VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

C PROGRAMMING LAB RECORD

Submitted by

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Under the Guidance of

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in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING
(Autonomous Institution under VTU)
BENGALURU-560019
April-2021 to June-2021

B.M.S. COLLEGE OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DECALARATION

I,AAAA , student of 2nd Semester, B.E, Department of Computer Science and Engineering, B. M. S. College of Engineering, Bangalore, hereby declare that, this laboratory work for "C Programming" course has been carried out by us under the guidance of Prof. Rekha G S ,Assistant Professor, Department of CSE, B. M. S. College of Engineering, Bangalore during the academic semester April-2021-June-2021

We also declare that to the best of our knowledge and belief, the development reported here is not from part of any other report by any other students.

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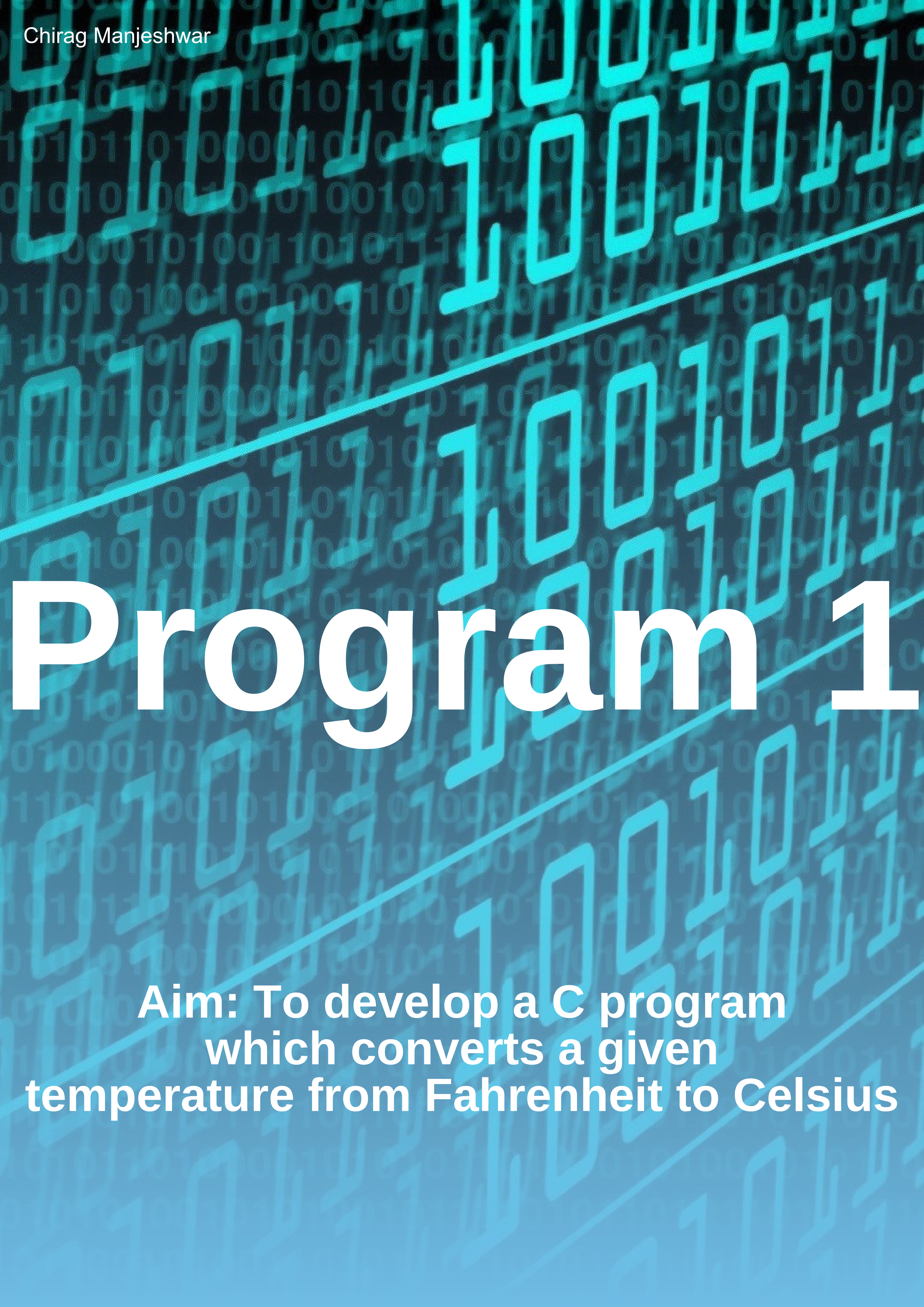

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Program 1

Aim: To develop a C program which converts a given temperature from Fahrenheit to Celsius

CODE

```
// convert Fahrenheit to Celsius

#include <stdio.h>
    // printf(), scanf()
#include <stdlib.h>
    // EXIT_SUCCESS

int main() {

    int f_temp;
    printf("Enter temperature in fahrenheit: ");
    scanf("%d", &f_temp);

    int c_temp = 5.0/9.0 * (f_temp - 32);
    printf("The temperature in celsius: %d\n", c_temp);

    return EXIT_SUCCESS;
}
```

