Remember, Record, Resist:

A Self-Contained QR-Code Archival System for Long-Term Information Preservation

A.K.A LYRA PHASMA

Supervisor:

PLACEHOLDER: Supervisor

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Department of Information Technology

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For those who endured.

For those forgotten.

May remembrance outlast us all.

Acknowledgements

To my parents, who gave me life and strength;

to my beloved, who brings stillness in my torrential storm;

and to those who have endured—the fallen, the widowed, the forgotten—whose stories deserve to be remembered and retold.

May this work stand as a small act of remembrance—an offering to those who came before us, and a reminder for those who follow.

Abstract

Waffle, waffle.

Keywords: keyword1, keyword2, keyword3, keyword4, keyword5

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Preface

This research began not as a formal study, but as a coping mechanism. I live with Bipolar I disorder, a condition that can be both ecstatic and devastating, in what I call *"Ecstatic Despair"*. It brings moments of boundless energy and creativity, followed by periods of deep-seated melancholy. With it come bouts of paranoia about loss—loss of memory, loss of meaning, and at times, visions of a total technological collapse where all digital traces vanish. I have lost countless files over the years through carelessness and accident, and each loss felt like a small death: moments, creations, and fragments of self, gone forever. Out of that grief came the impulse to preserve—to find a way to make memory tangible again.

That impulse led me to discover QR-based backup systems, which fascinated me but left me unsatisfied. Most assumed that the world's infrastructure would endure—that servers, scanners, and networks would always be there to read the data. But what if they were not? What if preservation itself had to survive the end of everything familiar? This question became the seed of what would later grow into *Remember, Record, Resist: A Self-Contained QR-Code Archival System for Long-Term Information Preservation*.

Two months into exploring this idea, I realized it wasn't just a side project anymore. It was a statement—a resistance to loss, not only personal but collective. In a country where archives are burned, histories are rewritten, and memories of war, dictatorship, and abuse are brushed aside, the act of preserving data becomes an act of defiance.

This study is for those who remember when they are told to forget; for those who lost their voices to erasure—whether through the silence of the dead, the neglect of the living, or the convenience of indifference. This research is dedicated to the archivists, historians, churches, and survivors who keep fragments of truth alive in fragile paper and fading ink. To them, and to anyone who has ever feared that everything might one day be lost—this is my small resistance.

Mabuhay ang katotohanan! Mabuhay ang mga alaala ng kahapon!

Mabuhay ang paghihimagsik ng alaala laban sa pagkalimot!

Chapter 1
The Problem and Its Background

1.1 Introduction

This study explores the design and implementation of a human-decodable, QR-based archival preservation system. As digital storage media face inevitable decay and format obsolescence, the need for an archival method that bridges human readability and machine precision becomes increasingly critical. The proposed system encodes data into QR codes arranged for redundancy, legibility, and long-term recoverability, ensuring that essential knowledge remains accessible even in the absence of functioning computers.

1.2 Background of the Study

Modern data storage relies heavily on digital formats—such as DOCX, XLSX, PDFs—and digital medium of storage such as hard drives and cloud storage. While convenient, these are fragile in the face of time: bit rot, format incompatibility, and dependency on specific hardware and software ecosystems threaten their longevity. Historically, human civilizations relied on physical inscriptions—stone tablets, manuscripts, and printed texts—that survived millennia. In contrast, digital information may not last beyond a few decades without continuous migration. This study seeks to integrate the endurance of physical archives with the density and structure of modern digital encoding.

1.3 Theoretical Framework

The theoretical basis of this research lies in three main domains:

1. **Information Theory** — for understanding data encoding efficiency and error correction.
2. **Archival Science** — for studying the principles of long-term preservation and access.
3. **Semiotics and Human Factors** — for ensuring that the encoded information remains interpretable by humans without computational assistance.

By merging these disciplines, the research aims to create an archival format that is both symbolic and functional—a literal preservation of meaning across generations.

1.4 Conceptual Framework

The conceptual framework envisions a dual-readable archival system where information is stored in a two-tier format:

1. **Machine Layer:** QR codes optimized for digital scanning and automated decoding.
2. **Human Layer:** A set of visual and linguistic patterns that allow a trained reader to manually interpret and reconstruct data using pen, paper, and logic alone.

This layered approach aligns with the idea of technological fallback—ensuring information remains recoverable even under total computational collapse.

1.5 Statement of the Problem

Current archival systems prioritize convenience and machine efficiency at the expense of long-term readability. The central problem addressed by this study is the lack of a unified, low-cost archival medium that:

1. Can be both machine-readable and human-decodable.
2. Uses open and accessible encoding standards.
3. Remains recoverable without dependence on specific software or hardware.

1.6 Objectives of the Study

The study aims to:

1. Design a QR-based archival encoding scheme suitable for long-term preservation.
2. Evaluate the human-decoding feasibility of the proposed format.
3. Develop Python-based tools for generating and decoding such archives.
4. Demonstrate a full archival workflow, from encoding a document to recovering it from printed QR codes.

1.7 Significance of the Study

This study contributes to both digital preservation and alternative communication methods. It offers:

1. A resilient archival solution that merges analog and digital traditions.
2. Educational value in demonstrating the intersection of computation, linguistics, and manual reasoning.
3. A foundation for future research on human-readable encodings, post-digital preservation, and low-tech data recovery.

1.8 Scope and Limitations of the Study

The system focuses on the encoding and decoding of small- to medium-sized datasets (e.g., text documents, structured tables) using QR code-based grids. Image and multimedia encoding are outside the scope of this work. While human readability is prioritized, it assumes literacy in basic symbolic logic and access to decoding instructions. Durability testing of physical media is limited to conceptual discussion rather than empirical environmental studies.

1.9 Definition of Terms

Archival Preservation The process of maintaining and protecting information for long-term accessibility.

QR Code A two-dimensional barcode capable of storing alphanumeric and binary data with error correction.

Human-Decodable Data that can be interpreted manually without computational tools.

Error Correction A method of recovering lost or damaged data within an encoded message.

Digital Obsolescence The phenomenon where digital formats or storage media become unusable due to technological advancement or decay.

Chapter 2
Review of Relevant Literature

2.1 Review of Relevant Literature

2.2 Synthesis

Chapter 3
Methodology