BUILT-IN SCANNER IN THE LAPTOP

A Project Report

Submitted in the partial fulfilment of the requirements for

the award of the degree of

Bachelor of Technology

In

MECHANICAL ENGINEERING

By

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DEPARTMENT OF MECHANICAL ENGINEERING

Declaration

The Project Report entitled "**BUILT-IN SCANNER IN THE LAPTOP"** is a record of bonafide work of **HEMANTH SANKU (170070177)**, **P.AMEERKHAN (170070151), D.SAI KUMAR (170070248)** submitted in partial fulfilment for the award of B. Tech in mechanical engineering to the K L University. The results embodied in this report have not been copied from any other departments/university/institute.

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Certificate

This is to certify that the Project Report entitled "**BUILT-IN SCANNER IN THE LAPTOP"**is being submitted by **Hemanth Sanku (170070177), P. Ameerkhan(170070151), D. Sai kumar (170070248)** submitted in partial fulfilment for the award of B. Tech in mechanical engineering to the K L University is a record of bonafide work carried out under guidance and supervision.

The results in this report have not been copied from any other departments/University/Institute.

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ABSTRACT

Turning Hard Document into Soft Document and sharing has become a hard and time-consuming task nowadays. By implementing or adapting this design in upcoming laptops users can on-the-go scan documents using their laptops and share or save them in laptop itself. No extra accessory is needed the same camera can be used for attending video conferences as well-as for scanning documents. And user can also feel secure about their privacy because while camera is not in use it will automatically be in closed position.

CONTENTS

1. INTRODUCTION

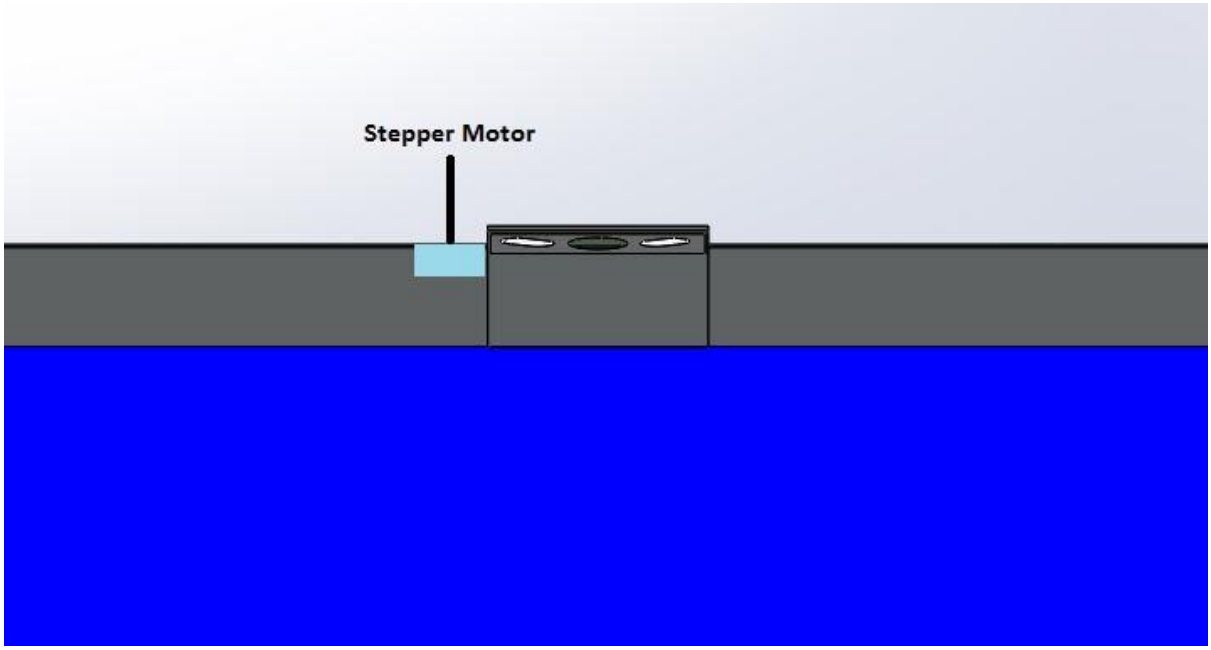
In this project we will be designing a camera which can be positioned in a way that we can scan any documents without need of scanner using laptop itself. An adjustable camera is fixed to laptop Lid which helps to scan Documents. The scanned Documents can be extracted in both JPEG and PDF formats. Two Flashlights are installed to both sides of camera for improving quality of scanning.

2. LITERATURE SURVEY

S. No.	Author	Title	Journal Details	Objectives	Methodology
1	M. Naveenkumar, A. Vadivel	OpenCV for Computer Applications	Proceedings of National Conference on Big Data and Cloud Computing (NCBDC'15), March 20, 2015	Help the computer to understand the content of an image.	Image filtering, Image Transforming, Object Tracking, Feature detecting
2	Muhammad Muzzamil Luqman, Petra Gomez-Kra¨mer, Jean-Marc Ogier	Mobile phone camera-based video scanning of paper documents	HAL Id: hal-00946625 https://hal.archives-ouvertes.fr/hal-00946625 Submitted on 13 Feb 2014	Optimising the document scanning by using accelerometer and gyroscope sensors data	Processing of accelerometer data, use of gyroscope data for visual user feedback
3	Stuart Taylor, Chris Dance, William Newman, Alex Taylor, Mauritius Seeger, Michael Taylor, Tony Aldhous	Advances in Interactive Video Scanning of Paper Documents	Research gate Publication-2951682 October 2004	Scanning document and detecting text while reading in CamWorks UI	CamWorks image processing, Skew detection, Text block segmentation, word, and line segmentation, binarizing