OUTPUT

```
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter temperature in fahrenheit: 212
The temperature in celsius: 100
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter temperature in fahrenheit: 434
The temperature in celsius: 223
```

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Program 2

Aim: To develop a C program to find the area of a triangle given its sides (using functions)

CODE

```
// calculate area of triangle

#include <stdio.h>
    // printf(), scanf(), fprintf()
#include <math.h>
    // sqrt()
#include <stdlib.h>
    // EXIT_FAILURE, EXIT_SUCCESS

double triangle_area(double, double, double);

int main() {

    double s1, s2, s3;
    printf("Enter the sides of a triangle: ");
    scanf("%lf %lf %lf", &s1, &s2, &s3);

    double area = triangle_area(s1, s2, s3);
    if (area == -1) {
        return EXIT_FAILURE;
    }

    printf("Area of triangle made with given sides: %.2lf\n", area)

    return EXIT_SUCCESS;
}


double triangle_area(double s1, double s2, double s3) {

    // validate input
    if (s1 + s2 < s3 ||
        s2 + s3 < s1 ||
        s1 + s3 < s2) {
```

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CODE

```
        fprintf(stderr, "Triangle not possible with given sides.\n");

        return -1;
    }

    // semi-perimeter
    double S = (s1 + s2 + s3)/2;

    // heron's formula
    double area = sqrt( (S) * (S-s1) * (S-s2) * (S-s3) );

    return area;
}
```

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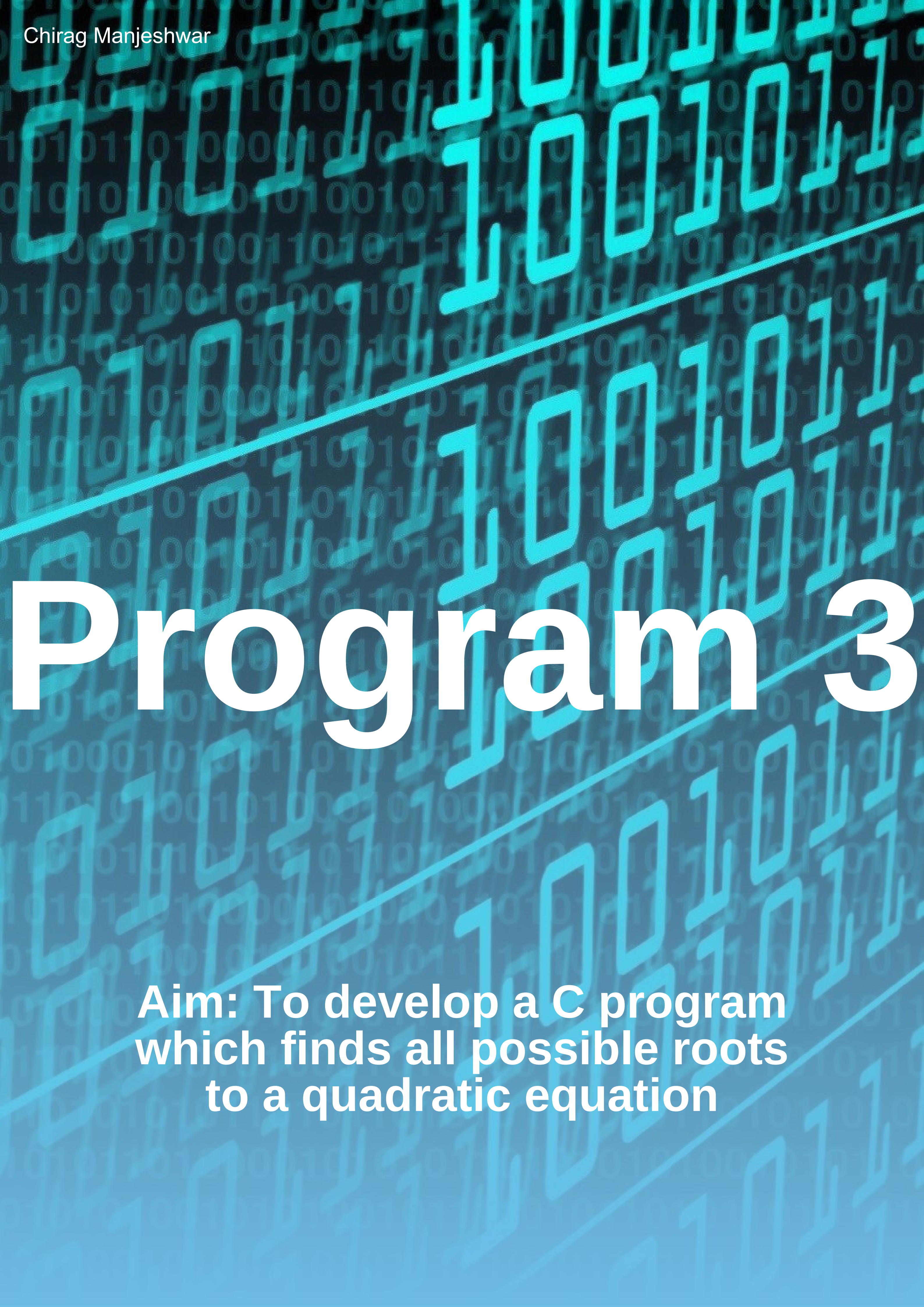
OUTPUT

```
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter the sides of a triangle: 5 4 3
Area of triangle made with given sides: 6.00
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter the sides of a triangle: 1 1 6
Triangle not possible with given sides.
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter the sides of a triangle: 4.5 6.5 8.7
Area of triangle made with given sides: 14.25
```



