



# **Daffodil** *International* **University**

**Bridge & Building Crack Founder And Inspection with Matlab**

By

**Joy Kumar Biswas**

**ID: 171-35-226**

**&**

**Md Rezwan Islam**

**ID:171-35-235**

Under the supervision of

**Raihana Zannat**

Senior Lecturer

Dept. of Software Engineering

A Project submitted in partial fulfillment of the Requirement for the degree of Bachelor Science  
in Software Engineering

**Department of Software Engineering (SWE)**

**DAFFODIL INTERNATIONAL UNIVERSITY**

June-2021

## APPROVAL

This paper titled as “**Bridge & Building Crack Founder And Inspection with Matlab** submitted by **Joy Kumar Biswas, ID:171-35-226** to the Department of Software Engineering, Daffodil International University has been accepted as a satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Software Engineering and approved as to its style and contents.

## DECLARATION

We hereby declare that this report has been done by us under the supervision of **Raihana Zannat**, Senior Lecturer, Dept. of Software Engineering, Daffodil International University. We also declare that this report nor any part of this report has been submitted elsewhere for award of any degree.

Supervised By

-----

**Ms. Raihana Zannat**

Lecturer (Senior Scale)

Department of Software Engineering



Submitted by:

-----

**Joy Kumar Biswas**

ID: 171-35-226

Department of Software Engineering  
Daffodil International University

Md Rezwan Islam

ID:171-35-235

Department of Software Engineering  
Daffodil international University

## **ACKNOWLEDGEMENT**

First of all, I am expressing our gratitude to the almighty for giving us the ability to complete this thesis work. I will like to express our sincere gratitude to my honorable supervisor, Raihana Zannat, Senior Lecturer, department of Software Engineering. This project would not have been completed without his support and guidance. His constant encouragement gave me the confidence to carry out my work.

I express my heartiest gratitude towards the entire department of Software Engineering at Daffodil International University for providing good education and knowledge.

I also express my gratitude to all my teachers SAM Motiur Rahman, Associate Professor; Dr. Imran Mahmud, Associate Professor and Head In-Charge, Dept. of Software Engineering. The knowledge that I have learned from the classes in my degree of bachelor in Software Engineering level were essential for this thesis. In course of conducting the study necessary information were collected through books, journals, electronic media and other secondary sources. I also want to thank my friends for providing me support and encouragement. Their optimism and encouragement have allowed to overcome any obstacle at any phase.

## **ABSTARCT**

In this project, image has been done with fuzzy filters. By using Matlab techniques synthetic aperture image can be spoiled by spackle noise. A new technique has been proposed which preserve the edges and then altered with images to get de-noised image. Comparative results showed that proposed filter shows better result than the other filtered results. From the results it is observed that the proposed fuzzy filter is more capable of suppressing speckle noise and simultaneously preserving edges.

## TABLE OF CONTENTS

APPROVAL-----

DECLARATION-----

ACKNOWLEDGEMENT-----

ABSTRACT -----

TABLE OF CONTENTS-----

LIST OF FIGURES-----

LIST OF TABLES-----

### CHAPTER 1: INTERODUCTION

1.1 Project Overview-----

1.2 Project purpose-----

    1.2.1 Background -----

    1.2.2 Benefits & Beneficiaries-----

1.2.3 Goals-----

1.3 Stakeholders-----

1.4 Proposed system Model (block diagram) -----

1.5 Project Schedule-----

    1.5.1 Gantt Chart-----

    -

    1.5.2 Release plan/Milestone-----

## CHAPTER 2: SOFTWARE REQUIREMENT SPECIFICATION

2.1	functional Requirements-----
2.2	Data Requirements-----
2.3	Performance Requirements-----
2.4	Dependability Requirements-----
-	
2.4.1	Reliability Requirements-----
-	
2.5	Maintainability and Supportability Requirements-----
2.5.1	Maintenance Requirements-----
---	
2.6	Security Requirements-----
---	
2.7	Usability and Human-Interaction Requirements-----
2.8	Look and feel Requirements-----
2.9	Operational and Environmental Requirements-----

### **CHAPTER 3: SYSTEM ANALYSIS**

- 3.1 Activity Diagram for image processing in MATLAB -----
- 3.1.1 Activity Diagram for project-----

### **CHAPTER 4: SYSTEM DESIGN SPECIFICATION**

- 4.1 Class Responsibilities Collaboration (CRC) Cards-----
- 4.2 Development Tools & Technology-----
- 4.2.1 User Interface Technology-----
- 4.2.1.1 MATLAB-----
- 4.2.1.2 Beta-flight-----
- 4.2.2 Implementation tools & Platforms-----
- 4.2.2.1 Implementation of MATLAB-----