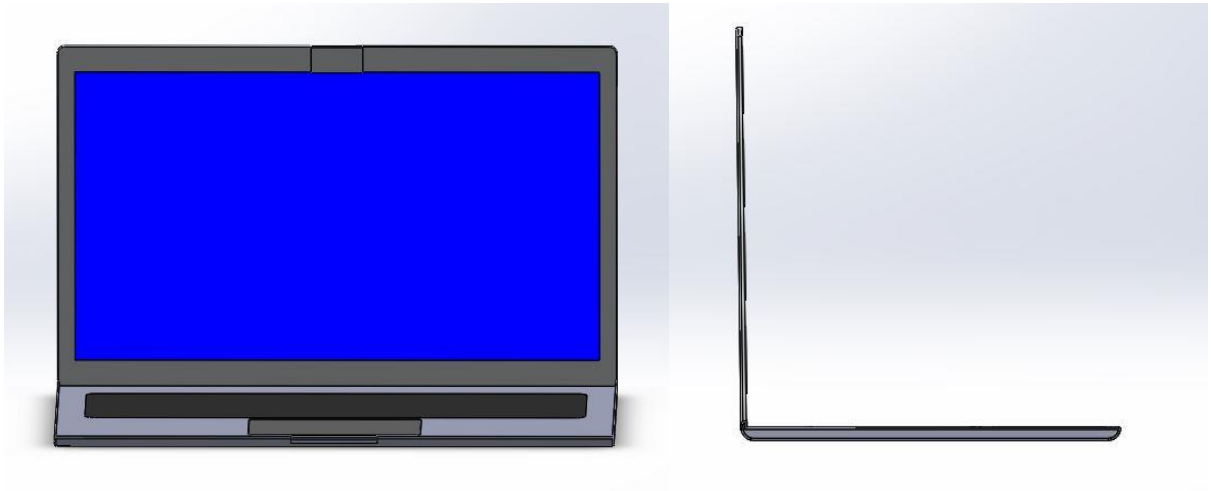
3. METHODOLOGY

There should be a Stepper motor fixed to the camera. For our different needs the camera will automatically adjusts its angle.



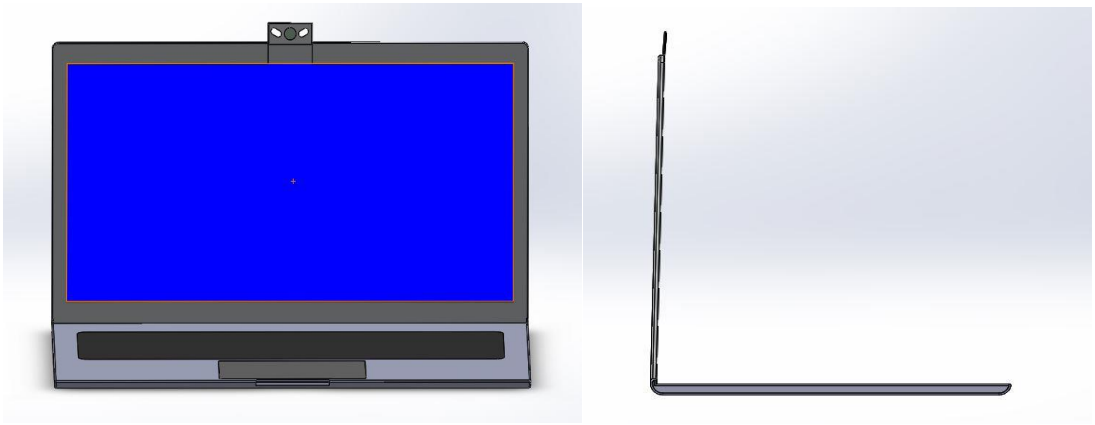
3.1 POSITION 1:

3.1.1 Fully Closed: When user is not using camera, it will be in closed position where a user can feel secure about his/her privacy.



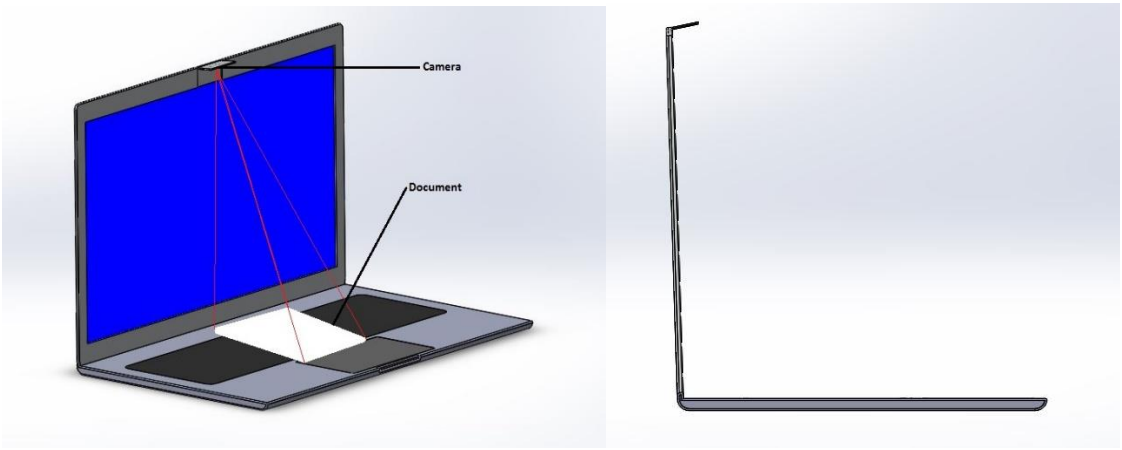
3.2 POSITION 2:

3.2.1 Fully Opened: When a user needs to make a videocall or attend online video conferences the camera will be fully opened.