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Program 3

Aim: To develop a C program which finds all possible roots to a quadratic equation

CODE

```
// find quadratic roots

#include <stdio.h>
    // printf(), scanf()
#include <math.h>
    // sqrt()
#include <stdlib.h>
    // EXIT_SUCCESS

int main() {

    double a, b, c;
    printf("Enter coefficients of x^2, x; and constant term: ");
    scanf("%lf %lf %lf", &a, &b, &c);

    if (b*b - 4*a*c >= 0) {
        // real roots

        double root1 = (-b - sqrt(b*b - 4*a*c))/(2*a);
        double root2 = (-b + sqrt(b*b - 4*a*c))/(2*a);

        printf("root 1: %.2lf\n", root1);
        printf("root 2: %.2lf\n", root2);
    }
    else {
        // imaginary roots

        double real = -b/(2*a);
        double imaginary = sqrt(-(b*b - 4*a*c));

        printf("root1: %.2lf + (%.2lf)i\n", real, imaginary);
        printf("root2: %.2lf + (%.2lf)i\n", real, imaginary);
```

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CODE

```
    }

    return EXIT_SUCCESS;
}
```

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OUTPUT

```
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter coefficients of x^2, x; and constant term: 2 6 2
root 1: -2.62
root 2: -0.38
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter coefficients of x^2, x; and constant term: 2 2 2
root1: -0.50 + (3.46)i
root2: -0.50 + (3.46)i
```

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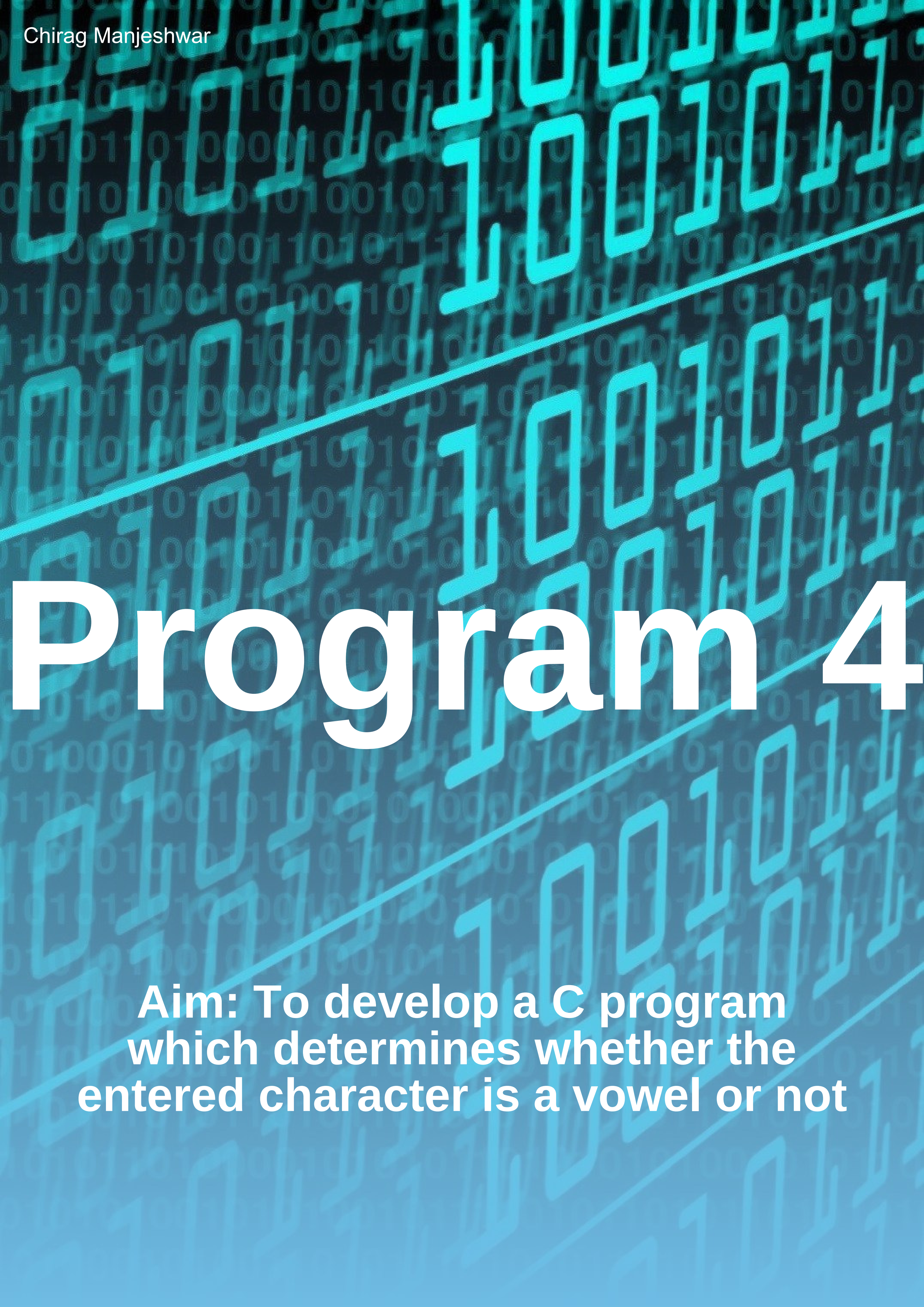

