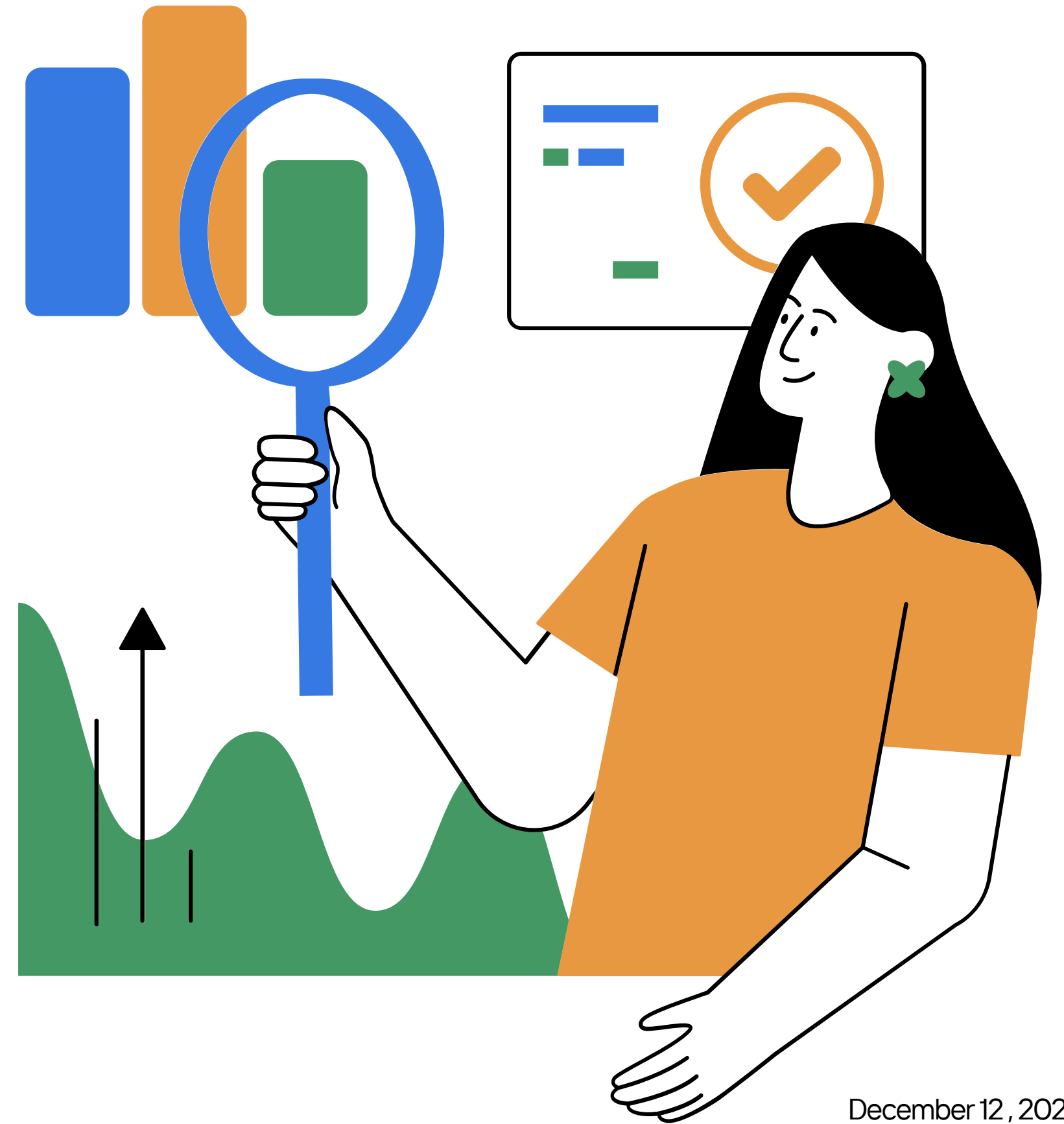


Smart Error Detection System

 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

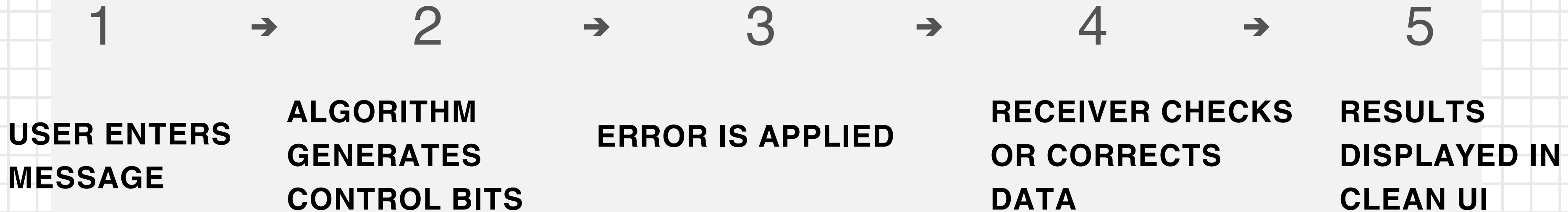
3

HAMMING CODE :
detects and corrects single-
bit errors

Supported Error Types

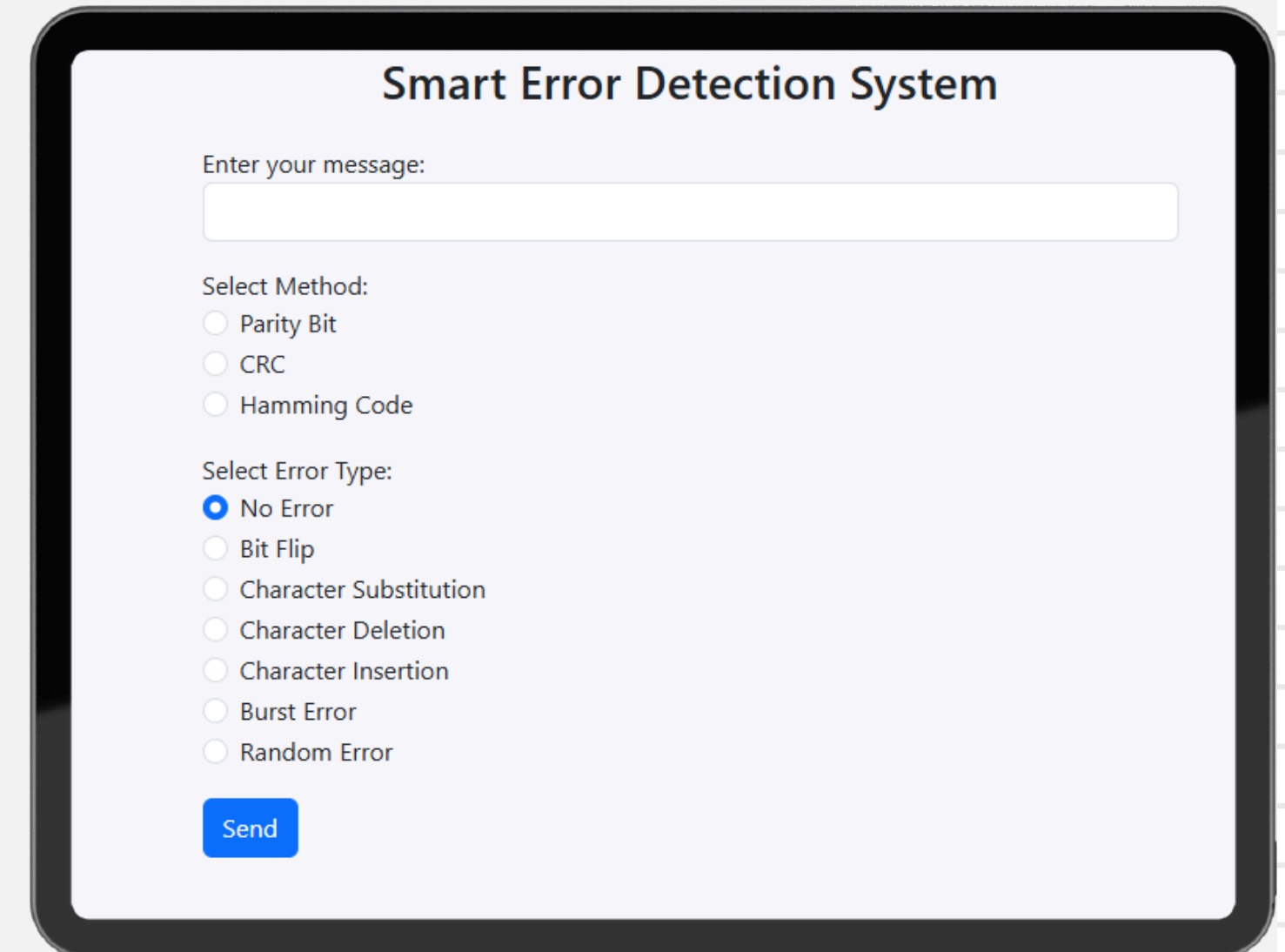
1. Bit Flip
2. Character Substitution
3. Deletion / Insertion
4. Burst Error
5. User-selectable or random

System Workflow



Modern Web Interface

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



A mockup of a web interface titled "Smart Error Detection System". It features a light blue background with a dark blue border. The interface includes a text input field for "Enter your message:", a "Select Method:" section with radio buttons for "Parity Bit", "CRC", and "Hamming Code", a "Select Error Type:" section with radio buttons for "No Error", "Bit Flip", "Character Substitution", "Character Deletion", "Character Insertion", "Burst Error", and "Random Error", and a blue "Send" button at the bottom.