3.3 POSITION 3:

3.3.1 Scanning Position: When a user needs to scan a document, the camera will tilt down towards document.

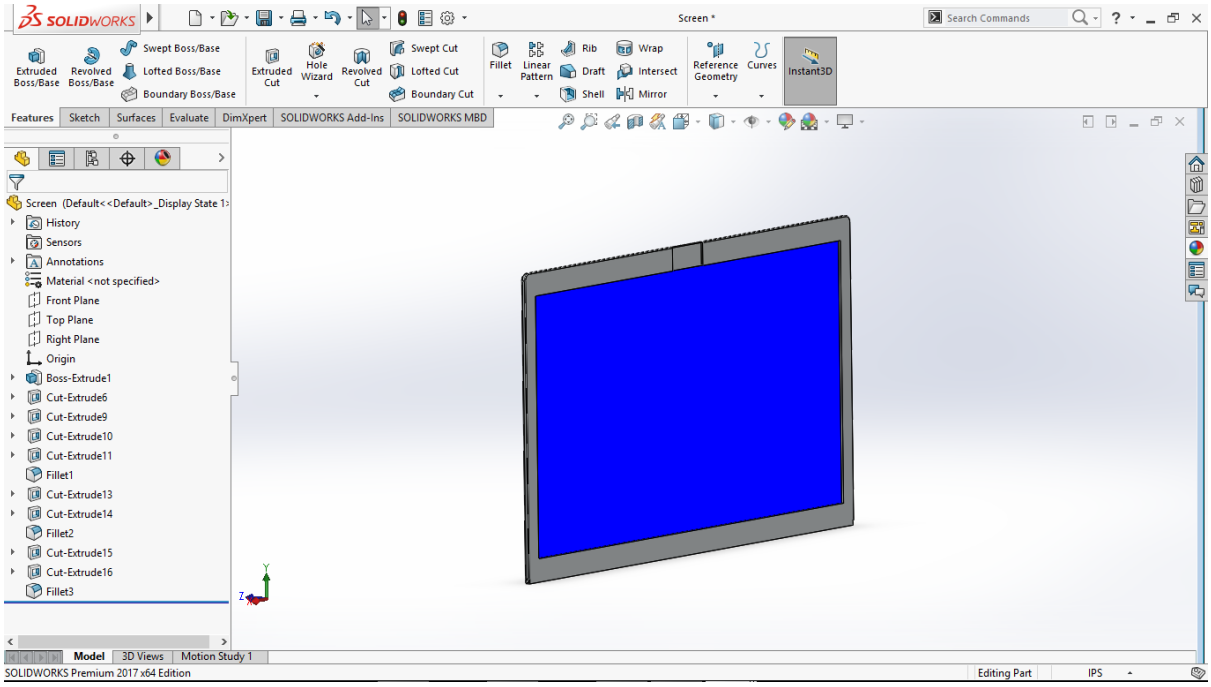


4. MODELLING

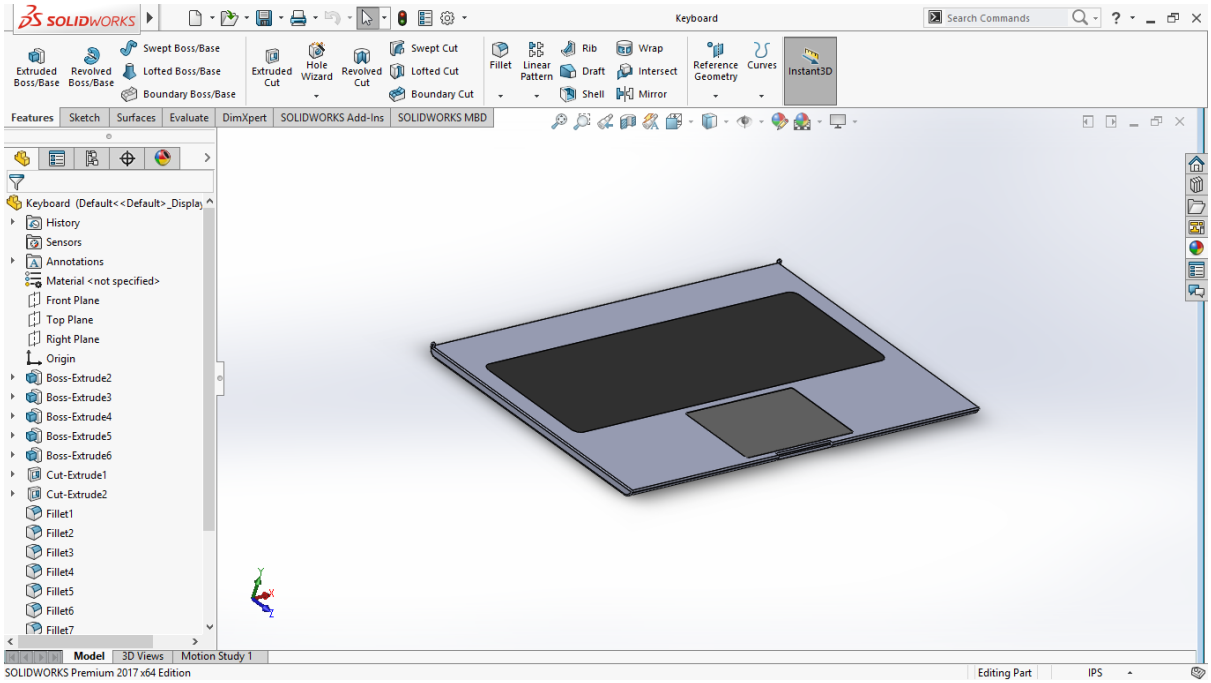
We have designed and assembled all parts and components in SOLID WORKS.

