**Research Proposal Template**

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# Abstract

The abstract is a summary of the research proposal. Abstracts are usually brief, around 150-250 words, and are designed to give readers a snapshot of the full document, helping them decide whether to read the entire work. Typically, an abstract includes:

* **Research Problem:** What issue or question does the study address?
* **Purpose:** The main objective or goal of research.
* **Methods:** The approach or procedures used to conduct research.
* **Results:** The key findings or outcomes of the study.
* **Conclusion:** The implications or significance of the results.

***Example****:*

“This paper aims to develop a fingerprint identification system using minutiae-based matching techniques. The study will employ image processing methods to extract and match minutiae points from fingerprint images. The expected outcome is an efficient and accurate system for personal identification, which could enhance security in various applications.”

This example sets up the goal (developing a fingerprint identification system), the methodology (minutiae-based matching techniques), and the application (personal identification).

# 1. Background

The background section provides readers with context about the research area and justifies why the topic matters. It sets the stage for the research by explaining the broader context and the specific issues being addressed.

**How to Write:**

* **Start with General Information:** Begin by introducing the broader topic to give readers a general understanding. This helps to set the context and frame the research within a larger field of study.
* **Narrow Down to Specific Issues:** Gradually focus on the specific issues or problems that your research will address. This helps to highlight the gaps in existing knowledge and the need for your study.
* **Mention Real-World Relevance:** Explain the practical implications or real-world relevance of the research. This demonstrates the importance and potential impact of your study on the field or society.

***Example:***

“Fingerprint is the most widely used biometric trait for personal identification. This research aims to improve the accuracy and efficiency of fingerprint identification systems. By addressing current limitations in minutiae extraction and matching, the study seeks to enhance security measures in various applications, such as government ID systems and banking.”

This example establishes the real-world application and importance of the topic, highlighting the broader context and specific issues being addressed.

# 2. Literature Review

The literature review demonstrates that you have thoroughly studied existing research and understand where your work fits within the broader academic landscape. It shows that you are aware of what has already been done and highlights the significance of your research.

**How to Write:**

* **Summarize Key Existing Studies:** Provide an overview of the most relevant and significant studies related to your research topic. This helps to establish a foundation of existing knowledge.
* **Highlight Gaps or Limitations:** Identify any gaps, inconsistencies, or limitations in the current research. This helps to justify the need for your study and shows where there is room for further investigation.
* **Identify How Your Research Builds on or Differs from Past Work:** Explain how your research will address the identified gaps or limitations. Highlight how your study builds on previous work or takes a different approach to contribute new insights to the field.

***Example:***

“Jain et al. proposed a system based on minutiae matching but faced issues with low-quality fingerprints. This study aims to improve the robustness of fingerprint identification systems by developing advanced image processing techniques that can handle low-quality inputs more effectively.”

This example helps highlight the improvements or differences your study offers, showing how it builds on or diverges from past work.

# 3. Research Questions (If any)

Research questions clearly state what you intend to find out through your study. They guide the research process and help to focus your investigation on specific, measurable aspects of the topic.

**How to Write:**

* **List 2–4 Specific, Researchable Questions:** Formulate questions that are specific and can be investigated through your research methods. Ensure they are clear and focused.
* **Align with Your Objectives:** Make sure your research questions align with the overall objectives of your study. They should directly relate to what you aim to achieve or discover.

***Example:***

* How can minutiae points be effectively extracted and matched?
* What accuracy can be achieved using the proposed system?

# 4. Aim and Objectives

The aim and objectives define what the study intends to achieve. The aim provides a broad goal, while the objectives outline specific steps to reach that goal.

**How to Write:**

**The Aim is a Broad Goal:** The aim should be a general statement that captures the overall purpose of the study. It is broad and overarching.

**Objectives are Specific Steps to reach the Aim:** Objectives break down the aim into smaller, actionable steps. They are specific, measurable, and directly related to achieving the aim.

***Example:***

* Aim: To develop an efficient fingerprint identification system.
* Objectives:
  + To extract minutiae from fingerprint images.
  + To match fingerprint data using ridge ending and bifurcation.

# 5. Significance of the Study

The significance of the study explains the value or impact of your research. It highlights why your study is important and who will benefit from it.

**How to Write:**

* Why is Your Study Important? Discuss the importance of your research in addressing a specific problem or advancing knowledge in your field. Explain how your study fills a gap or contributes new insights.
* Who Benefits from It? Identify the groups or sectors that will benefit from your research findings. This could include academic communities, industry professionals, policymakers, or the general public.

***Example:***

“The system could enhance security in government ID systems and banking, providing a more reliable method for identity verification. This shows the societal and practical contribution of the study, potentially reducing fraud and increasing trust in digital transactions.”