Program 4

Aim: To develop a C program which determines whether the entered character is a vowel or not

CODE

```
// check if vowel

#include <stdio.h>
    // printf(), scanf()
#include <stdlib.h>
    // EXIT_SUCCESS

int main() {

    char input_c;
    printf("Enter a character: ");
    scanf("%c", &input_c);

    switch(input_c) {

        case 'a': case 'e':
        case 'i': case 'o':
        case 'u':

            printf("Entered character is a vowel.\n");
            break;

        default:

            printf("Entered character is a consonant.\n");
            break;
    }

    return EXIT_SUCCESS;
```

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CODE

```
}
```

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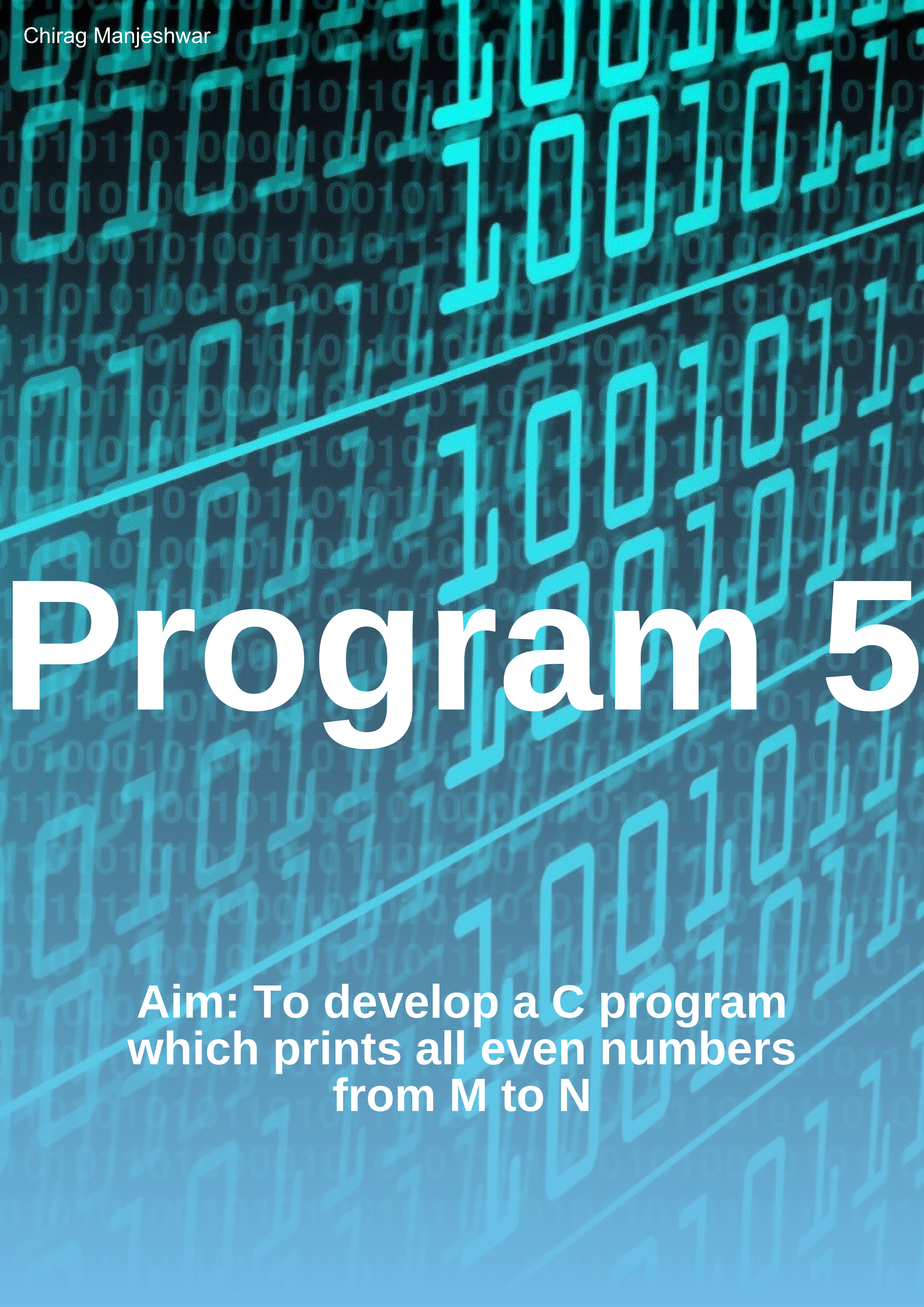
OUTPUT

```
Enter a character: a
Entered character is a vowel.
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter a character: p
Entered character is a consonant.
```