4.1 PARTS:

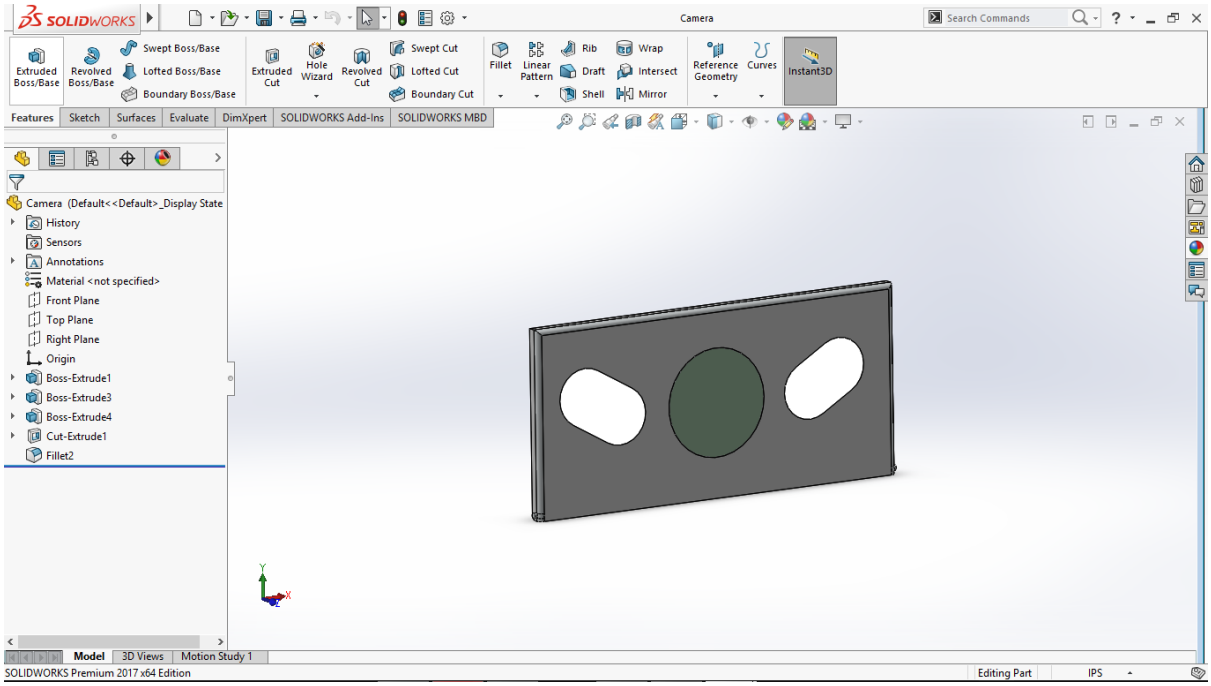
4.1.1 Screen.