## CHAPTER 5: SYSTEM TESTING

5.1	Testing Features-----
5.1.1	Features to be tested -----
5.1.2	Features not be tested-----
5.2	Testing Strategies-----
5.2.1	Test Approach-----
5.2.2	Suspension and Resumption-----
5.3	Testing Environment (hardware/software requirements) -----
5.4	Test Case-----
5.4.1	Test case Report-----

## CHAPTER 6: USER MANUAL

6.1	user (Sobel) -----
6.2	User (Canny) -----
6.3	User (Final result) -----

**CHAPTER 7: PROJECT SUMMARY**

7.1 GitHub Link-----  
7.2 Critical Evolution-----  
7.3 Limitations-----  
7.4 Achievements-----  
7.5 Future Scope-----  
7.6 References-----

**List of Figures**

Fig 1.4 Block diagram-----  
Fig 1.5.1.1 Gantt Chart-----  
Fig 3.1 Activity Diagram-----  
Fig 1.5.1 Gantt Chart -----  
Fig 3.1.1 Activity Diagram-----  
Fig 6.1User Manual (Sobel) -----  
Fig 6.1.1 User (Canny) -----  
Fig 6.1.2 User (final result) -----

**List of Tables**

Table 1.5.1.1 Finding Idea Proposal-----  
Table 1.5.1.2 Requirement Gathering-----  
Table 1.5.1.3 Logical System Design-----  
Table 5.4 Test Cases-----  
Table 5.4.1 Test Case Report-----



## Chapter-1

### Introduction

An unmanned aerial vehicle(UAV),known as a drone, is an aircraft without a human pilot. Drone stands for Dynamically. Its flight is either controlled automatically by computers or under the remote control . Understand the Types And Causes Of Concrete Cracking In Bridges/building. Familiarize with methods used to control concrete cracking in bridge structures . Familiarize with the influence of concrete cracking on short and long-term durability . In MATLAB Image Processing has two main advantages as it Involves preprocess steps as well as crack detection method to get accurate result and Detects deeper as well as minor cracks.

### 1.1 Overview

Our main purpose to find out the cracks on the building. We re-accessed one single image through MATLAB and find out the crack by using “canny” method to detect edge. Here, we can find out any major crack on a bridge. In this process, we gather information what is help us to take proper decision to stop any unwanted event may occur.

### Purpose & Scope

The proposed filters which is a combination of the fuzzy algorithms and fuzzy edge detection algorithm with four basic fuzzy algorithms using images. In proposed method will be compared with Canny method and calculated the quality improvement of the image. And the main objective of the work presented is to we can find out any major crack on a building. The details of the Edge detection phase, the Canny methods is discussed and the proposed method and the performance metric. Finally, the experimental result and conclusion are respectively presented.

### 1.2.1 Background

The main purpose of this project is to find crack very easy the main purpose of implementing this application is so that everyone easily found their crack in their building and take proper action

Requirement of Project Build:

- ✚ Drone
- ✚ MATLAB
- ✚ Edge Detection
- ✚ Canny method
- ✚ Sobel method

### 1.2.2 Benefits & Beneficiaries

**Building & Bridge Crack Founder And Inspection with Matlab** this is an online website so people/organization can easily find crack on their building or bridge So that We can easily manage.

- ❖ Involves pre-processing steps as well as crack detection method to get accurate.
- ❖ Detect deeper as well as minor crack.
- ❖ Crack detect 80-90% accuracy.
- ❖ It's use also to detect Bridge crack and take some steps to avoid losses.

### 1.2.3 Goal

The main goal of this project to find out the cracks on the bridge and building, Improve performance. It will save some time. Another part is that admin can remove anything from it. We re-accessed one single image through MATLAB and find out crack. And we gather the information what is help us to take pop decision to stop any Unwanted event may occur.

### 1.3 Stakeholders

In this system, Stakeholders are main source of information. In this project, stakeholders are commercial people/government people, organization, and admin.

Basically Admin and User can use this project

- Admin
- User

### 1.4 proposed System Model (block diagram)

Block diagram is a diagram what is presents functions of relations in a system. Block diagram shows relation between blocks in a system.