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Program 5

Aim: To develop a C program which prints all even numbers from M to N

CODE

```
// print even numbers from N to N

#include <stdio.h>
    // printf(), scanf()
#include <stdlib.h>
    // EXIT_SUCCESS

int main() {

    int M, N;
    printf("Enter M and N: ");
    scanf("%d %d", &M, &N);

    printf("Required numbers:");

    for (int i = (M%2?M+1:M); i <= N; i+=2) {
        printf(" %d", i);
    }
    printf("\n");

    return EXIT_SUCCESS;
}
```

OUTPUT

```
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter M and N: 5 13
Required numbers: 6 8 10 12
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter M and N: 8 16
Required numbers: 8 10 12 14 16
```

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Program 6

Aim: To develop a C program to calculate the sum of squares of first N odd numbers

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CODE

```
// sum of squares

#include <stdio.h>
    // printf(), scanf()
#include <stdlib.h>
    // EXIT_SUCCESS

int main() {

    int N;
    printf("Enter N: ");
    scanf("%d", &N);

    int sum = 0;
    for (int i = 0; i < N; ++i) {
        int term = 2*i + 1;
            // term = 1 3 5 .. (N terms)
        sum += term * term;
    }

    printf("Sum of square of first N odd numbers: %d\n", sum);

    return EXIT_SUCCESS;
}
```

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OUTPUT

```
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter N: 2
Sum of square of first N odd numbers: 10
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter N: 9
Sum of square of first N odd numbers: 969
```

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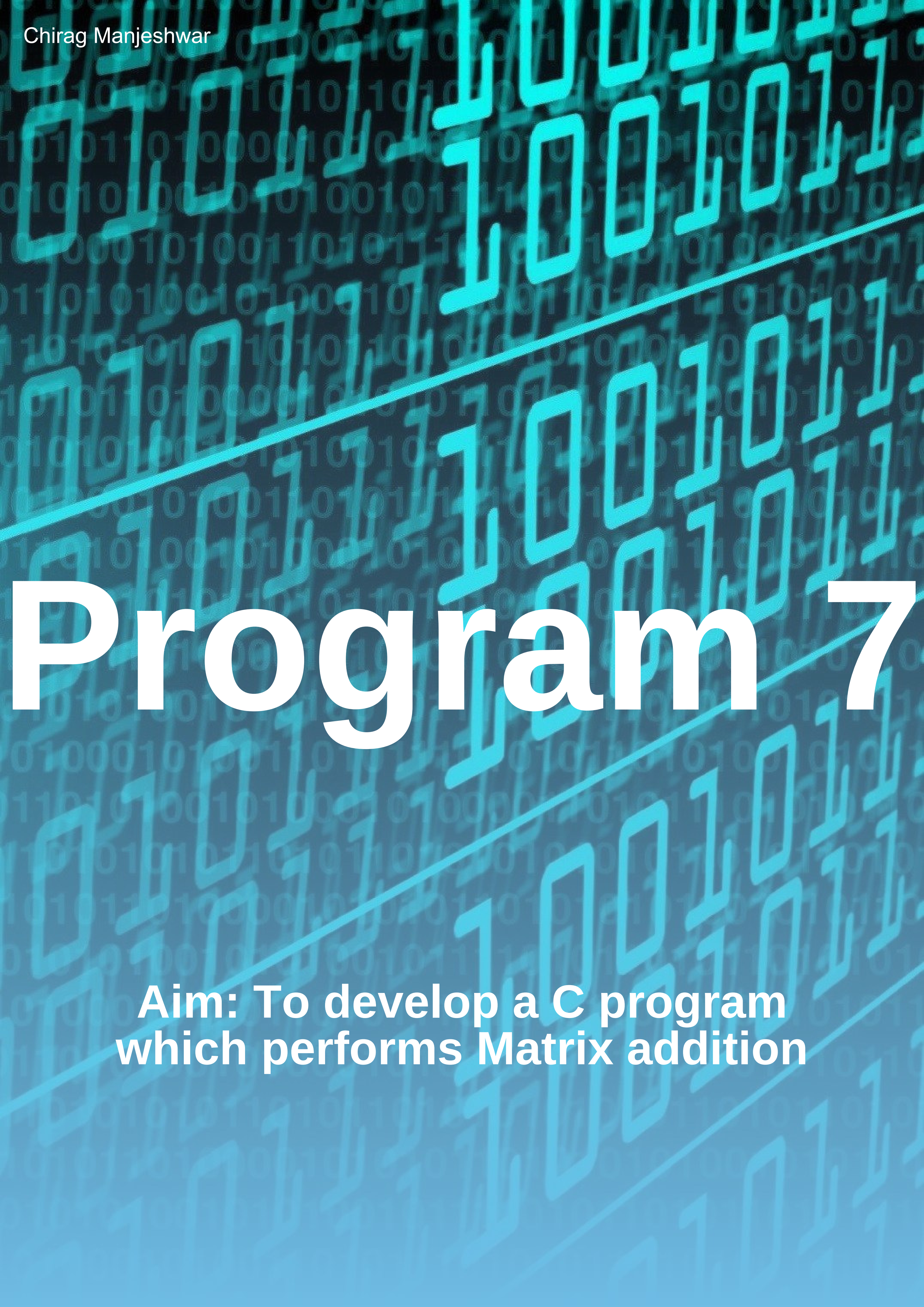