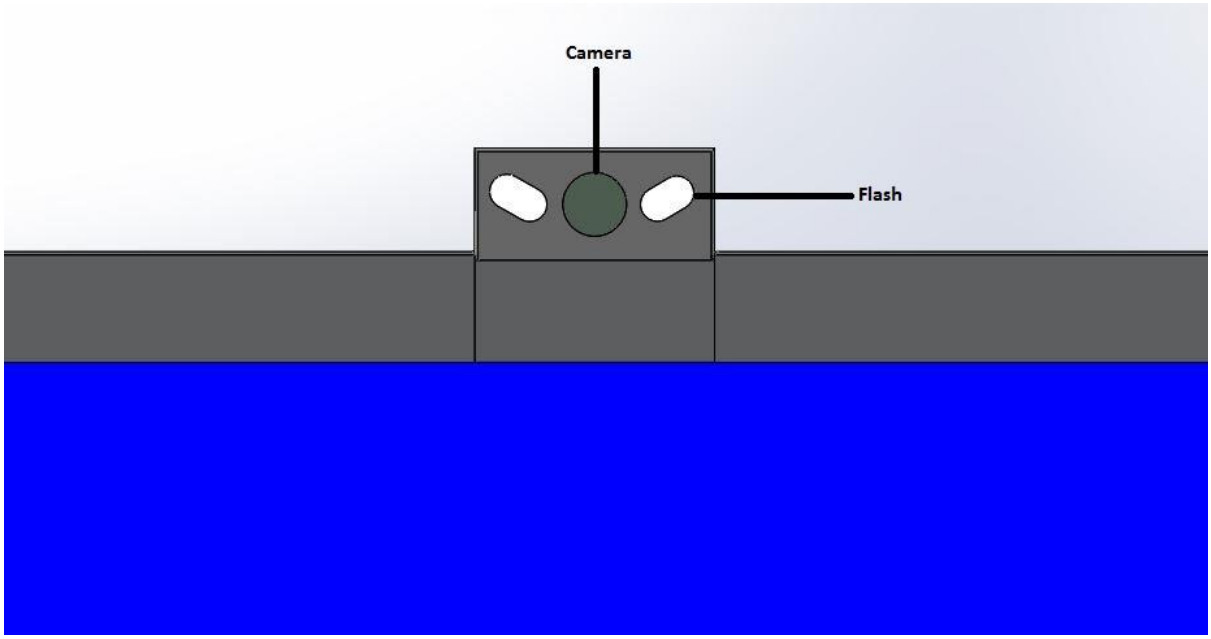


4.1.2 Keyboard.

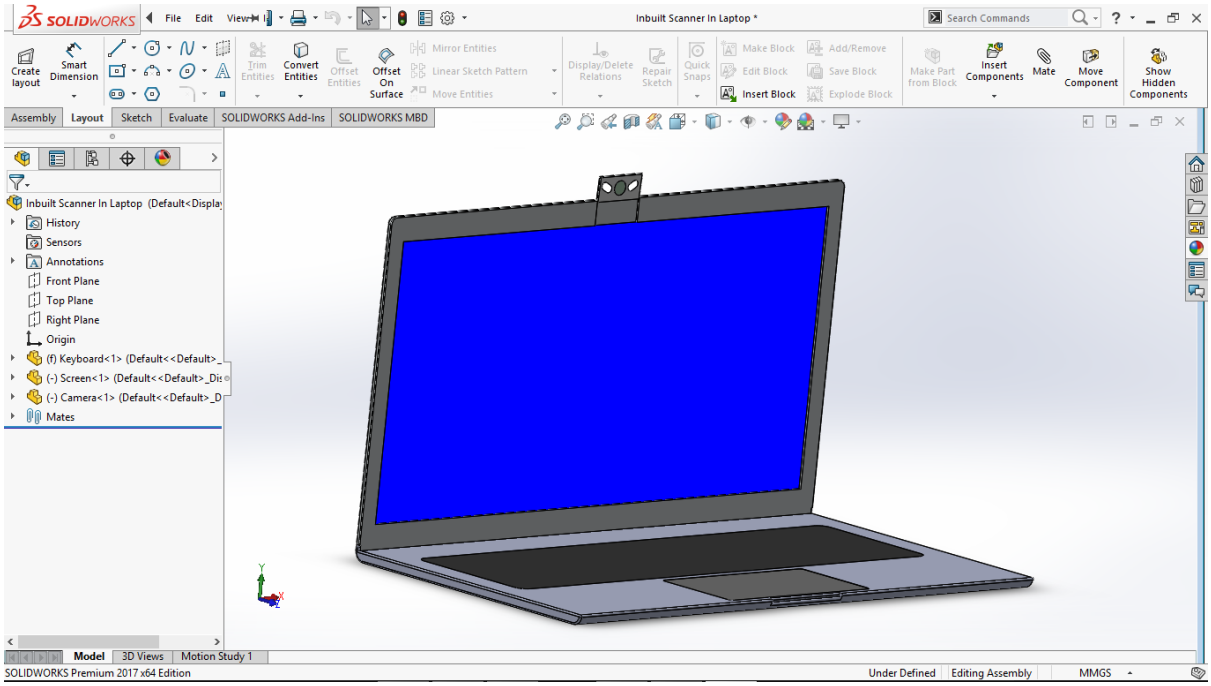


4.1.3 Camera Module.





4.2 ASSEMBLY:


SOLIDWORKS
File
Edit
View
Inbuilt Scanner In Laptop *
Search Commands
Create layout
Smart Dimension
Trim Entities
Convert Entities
Offset Entities
Offset On Surface
Mirror Entities
Linear Sketch Pattern
Move Entities
Display/Delete Relations
Repair Sketch
Quick Snaps
Make Block
Edit Block
Insert Block
Add/Remove
Save Block
Explode Block
Make Part from Block
Insert Components
Mate
Move Component
Show Hidden Components
Assembly
Layout
Sketch
Evaluate
SOLIDWORKS Add-Ins
SOLIDWORKS MBD
Inbuilt Scanner In Laptop (Default<Displa
History
Sensors
Annotations
Front Plane
Top Plane
Right Plane
Origin
(f) Keyboard<1> (Default<<Default>
(-) Screen<1> (Default<<Default>_Dis
(-) Camera<1> (Default<<Default>_D
Mates
Model
3D Views
Motion Study 1
SOLIDWORKS Premium 2017 x64 Edition
Under Defined
Editing Assembly
MMGS

5. CODE

We have executed the code using Python IDLE by importing different necessary libraries using pip.

5.1 REQUIRED LIBRARIES:

OpenCV: It is a Python library of programming functions mainly aimed at real-time Computer Vision Applications. It mainly focuses on image processing, video capture and analysis including features like face detection and object detection.

NumPy: It is a Python library used for working with arrays. It also has functions for working in domain of linear algebra, Fourier transform, and matrices.

Mapper: It is an algorithm for exploration, analysis, and visualization of data.

PIL(Pillow): Python Imaging Library is a free and open-source additional library for the Python programming language that adds support for opening, manipulating, and saving many different image file formats.

Img2pdf: It is an Imaging library used for manipulating and saving many image formats.

OS: It is a library provides functions for interacting with the operating system.

5.2 EXECUTION CODE:

```
#Importing Necessary Libraries

import cv2

import numpy as np

import mapper

import img2pdf

from PIL import Image, ImageEnhance

import os


#Capturing Photo Uising Webcam
```

```
cam = cv2.VideoCapture(0)

cv2.namedWindow("test")

img_counter = 0
while True:
    ret, frame = cam.read()
    if not ret:
        print("failed to grab frame")
        break
    cv2.imshow("test", frame)

    k = cv2.waitKey(1)
    if k%256 == 27:
        # ESC pressed
        print("Escape hit, closing...")
        break
    elif k%256 == 32:
        # SPACE pressed
        img_name = "test_img.jpg".format(img_counter)
        cv2.imwrite(img_name, frame)
        print("{} written!".format(img_name))
        img_counter += 1
        break
```

```
#Reading Img and Enhansing
image=cv2.imread("test_img.jpg")   #read in the image
image=cv2.resize(image,(1300,800)) #resizing because opencv does not work well with bigger images
orig=image.copy()

#GrayScale Filter
gray=cv2.cvtColor(image,cv2.COLOR_BGR2GRAY)  #RGB To Gray Scale
cv2.imshow("Title",gray)

#Canny Edge detection
edged=cv2.Canny(gray,30,50)  #30 MinThreshold and 50 is the MaxThreshold
cv2.imshow("Canny",edged)

contours,hierarchy=cv2.findContours(edged,cv2.RETR_LIST,cv2.CHAIN_APPROX_SIMPLE)  #retrieve the contours as a list, with simple apprximation model
contours=sorted(contours,key=cv2.contourArea,reverse=True)

#the loop extracts the boundary contours of the page
for c in contours:
    p=cv2.arcLength(c,True)
    approx=cv2.approxPolyDP(c,0.02*p,True)

    if len(approx)==4:
```

```
        target=approx
        break

#Mapping
approx=mapper.mapp(target) #find endpoints of the sheet

pts=np.float32([[0,0],[800,0],[800,800],[0,800]])  #map to 800*800 target window

op=cv2.getPerspectiveTransform(approx,pts)  #get the top or bird eye view effect
dst=cv2.warpPerspective(orig,op,(800,800))
cv2.imshow("Scanned",dst)

#saving the scanned img
img_name = "scanned_org.jpg".format(img_counter)
cv2.imwrite(img_name,dst)

#Improving Brightness
#read the image
im = Image.open("scanned_org.jpg")

#image brightness enhancer
enhancer = ImageEnhance.Brightness(im)

factor = 1.5 #brightens the image
```

```
im_output = enhancer.enhance(factor)

im_output.save('scanned_brightened.jpg')


#Improving Sharpness

#read the image

im = Image.open("scanned_brightened.jpg")


#image brightness enhancer

enhancer = ImageEnhance.Sharpness(im)


factor = 1 #brightens the image

im_output = enhancer.enhance(factor)

im_output.save('scanned_sharpened.jpg')


#Converting Scanned img to pdf

# storing image path

img_path = "D:/K L University/OneDrive - K L
University/Academics/Project/Code/2/scanned_sharpened.jpg"


# storing pdf path

pdf_path = "D:/K L University/OneDrive - K L
University/Academics/Project/Code/2/Output/scanned_Doc.pdf"


# opening image

image = Image.open(img_path)
```

```
# converting into bytes using img2pdf

pdf_bytes = img2pdf.convert(image.filename)


# opening or creating pdf file

file = open(pdf_path, "wb")


# writing pdf files with chunks

file.write(pdf_bytes)


# closing image file

image.close()


# closing pdf file

file.close()

# output

print("Successfully made pdf file")


#END

# press Esc to close

cv2.waitKey(0)

cv2.destroyAllWindows()
```

