Smart Error Detection System

Data Communication Project

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Our Team

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Project Overview

- Simulates data transmission over an unreliable channel
- Detects and corrects errors using Parity, CRC, and Hamming
- Realistic error injection (bit flip, substitution, deletion, burst...)
- Modern web interface using Flask + Bootstrap

System Components

1. SENDER: USER ENTERS MESSAGE + SELECTS METHOD
2. ERROR CHANNEL: SIMULATES CORRUPTION
3. RECEIVER: VERIFIES INTEGRITY AND CORRECTS DATA
4. WEB INTERFACE INTEGRATES ALL STEPS SEAMLESSLY

Error Detection / Correction Methods

1

PARITY BIT :
simple error detection

2

CRC :
robust polynomial-based detection

3

HAMMING CODE :
detects and corrects single-bit errors

Supported Error Types

1. Bit Flip
2. Character Substitution
3. Deletion / Insertion
4. Burst Error
5. User-selectable or random

System Workflow

1 → 2 → 3 → 4 → 5

USER ENTERS MESSAGE

ALGORITHM GENERATES CONTROL BITS

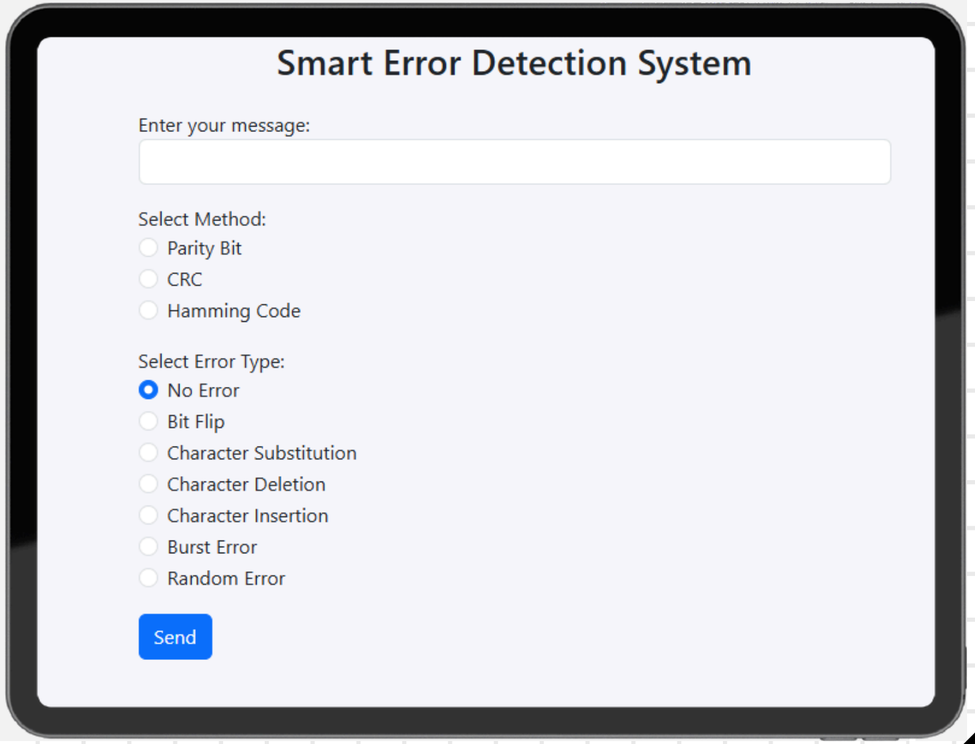
ERROR IS APPLIED

RECEIVER CHECKS OR CORRECTS DATA

RESULTS DISPLAYED IN CLEAN UI

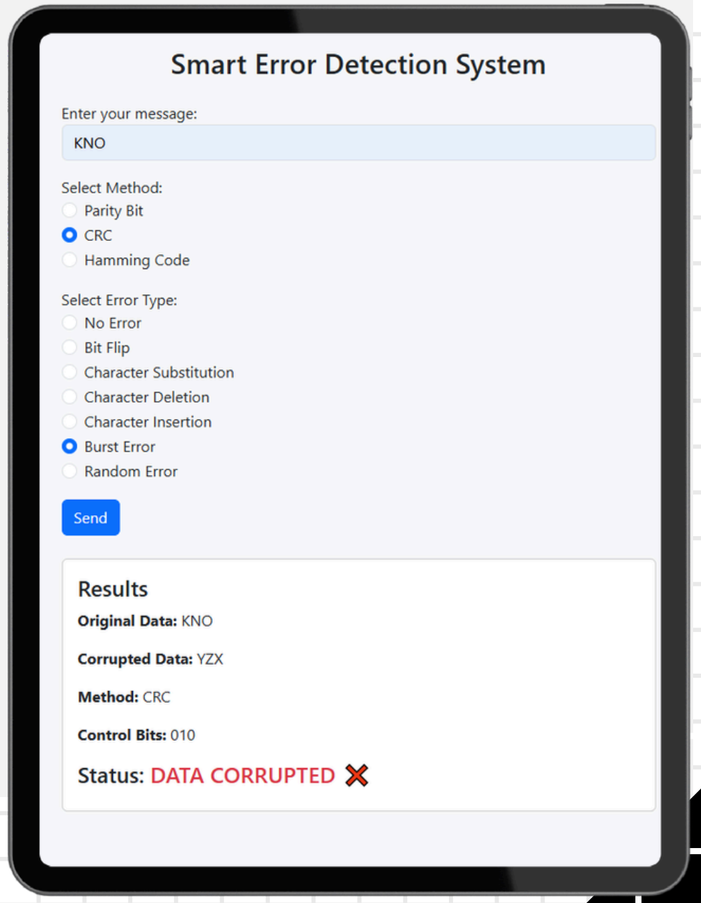
Modern Web Interface

- Single-page UI
- Bootstrap components
- Interactive method and error selection
- Clear result visualization



Results Example / Conclusion

- Complete simulation of data communication errors
- Accurate detection and correction
- Clean web interface enhances usability
- Demonstrates strong understanding of networking concepts



Thank You

- https://github.com/muhammedkenno
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