Program 7

Aim: To develop a C program which performs Matrix addition

CODE

```
// matrix addition

#include <stdio.h>
    // printf(), scanf()
#include <stdlib.h>
    // EXIT_SUCCESS

const int MAX_SIZE = 100;

int main() {

    int M, N;
    printf("Enter order M and N of the Matrices: ");
    scanf("%d %d", &M, &N);

    int m1[MAX_SIZE][MAX_SIZE];
    printf("Enter elements of first Matrix:\n");
    for (int i = 0; i < M; ++i) {
        for (int j = 0; j < N; ++j) {
            scanf("%d", &m1[i][j]);
        }
    }

    int m2[MAX_SIZE][MAX_SIZE];
    printf("Enter elements of second Matrix:\n");
    for (int i = 0; i < M; ++i) {
        for (int j = 0; j < N; ++j) {
```

CODE

```
            scanf("%d", &m2[i][j]);
        }
    }

    // add the matrices
    int result[MAX_SIZE][MAX_SIZE];
    for (int i = 0; i < M; ++i) {
        for (int j = 0; j < N; ++j) {
            result[i][j] = m1[i][j] + m2[i][j];
        }
    }

    printf("Resultant Matrix:\n");
    for (int i = 0; i < M; ++i) {
        for (int j = 0; j < N; ++j) {
            printf("%d ", result[i][j]);
        }
        printf("\n");
    }
    printf("\n");

    return EXIT_SUCCESS;
}
```

OUTPUT

```
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter order M and N of the Matrices: 2 2
Enter elements of first Matrix:
1 2
3 4
Enter elements of second Matrix:
2 2
2 2
Resultant Matrix:
3 4
5 6
```

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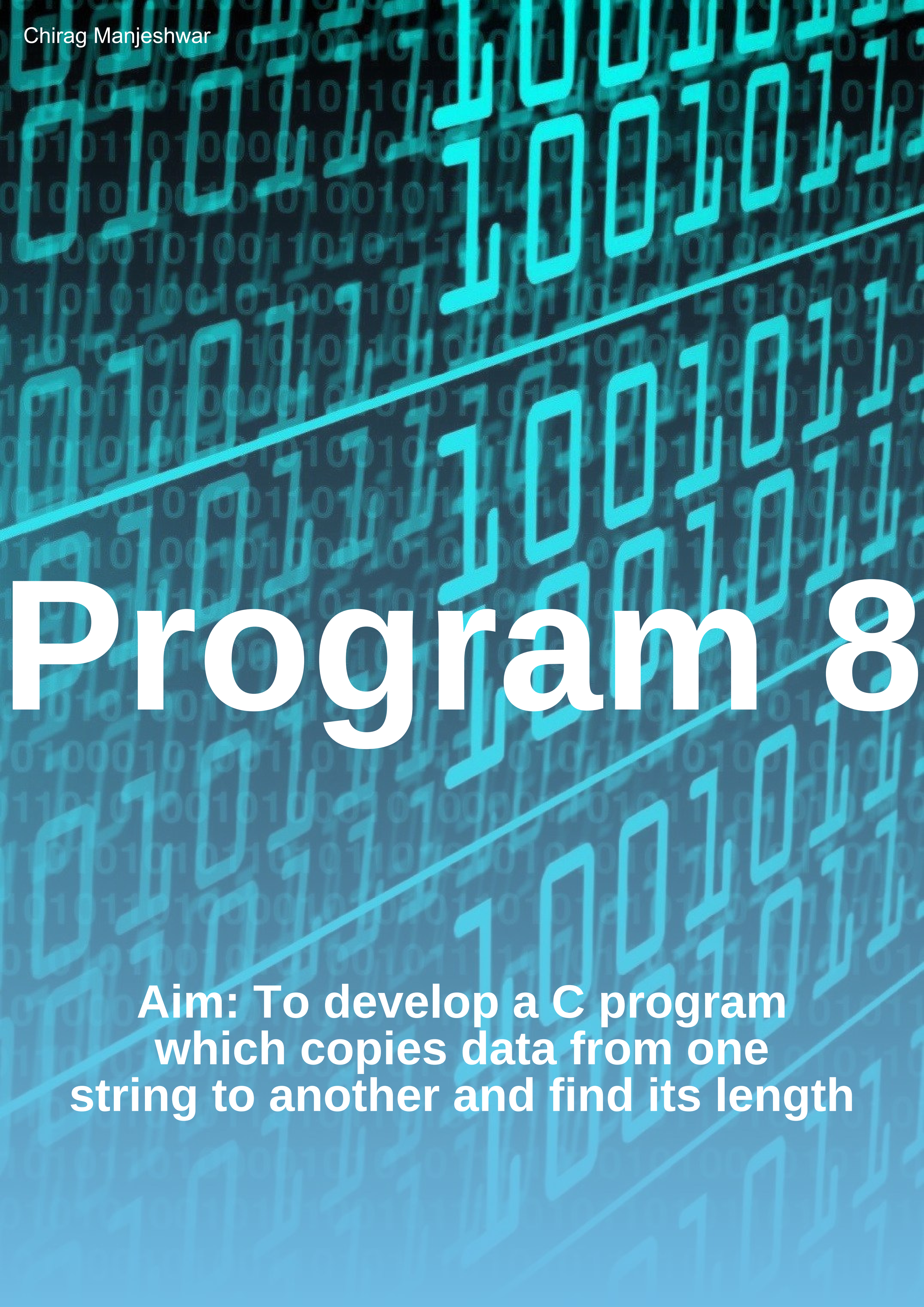