5.3 MAPPER CODE: This code is used for analysing image and deleting the unwanted borders which has been detected by the canny edge detection tool

5.3.1 Code:

```
import numpy as np

def mapp(h):
    h = h.reshape((4,2))
    hnew = np.zeros((4,2),dtype = np.float32)
    add = h.sum(1)
    hnew[0] = h[np.argmin(add)]
    hnew[2] = h[np.argmax(add)]
    diff = np.diff(h,axis = 1)
    hnew[1] = h[np.argmin(diff)]
    hnew[3] = h[np.argmax(diff)]
    return hnew
```

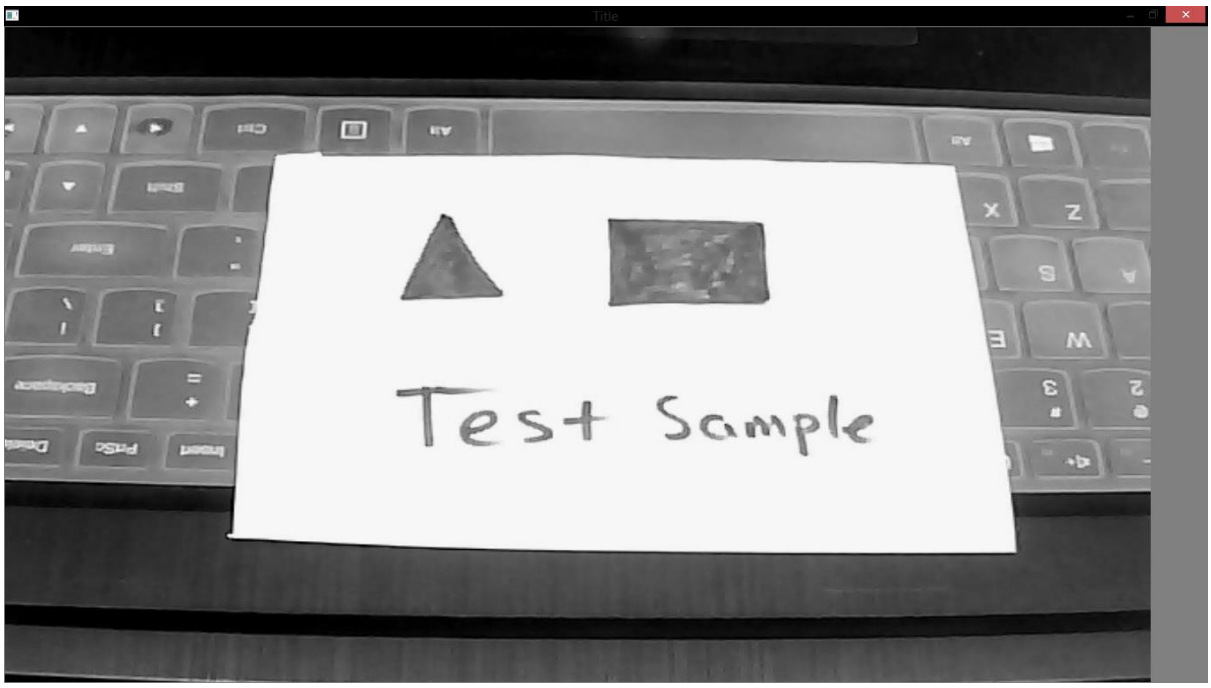
6. RESULTS

By running the above code in Python IDLE the execution of the code process goes in step-by-step manner.