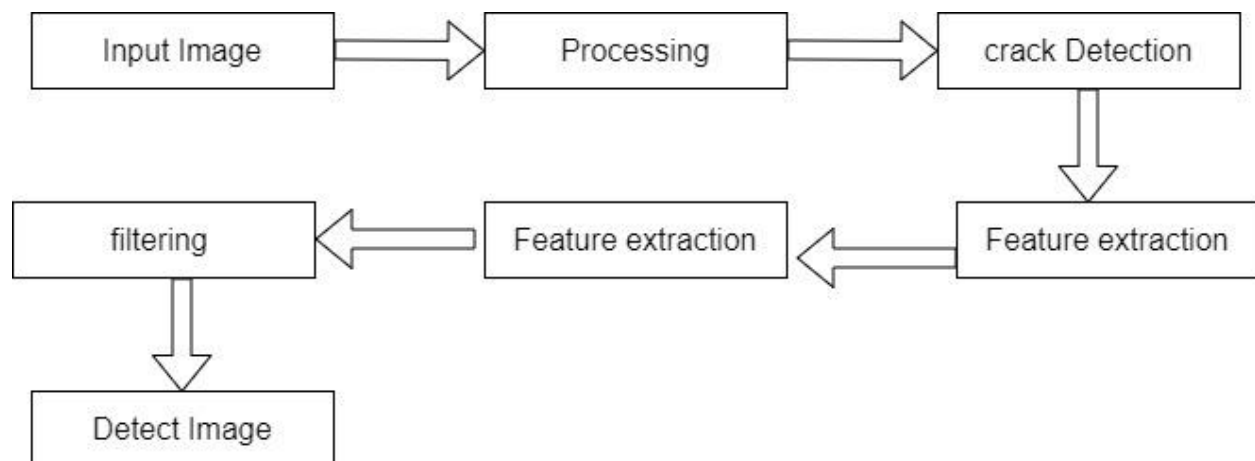


Figure1.4

## 1.5 Project Schedule

Takes a fairly good time to finish the project. From the whole system I tried to finish my website

The website took approximately six months to complete. Here is the Gantt chart. So that I can easily know when I finish my work.

### 1.5.1 Gantt Chart

#### 1.5.1.1 Finding idea proposal:

No	Work Description	Start	End	Total
1	Idea selection	01-01-2021	04-01-2021	04
2	Idea Finding with Supervisor	05-01-2021	08-01-2021	04
3	Work flow Maintenance	09-01-2020	09-02-2021	30
4	SDLC Selection	11-02-2021	18-02-2021	08

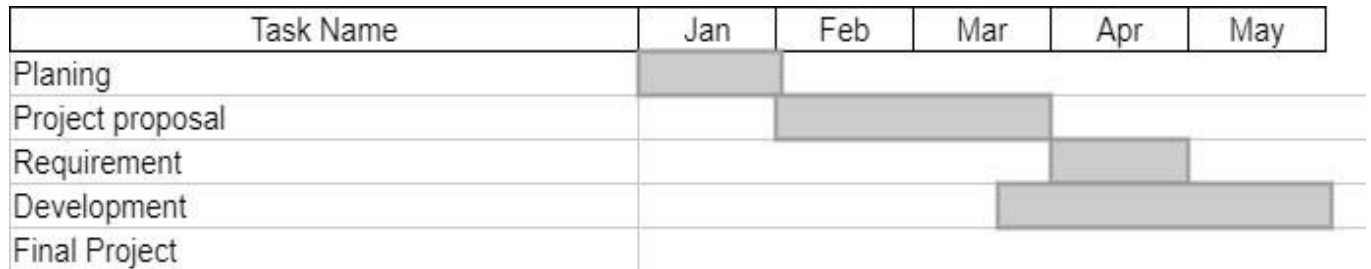
#### 1.5.1.2 Requirements Gathering

No	Work Description	Start	End	Total
1	System Flow	20-02-2021	25-02-2021	06
2	Requirement gathering	27-02-2021	02-03-2021	04
3	All requirement and information	04-04-2021	11-04-2021	08

#### 1.5.1.3 Logical System Design

No	Work Description	Time
1	Use case Diagram	04-05-2021
2	Activity Diagram	05-05-2021
3	Sequence Diagram	06-05-2021
4	Class Diagram	07-05-2021

### 1.5.1. Gantt Chart



The Gantt chart displays the following task durations:

Task Name	Jan	Feb	Mar	Apr	May
Planing	Shaded				
Project proposal		Shaded	Shaded		
Requirement				Shaded	
Development				Shaded	Shaded
Final Project					

**Fig:1.5.1**

### 1.5.2 Release Plan /Milestone

I want to release this system in 2023 because the system has many option in this project, I will add many more features during this time.