Program 8

Aim: To develop a C program which copies data from one string to another and find its length

CODE

```
// store details of books

#include <stdio.h>
    // printf(), scanf(), fgets(), stdin
#include <stdlib.h>
    // EXIT_SUCCESS

#define MAX_SIZE 100

struct Book {

    char title[MAX_SIZE],
         author[MAX_SIZE],
         publish_date[MAX_SIZE];

    int price, no_pages;
};

int main() {

    const int no_books = 3;
    struct Book books[no_books];

    // input book details
    for (int i = 0; i < no_books; ++i) {
        printf("Enter details of book(%d):\n", i+1);
        printf("title: ");
        fgets(books[i].title, MAX_SIZE, stdin);
```

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CODE

```
        printf("author: ");
        fgets(books[i].author, MAX_SIZE, stdin);
        printf("publish date: ");
        fgets(books[i].publish_date, MAX_SIZE, stdin);
        printf("price: ");
        scanf("%d", &books[i].price);
        printf("number of pages: ");
        scanf("%d", &books[i].no_pages);

        getchar();
        // discard linefeed character
    }

    // find most expensive
    struct Book expensive_book = books[0];
    for (int i = 1; i < no_books; ++i) {
        if (books[i].price > expensive_book.price) {
            expensive_book = books[i];
        }
    }

    printf(
        "\nDetails of most expensive book:\n"
        "Title: %s"
        "Author: %s"
        "Publish date: %s"
        "Price: %d\n"
        "Number of pages: %d\n"
```

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CODE

```
        ,
        expensive_book.title, expensive_book.author,
        expensive_book.publish_date,
        expensive_book.price, expensive_book.no_pag
    );

    return 0;
}
```

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OUTPUT

```
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter details of book(1):
title: Harry Potter
author: J K Rowling
publish date: 1997
price: 2000
number of pages: 350
Enter details of book(2):
title: Eragon
author: Paolini
publish date: 2005
price: 3000
number of pages: 500
Enter details of book(3):
title: Red Pyramid
author: Rick Riordan
publish date: 2010
price: 800
number of pages: 300

Details of most expensive book:
Title: Eragon
Author: Paolini
Publish date: 2005
Price: 3000
Number of pages: 500
```