Smart Error Detection System

Enter your message:

Select Method:

- ☐ Parity Bit
- ☐ CRC
- ☐ Hamming Code

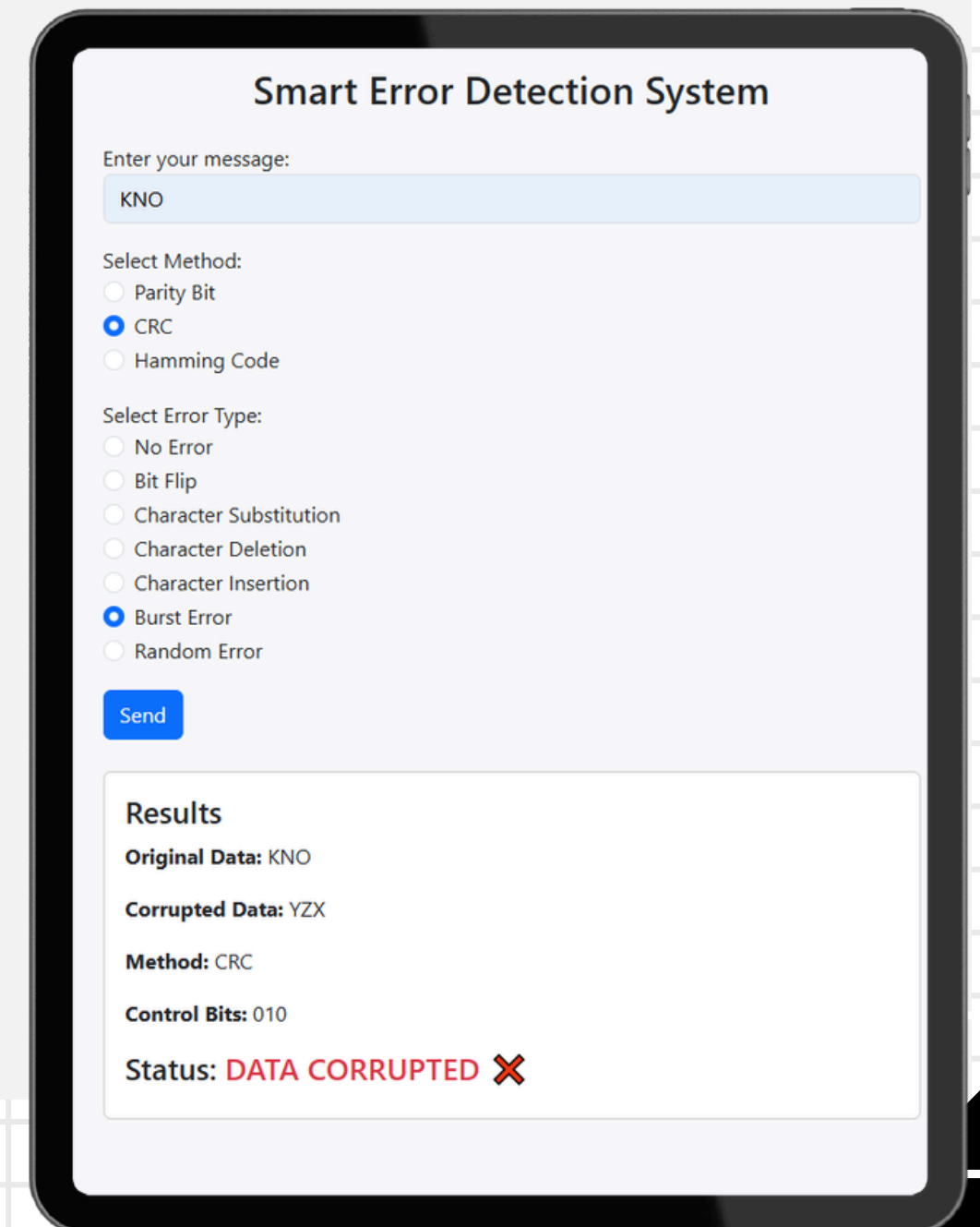
Select Error Type:

- ☒ No Error
- ☐ Bit Flip
- ☐ Character Substitution
- ☐ Character Deletion
- ☐ Character Insertion
- ☐ Burst Error
- ☐ Random Error

Send

Results Example / Conclusion

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

A screenshot of a web application titled "Smart Error Detection System". It features a text input field with "KNO", radio buttons for "Select Method" (CRC is selected) and "Select Error Type" (Burst Error is selected), a "Send" button, and a "Results" section showing original data, corrupted data, method, control bits, and a status of "DATA CORRUPTED" with a red X icon.

Smart Error Detection System

Enter your message:

KNO

Select Method:

☐ Parity Bit

☒ CRC

☐ Hamming Code

Select Error Type:

☐ No Error

☐ Bit Flip

☐ Character Substitution

☐ Character Deletion

☐ Character Insertion

☒ Burst Error

☐ Random Error

Send

Results

Original Data: KNO

Corrupted Data: YZX

Method: CRC

Control Bits: 010

Status: DATA CORRUPTED ✖

Thank You



● <https://github.com/muhammedkenno>