## Chapter-2

### 2.1 SOFTWARE REQUIREMENT SPECIFICATION

- ❖ MATLAB
- ❖ Drone

### 2.2 Data Requirements

The requirements for creating the system model refer to those data. My project needs to focus on a few things, such as:

- ❖ Image processing
- ❖ Crack Detection
- ❖ Sobel Method
- ❖ Canny Method
- ❖ Log Method
- ❖ Edge enhancement

### 2.3 Performance Requirement

Performance requirements define how effectively a system performs under certain conditions, Performance requirements are key components when Planning and testing the System. All of the behaviors have been resolved in this project.

### 2.4 Dependability Requirement

#### 2.4.1 Reliability Requirement

Reliability requirements Goal details for material.

## **2.5 Maintainability & Supportability Requirement**

### **2.5.1 Maintenance Requirements**

- ❖ Prevent spare event
- ❖ Always Detect Crack
- ❖ This system requires a checkup team

## **2.6 Security Requirement**

Every time there is a security breach.

MATLAB has ability to done all process with image processing an find the accurate result.

## **2.7 Usability and Human-Interaction Requirements**

Usability is a feature of consistency in how easy it is to use user interfaces. The term "usability" also refers to approaches during the process for ease of user.

## **2.8 Look and Feel Requirements**

Some such elements,

- ❖ Color
- ❖ Image
- ❖ Layout

## **2.9 Operational & Environmental Requirement**

The operational essential definition function includes the following activities: Identify the partners who are interested or interested in this system so the main stakeholders are the students, they should register and login for other activities. Recognize measurements of functionality and compatibility, so that users can easily access and use this system.