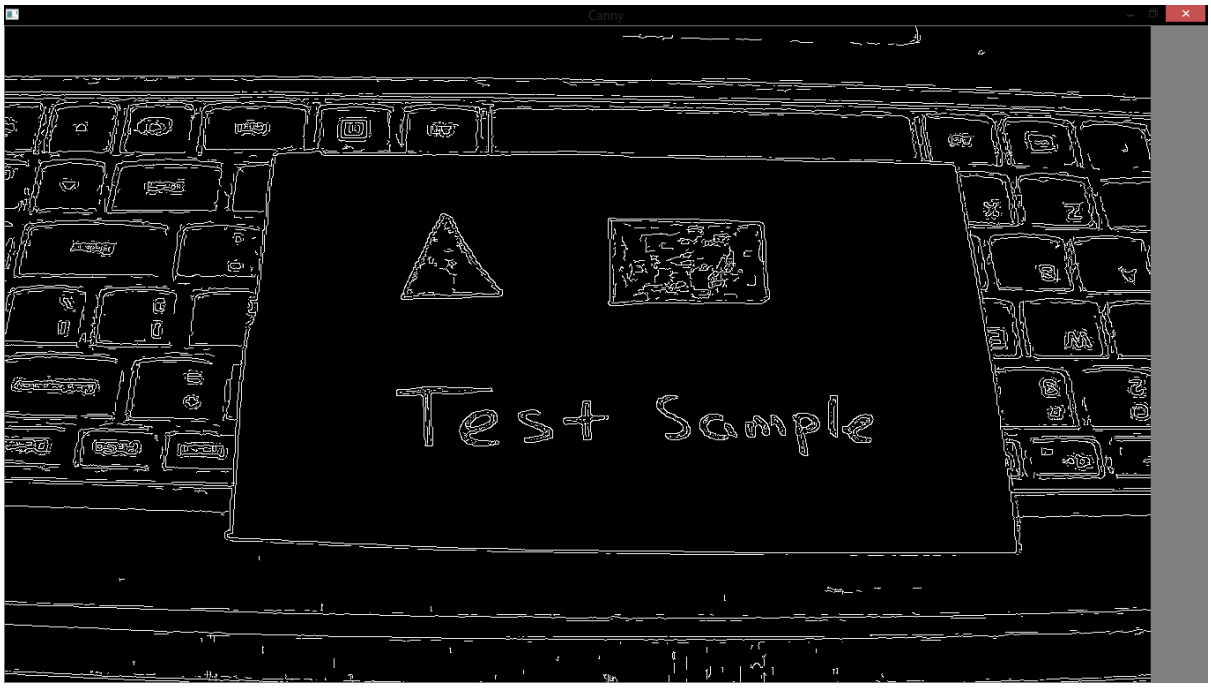
```
Final Code.py - D:\K L University\OneDrive - K L University\Academics\Project\Code\2\Final Code.py (3.8.1)
File  Edit  Format  Run  Options  Window  Help
#Importing Necessary Libraries
import cv2
import numpy as np
import mapper
import img2pdf
from PIL import Image, ImageEnhance
import os



#Capturing Photo Using Webcam
cam = cv2.VideoCapture(0)

cv2.namedWindow("test")

img_counter = 0
while True:
    ret, frame = cam.read()
    if not ret:
        print("failed to grab frame")
        break
    cv2.imshow("test", frame)

    k = cv2.waitKey(1)
    if k%256 == 27:
        # ESC pressed
        print("Escape hit, closing...")
        break
    elif k%256 == 32:
        # SPACE pressed
        img_name = "test_img.jpg".format(img_counter)
        cv2.imwrite(img_name, frame)
        print("{} written!".format(img_name))
        img_counter += 1
        break


#Reading Img and Enhansing
                                                                    Ln: 1  Col: 0
```

