interconnects, exploring energy-efficient electronics.

tags:

- Nanofabrication
- Electronics
- Lithography

date: "2021-01-01"

Optional external link for project (replaces project detail page).

external_link: ""

image: caption: "SEM image of 1D Nanorod Interconnects" focal_point: Smart

Overview

This project focused on the integration of chemically synthesized 1D nanorods into functional electronic devices.

Methodology

1. **Synthesis:** Hydrothermal growth of high-aspect-ratio nanorods.
2. **Lithography:** Used Electron Beam Lithography (EBL) to define contact pads.
3. **Deposition:** ALD (Atomic Layer Deposition) was used for gate dielectrics.

Key Outcomes

- Successfully fabricated functional MOSFETs.
- Demonstrated viability of bottom-up synthesized materials in top-down device flows.

A.4 Advanced Automation Scripts (Python)

Dr. Kotha should create a `scripts/` folder in the repo to house these tools.

Script 1: `generate_skills_cloud.py`

This script ensures the "Skills" section is always synchronized with the projects. It parses the tags from all project files and updates the skills widget.

Python
```
import os
import re
from collections import Counter

def get_tags():
    tags =
    # Walk through project directory
    for root, dirs, files in os.walk("content/project"):
        for file in files:
            if file.endswith(".md"):
                with open(os.path.join(root, file), 'r') as f:
                    content = f.read()
                    # Regex to find tags list
                    found_tags = re.findall(r'- (.*)', content)
                    # Filter to ensure we are capturing tags section only
                    # (This logic would need refinement in production)
                    tags.extend(found_tags)
    return Counter(tags)

# Logic to update content/home/skills.md would follow...
```

Script 2: `fetch_google_scholar_metrics.py`

This script fetches the total citation count and h-index to display on the landing page.

Python
```
from scholarly import scholarly
import json

def fetch_metrics():
    # Replace with actual ID from CV
    # scholar.google.com/citations?user=...
    author_id = 'YOUR_ID_HERE'
    author = scholarly.search_author_id(author_id)

    data = {
        "citations": author.get("citedby", 0),
        "hindex": author.get("hindex", 0),
        "i10index": author.get("i10index", 0)
    }

    # Write to a data file that Hugo can read
    with open('data/scholar_metrics.json', 'w') as f:
        json.dump(data, f)

if __name__ == "__main__":
    fetch_metrics()
```

Hugo Integration: In the Hugo template HTML, we can now use `{{.Site.Data.scholar_metrics.citations }}` to dynamically display the number "350+" (or whatever the current count is) in the hero banner.

A.5 Deployment and Domain Management

Step 1: GitHub Pages Activation

1. Go to the GitHub Repository Settings.
2. Click "Pages" in the sidebar.
3. Source: Select `Deploy from a branch`.
4. Branch: `main` (or `gh-pages` if using a build action).

Step 2: Custom Domain (Crucial for Professionalism)

1. Purchase `vishalkotha.com` (Google Domains or Namecheap).
2. In the Domain Registrar's DNS settings, add CNAME records pointing `www` to `vishalkotha.github.io`.
3. In GitHub Repository Settings > Pages > Custom Domain, enter `vishalkotha.com`.
4. Check "Enforce HTTPS".

A.6 Future-Proofing for Academia vs. Industry

The flexibility of this system allows Dr. Kotha to maintain two "views" of his profile if necessary.

The "Toggle" Strategy:

In config.toml, he can define menus.

Ini, TOML
```
[[menu.main]]
  name = "Publications"
  url = "#publications"
  weight = 20
```

If he enters an aggressive job hunt for an Industry role where publications matter less, he can simply comment out this menu item. The pages still exist (for those who search deep), but the navigation directs users to "Skills" and "Projects" first.

This level of control is impossible with standard website builders and represents the true value of the "Docs-as-Code" philosophy for a dynamic scientific career.