## Chapter 3: System Analysis

### 3.1 Activity Diagram for Image processing for MATLAB

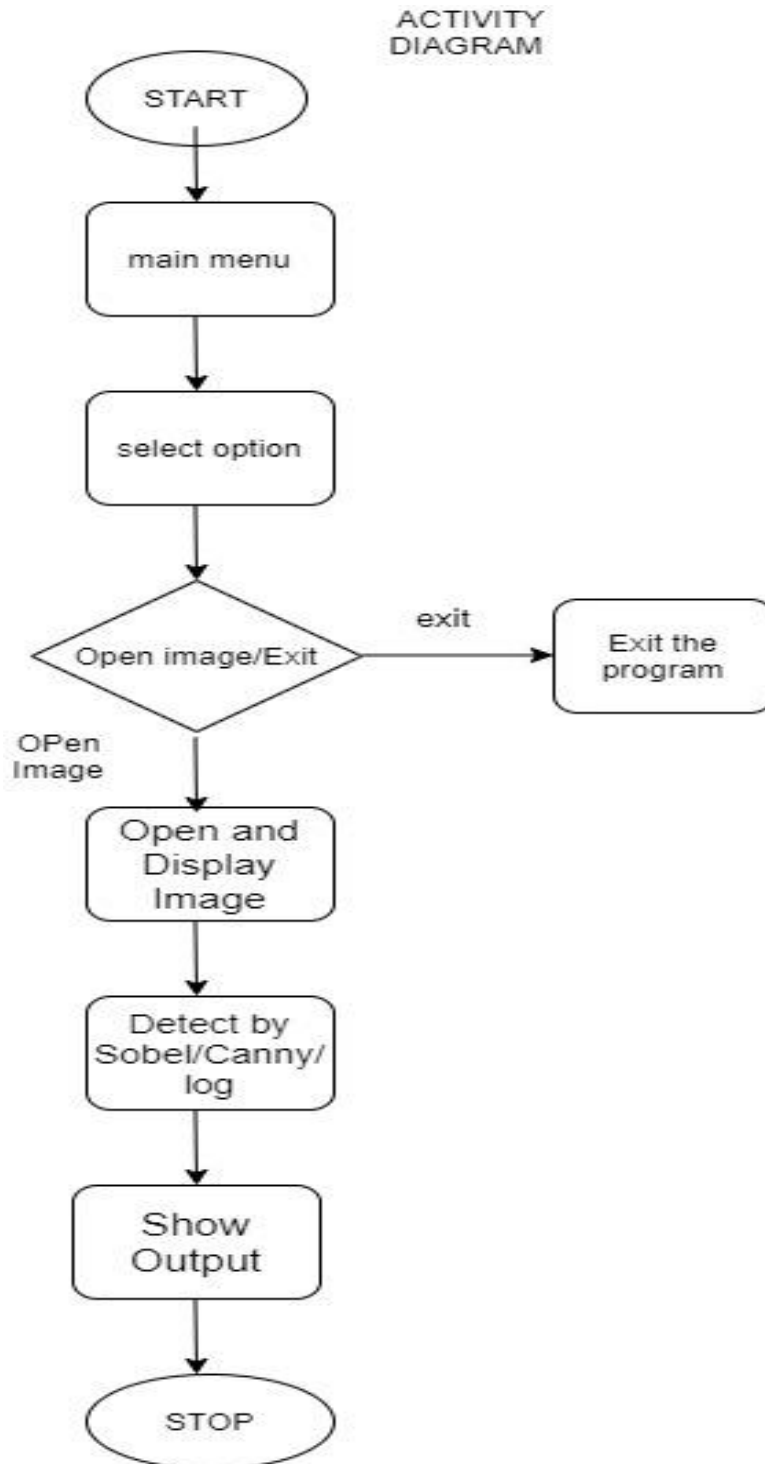


Figure:3.1

### 3.1.1 Activity Diagram for project

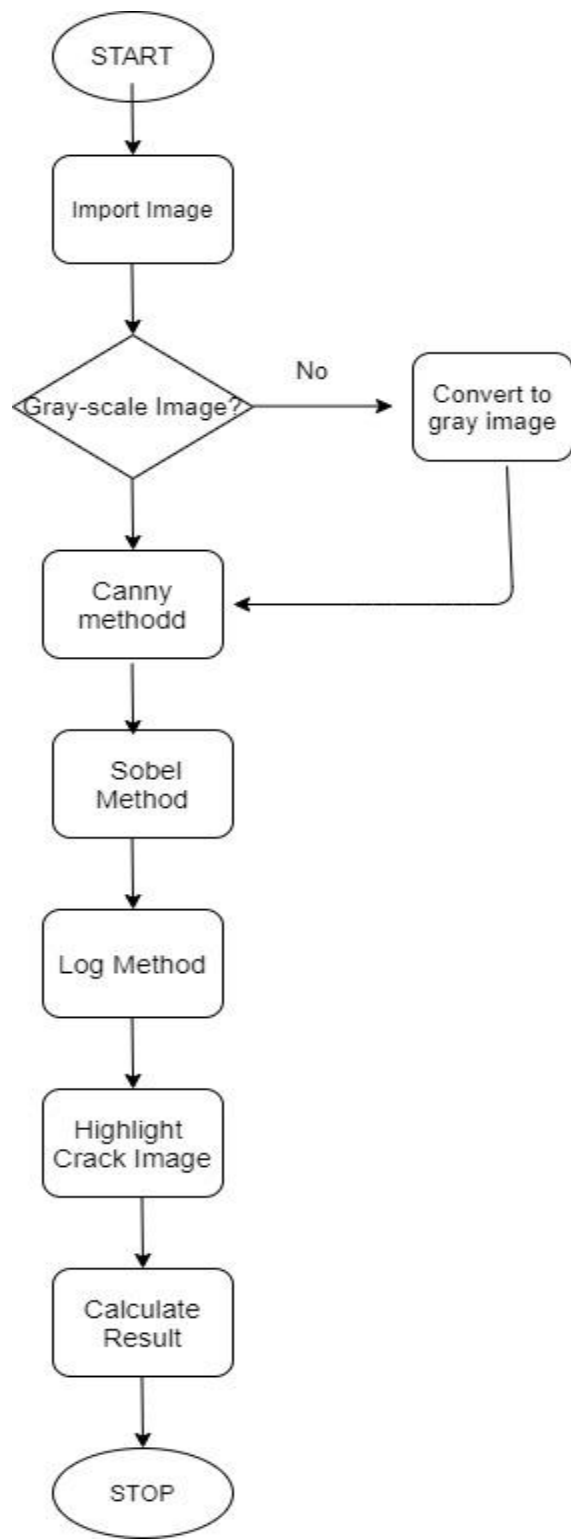


Figure:3.1.1

## Chapter-4: System Design Specification

### 4.1 Class Responsibilities Collaboration (CRC) Cards

Class Responsibilities Collaboration (CRC) Cards the Class Responsibility Collaborator (CRC) cards are exponent cards that are turn on advantage for mapping postulant classes in predefined sketch continuity; e.g., Use Case Scenarios. In this project we don't have any use cases.

Fig:4.2

### 4.2 Development Tools & Technology

#### 4.2.1 User Interface Technology

The user interface (UI) is the point of human-computer interaction and communication on the device. This may include the presence of a display screen, keyboard, a mouse and a desktop. It allows a user to interact with an application.

##### 4.2.1.1 MATLAB

Matlab is a programming platform used specifically for engineers and scientists. The heart of MATLAB is a language, a matrix-based language allowing the most natural expression of mathematics.