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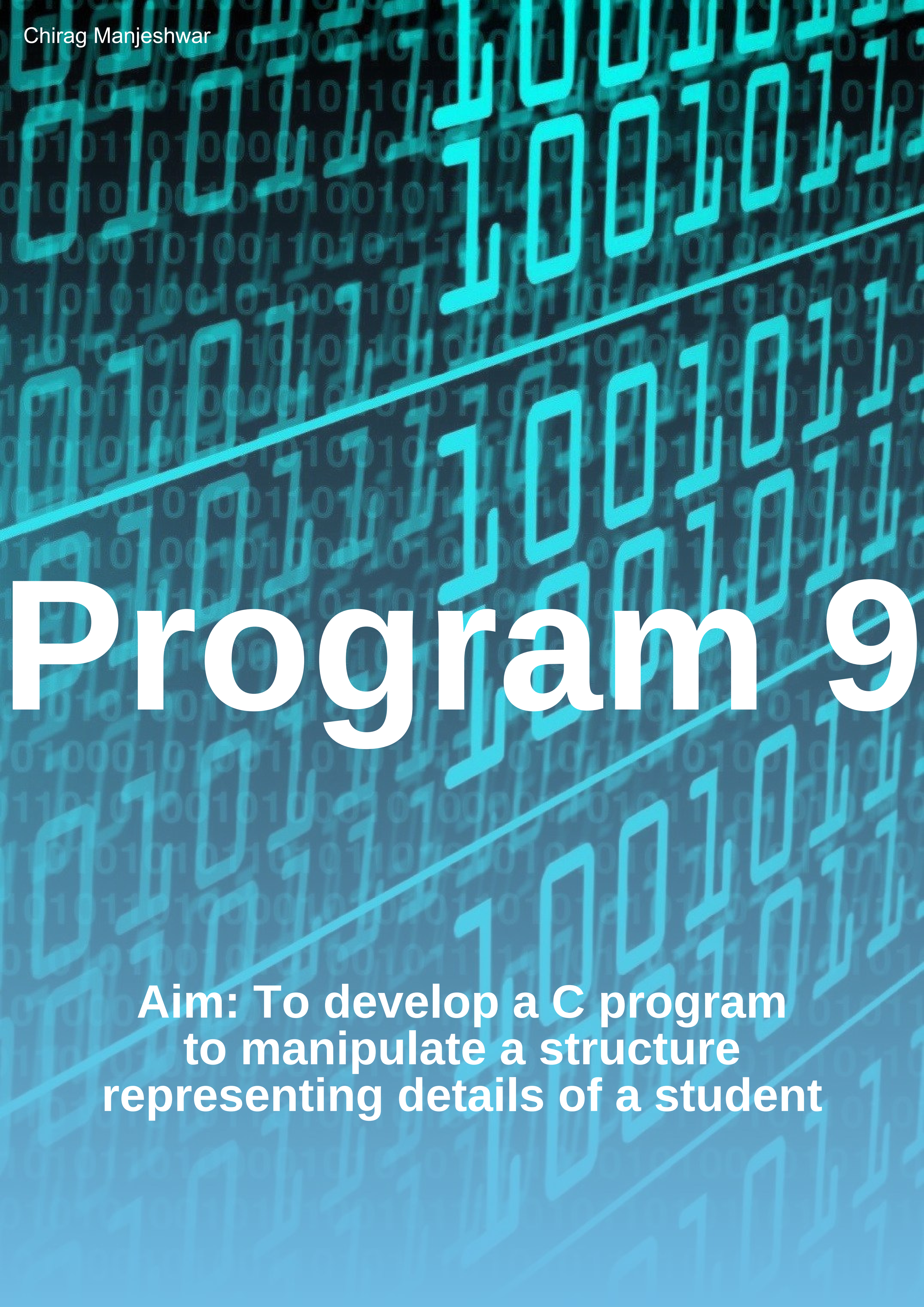

Program 9

Aim: To develop a C program to manipulate a structure representing details of a student

CODE

```
// swap two numbers (use pointers)

#include <stdio.h>
    // printf(), scanf()
#include <stdlib.h>
    // EXIT_SUCCESS

void swap(int*, int*);

int main() {

    int a, b;
    printf("Enter two values: ");
    scanf("%d %d", &a, &b);

    swap(&a, &b);

    printf("Values after swapping: %d %d\n", a, b);

    return EXIT_SUCCESS;
}

void swap(int* a, int* b) {
    int temp = *a;
    *a = *b;
    *b = temp;
}
```

OUTPUT

```
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter two values: 2 4
Values after swapping: 4 2
chiru@chirux:~/Desktop/CCP assignent$ ./a.out
Enter two values: -2 -90
Values after swapping: -90 -2
```

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Program 10

Aim: To develop a C program to perform arithmetic operations on two integers (using pointers)

CODE

```
#include <stdio.h>
    // fgets(), puts(), FILE*, fopen(), fclose()
#include <stdlib.h>
    // EXIT_SUCCESS

const int MAX_SIZE = 100;

int main() {

    // get user input
    char user_data[MAX_SIZE];
    printf("Enter data to be sent to file: ");
    fgets(user_data, MAX_SIZE, stdin);

    FILE* bmsce;

    // save data to file
    bmsce = fopen("BMSCE.txt", "w");
    fputs(user_data, bmsce);
    fclose(bmsce);

    // get data from file
    char file_data[MAX_SIZE];
```

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CODE

```
    bmsce = fopen("BMSCE.txt", "r");
    fgets(file_data, MAX_SIZE, bmsce);
    fclose(bmsce);

    // display file data
    printf("Data stored in file: ");
    fputs(file_data, stdout);

    return EXIT_SUCCESS;
}
```

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OUTPUT

```
chiru@chirux:~/Desktop/CCP assignent$ ./a.o
Enter data to be sent to file: some data
Data stored in file: some data
chiru@chirux:~/Desktop/CCP assignent$ ./a.o
Enter data to be sent to file: some other data
Data stored in file: some other data
chiru@chirux:~/Desktop/CCP assignent$ ./a.o
Enter data to be sent to file: 10 data
Data stored in file: 10 data
```