# 6. Scope of the Study

The scope of the study defines the boundaries of your work. It clarifies what the study will cover and what it will intentionally leave out, helping to set clear expectations for readers.

**How to Write:**

* What Will the Study Cover? Describe the specific aspects, variables, or areas that your research will focus on. This helps to outline the extent and limits of your study.
* What is Intentionally Left Out? Mention any related topics, variables, or areas that your study will not address. This helps to avoid confusion and ensures that readers understand the limitations of your research.

***Example:***

“The system is designed for personal identification only, not forensics. This helps avoid confusion about expectations by clearly stating that the study focuses on personal identification applications and does not extend to forensic analysis.”

# 7. Research Methodology

The research methodology section explains how the research will be carried out. It provides a detailed plan of the methods, tools, techniques, and processes used to conduct the study.

**How to Write:**

* **Describe Your Method (Qualitative/Quantitative/Mixed):** Specify whether your research approach is qualitative, quantitative, or a mix of both. Explain why this method is suitable for your study.
* **Explain Tools, Techniques, and Processes:** Detail the specific tools, techniques, and processes you will use to collect and analyze data. This could include software, instruments, procedures, and any other relevant methodologies.

***Example:***

“Minutiae matching was performed by extracting ridge endings and bifurcations using MATLAB. This involved using image processing techniques to identify and match unique fingerprint features.”

Include Diagrams or Workflows if Applicable: If your methodology involves complex processes, consider including diagrams or workflows to visually represent the steps. This can help readers better understand your approach.

# 8. Requirements Resources

The purpose of this section is to list the tools, software, datasets, and other resources needed to conduct the research. It ensures that all necessary materials are identified and available for the study.

**How to Write:**

* **Include Software:** Specify any software programs that will be used in the research. This could include data analysis tools, programming environments, or specialized applications.
* **Include Hardware:** Mention any hardware requirements, such as computers, servers, or specific devices needed for data collection or analysis.
* **Include Data Sources:** Identify the datasets or data sources that will be used. This could include publicly available databases, proprietary datasets, or data collected through experiments or surveys.

***Example:***

* Software: MATLAB for image processing.
* Hardware: High-performance computing system for data analysis.
* Data Sources: Fingerprint database from FVC 2002.

# 9. Research Plan

To outline the steps and timeline for conducting the research, including risk management and contingency plans.

**How to Write:**

* **Outline the Steps:** Describe the major phases of your research, from initial planning to final analysis and reporting. This helps to provide a clear roadmap of your study.
* **Include a Timeline:** Provide a timeline for each phase of the research. This helps to ensure that the study stays on track and that all tasks are completed within the planned timeframe.
* **Identify Potential Risks:** Highlight any potential risks or challenges that could impact the research. This could include technical issues, data availability, or other unforeseen obstacles.
* **Develop Contingency Plans:** Outline contingency plans to address the identified risks. This ensures that you have a strategy in place to mitigate any issues that arise and keep the research on track.

***Example:***

* Phase 1: Literature review and hypothesis formulation (Month 1-2)
  + Risk: Limited access to recent studies.
  + Contingency: Use interlibrary loans and online databases to access necessary resources.
* Phase 2: Data collection and preprocessing (Month 3-4)
  + Risk: Delays in data acquisition.
  + Contingency: Have backup data sources and extend the data collection period if needed.
* Phase 3: Data analysis and interpretation (Month 5-6)
  + Risk: Software or hardware malfunctions.
  + Contingency: Regularly back up data and have alternative analysis tools available.
* Phase 4: Writing and dissemination of findings (Month 7-8)
  + Risk: Delays in writing or peer review.
  + Contingency: Allocate extra time for revisions and seek early feedback from peers.

# References

To list all the sources cited in your research proposal, ensuring proper credit to the original authors and allowing readers to locate the sources.

**How to Write:**

* **Follow a Citation Style:** Use a consistent citation style (Harvard Style) as required by the institution.
* **Include All Cited Sources:** List all the books, articles, websites, and other sources you have referenced in your proposal. This provides credit to the original authors and allows readers to locate the sources.
* **Cross-Referencing:** Ensure that all in-text citations in your proposal correspond to full references in this section. This helps readers easily find the sources you have cited.

***Example:***

* Author, A. A. (Year). Title of work. Publisher.
* Author, B. B. (Year). Title of article. Title of Periodical, volume number(issue number), pages.
* Author, C. C. (Year). Title of webpage. Website Name. URL
* In-Text Citation Example:
  + (Author, Year)
* Cross-Referencing Example:
  + In your text: "According to Author A. A. (Year), ..."
  + In the References section: "Author, A. A. (Year). Title of work. Publisher."

**Refer: Harvard Referencing Guide**