#### Work of MATLAB:

1. Data explore
2. Develop Algorithms
3. Models and applications creator

MATLAB express you take your ideas from research to production by deploying to enterprise applications and embedded devices.

### 4.2.1.2 Beta-flight

**Beta-flight Configurator** is a **configuration** management tool for **Drone**. This utility app lets you set up the features of your flight controller also programming and help you get in the air. You can also use this application to explore other settings and optimize your Drone

Beta-flight is flight controller software used to fly multi-rotor craft and drone. This fork differs from Base flight and Clean-flight in that it focuses on flight performance, leading-edge feature additions, and wide target support.

## 4.2.2 Implementation Tools & Platforms

### 4.2.2.1 Implementation of Database

Edge detection is an image processing technique for finding the boundaries of objects within a images. It works by detecting discontinuously in increase bright. Edge detection is used for image and data extract in areas such as image processing.

Some common methods are:

1. **Sobel Method**
2. **Canny Method**
3. **Log method**

#### 1.Sobel Method:

Sobel Operator: It is a discrete differentiation gradient-based operator. It computes the gradient approximation of image intensity function for image **edge detection**.

#### 2. Canny Method:

The most powerful edge-detection method that is the Canny method. The Canny method differs from the other edge-detection methods. It uses two(2) different thresholds to detect strong and weak edges.

**3.Log Method:** Log is a Natural logarithm. And it's Syntax is given below-

$Y = \text{Log}(X)$

$Y = \log(X)$  ; returns the natural logarithm  $\ln(x)$  of each element in array X.

The log function domain include negative and complex numbers

$Z = u + i*w$ , the complex logarithm returns  $\log(z)$ .

$$\log(\text{abs}(z)) + 1i*\text{angle}(z)$$

If we want negative and complex numbers to return error messages than return complex result.

X — Input array:

input array, specified as a scalar, vector, matrix, or multidimensional array.

Y — Output array:

Logarithm values, returned as a scalar, vector, matrix, or multidimensional array.

For positive real values of X in the interval (0, Inf), For complex and negative real values of X, Y is complex.

## CHAPTER-5: SYSTEM TESTING

### 5.1 Testing Features

Feature testing is a software development method of Testing of a feature to condition the best user knowledge.

#### 5.1.1 Features to be Tested

- ❖ Process the image
- ❖ Convert a image As Canny, Sobel and Log Method
- ❖ Detect final crack detection
- ❖ Make the final result

#### 5.1.2 Features not to be Tested

- ❖ The original image is RGB or Gray ,or black and white.

### 5.2 Testing Strategies

A test strategy is a configuration that recalculates test access in a software development cycle. The purpose of a testing strategy is to provide gradual exceptions to the actual test actions to meet those objectives from a regulatory, high-level targeting point of view.

#### 5.2.1 Test Approach

- Interface testing
- Edge detect testing
- Performance testing

### **5.2.3 Suspension and Resumption**

The suspension ground for software testing means that the whole or part of the test activities have to be increased in excess when the resumption criteria indicate the resumption of the previously suspended activities.

## **5.3 Testing Environment (hardware/software requirements)**

### **Hardware requirements**

- Drone
- Remote
- Camera
- Flight Controller

### **Software requirements**

MATLAB Any version of Release

Windows 10 & 8

## 5.4 Test Cases

<b>Test Name: MATLAB</b>			
<b>Test Procedure</b>	<b>MATLAB image processing</b>		
<b>Test ID</b>			
<b>Step No.</b>	<b>Operator Action</b>	<b>Expected result and Evaluation Criteria</b>	<b>Result</b>
1	Form Validation	Each every method checking	Ok
2	User Existing	Checking Final result	Ok

