Project 1

Ryan Scopio

**Design:**

I chose C as my language since C gives me a lower level of abstraction and allows me easier manipulation of memory. Originally, I wanted to have my message stored in a bit array but too many issues occurred so I switched it to a char array and wrote a xor function to cover it.

**Code:**

#include<stdio.h>

#include<string.h>

#define N sizeof(polynomial)

char data[28], checksum[28], polynomial[] = "10001000000100001";

int length, i, k;

void xor() {

for (k = 1; k < N; k++)

{

checksum[k] = ((checksum[k] == polynomial[k]) ? '0' : '1');

}

}

void crc() {

for (i = 0; i < N; i++)

{

checksum[i] = data[i];

}

do {

if (checksum[0] == '1') {

xor ();

}

for (k = 0; k < N - 1; k++) {

checksum[k] = checksum[k + 1];

}

checksum[k] = data[i++];

} while (i <= length + N - 1);

}

int main()

{

printf("\nEnter data : ");

scanf("%s", data);

printf("\n\_\_\_\_\_\_");

printf("\nGeneratng polynomial : %s", polynomial);

length = strlen(data);

for (i = length; i < length + N - 1; i++) {

data[i] = '0';

}

printf("\n\_\_\_\_\_");

printf("\nModified data is : %s", data);

printf("\n\_\_\_\_\_");

crc();

printf("\nChecksum is : %s", checksum);

for (i = length; i < length + N - 1; i++) {

data[i] = checksum[i - length];

}

printf("\n\_\_\_\_\_");

printf("\nFinal codeword is : %s", data);

printf("\n\_\_\_\_\_");

printf("\nTest error detection 0(yes) 1(no)? : ");

scanf("%d", &i);

if (i == 0)

{

do {

printf("\nEnter the position where error is to be inserted : ");

scanf("%d", &i);

} while (i == 0 || i > length + N - 1);

data[i - 1] = (data[i - 1] == '0') ? '1' : '0';

printf("\n\_\_\_\_\_");

printf("\nErroneous data : %s\n", data);

}

crc();

for (i = 0; (i < N - 1) && (checksum[i] != '1'); i++);

if (i < N - 1)

{

printf("\nError detected\n\n");

}

else

{

printf("\nNo error detected\n\n");

}

printf("\n\_\_\_\_\_\n");

return 0;

}

**Output:**

Enter data : 1110101

\_\_\_\_\_\_

Generatng polynomial : 10001000000100001

\_\_\_\_\_

Modified data is : 111010100000000000000000

\_\_\_\_\_

Checksum is : 00101110000010110

\_\_\_\_\_

Final codeword is : 111010100101110000010110

\_\_\_\_\_

Test error detection 0(yes) 1(no)? : 0

Enter the position where error is to be inserted : 2

\_\_\_\_\_

Erroneous data : 101010100101110000010110

Error detected

\_\_\_\_\_