### 5.4.1 Test Case Report

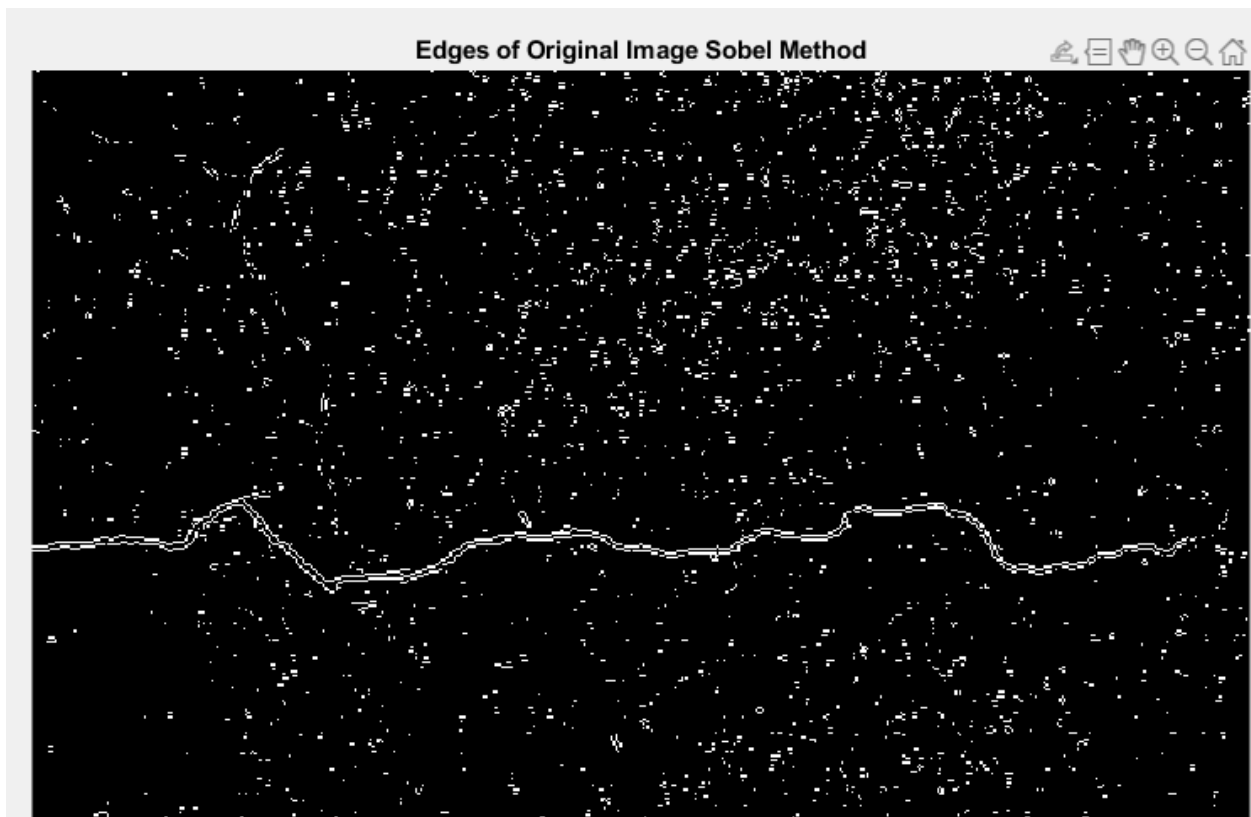
<b>Functions</b>	<b>Description</b>	<b>Executed%</b>	<b>Pass%</b>	<b>Pending</b>	<b>Priority</b>
Start	Open MATLAB and run	100%	100%	0	High
Open	Check all	100%	100%	0	High
Run	Run Final result	100%	100%	0	High
View	Check all result	100%	100%	0	High



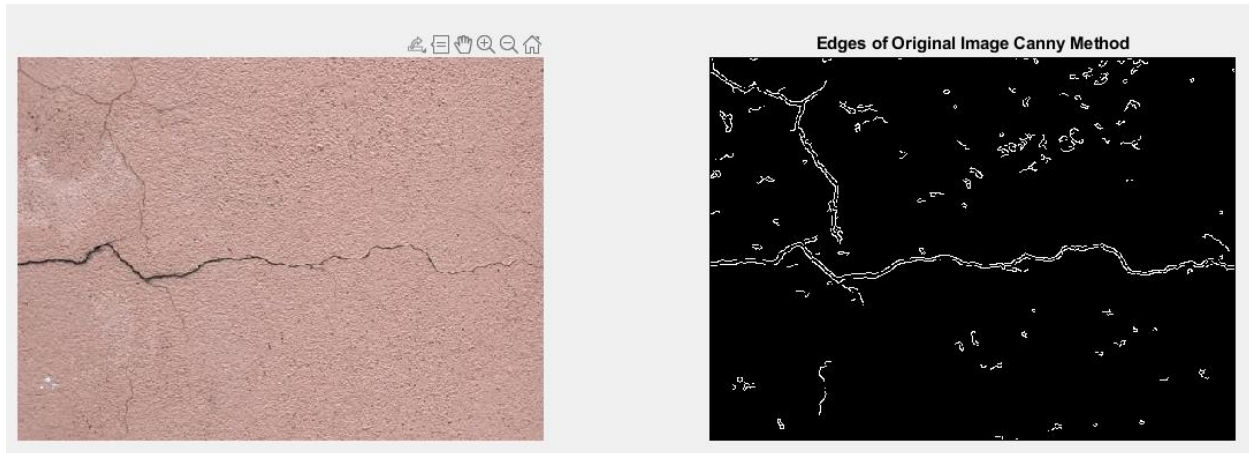
## CHAPTER-6: USER MANUAL

All the information required by the user to make full use of the information system is included in the user manual

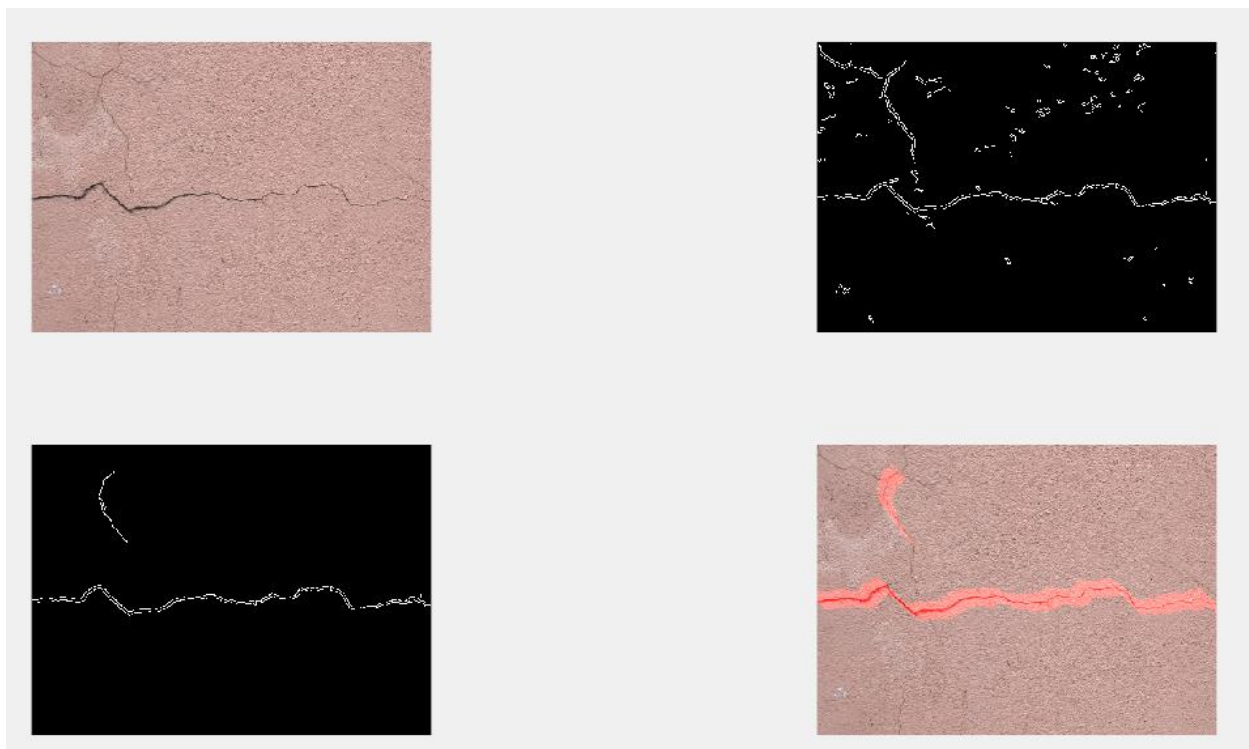
### 6.1 User (Sobel Method)



### 6.1.1 User (Canny Method)



### 6.1.2 User (Final Method)



## CHATER-7: PROJECT SUMMARY

### 7.1 GitHub Link:

<https://github.com/Joy-Biswas/Bridge-building-crack-founder-and-inspection>

### 7.2 Critical Evolution

- ❖ To make crack detection method to get result.
- ❖ Deeper detect for a crack image.

### 7.3 Limitation

- ❖ Fail to work Properly on poor Quality
- ❖ Detect minor Crack with 50-60% Accuracy
- ❖ Fail to take images inside of a building.

### 7.4 Achievements

- ❖ Inspection Bridge/building to avoid unwanted event.
- ❖ It Also prevent many life/time/cost after earthquake may occur in Bangladesh
- ❖ It checks time and cost by detecting crack image to take images from DRONE.

### 7.5 Future Scope

Future Scope We'll develop our project in next, for more necessary.

- ❖ Use it as a Government Project
- ❖ Use it also as a Commercial Project
- ❖ Use it after earthquake

## 7.6 References

### Web References

- ❖ <https://creately.com/tour/>
- ❖ <https://www.w3schools.com/>
- ❖ <https://github.com/>
- ❖ [www.google.com](http://www.google.com)
- ❖ <https://www.mathworks.com/>