6.1 STEP 1: Scanning or snapping a photo through external or internal camera module of the laptop and saving it.

6.2 STEP 2: Applying grayscale filter to original image that saved and saving it after applying filter.

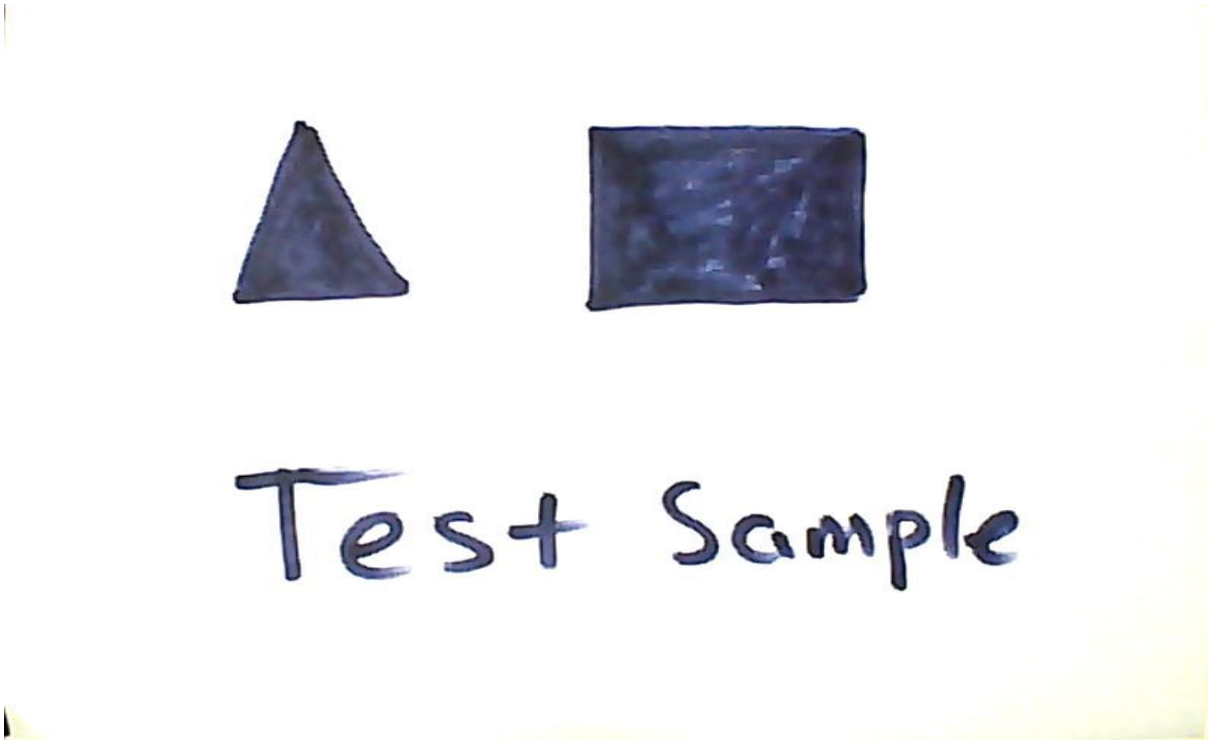


6.3 STEP 3: Applying Canny Edge Detection tool for detecting all edges in the image.

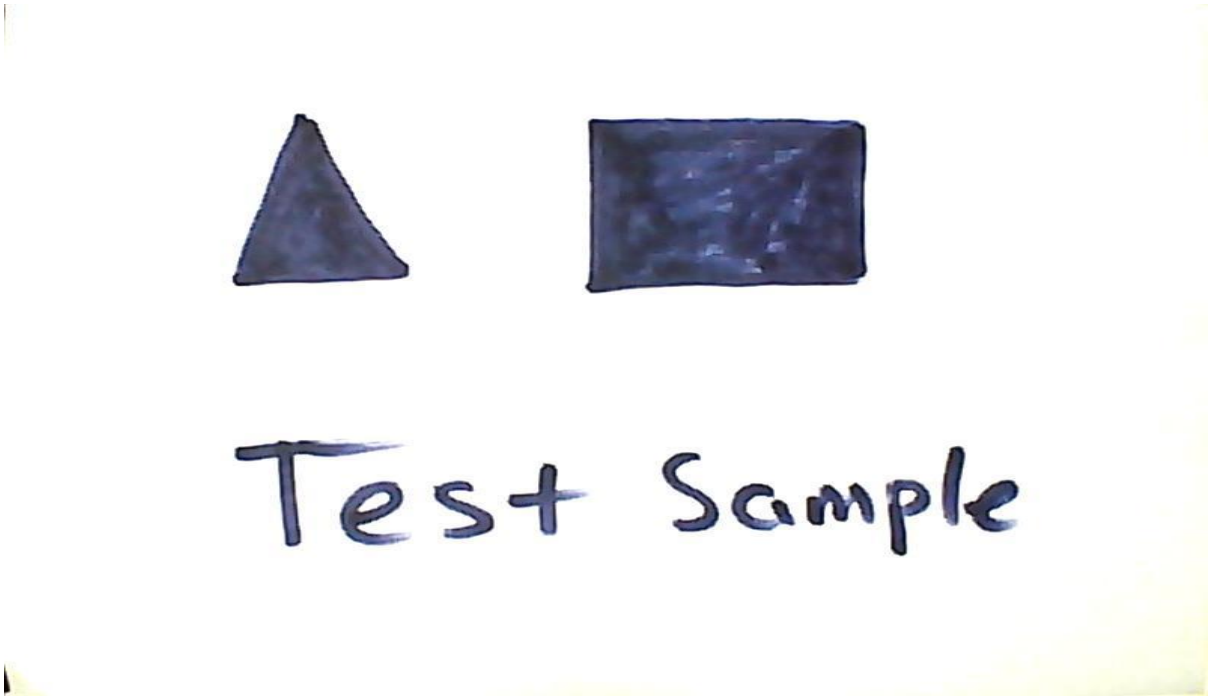


6.4 STEP 4: By using mapper algorithm detect the long edges and delete the unwanted edges and aligning the document and saving it.

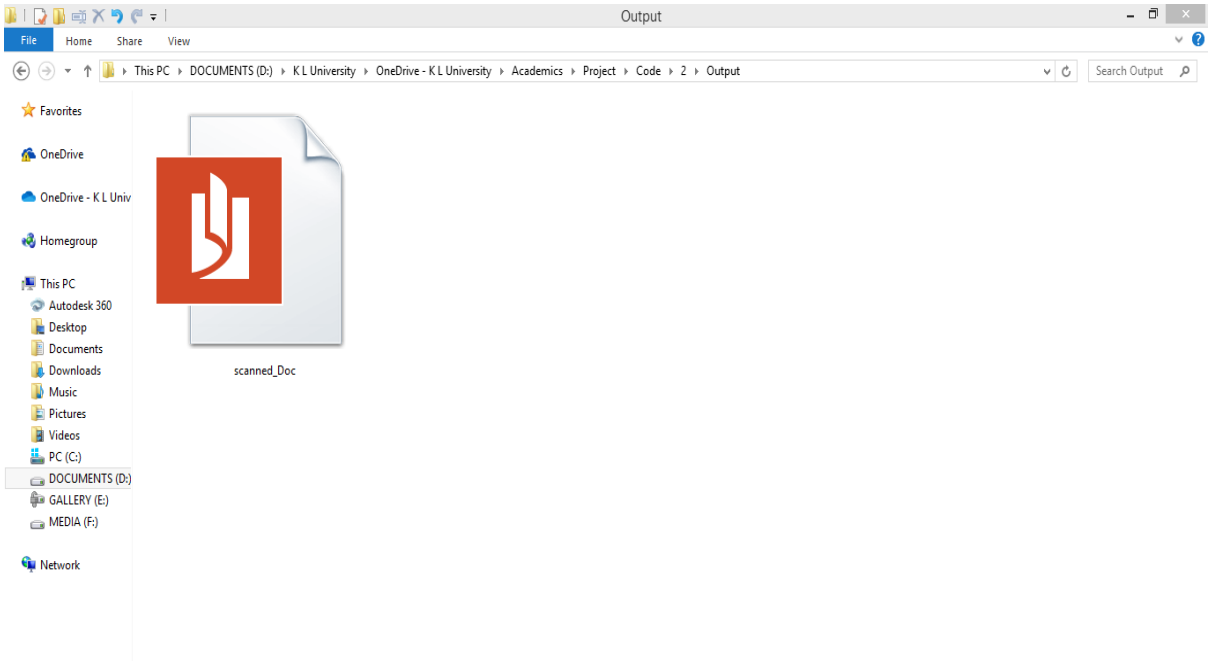
6.5 STEP 5: Improving the Brightness of the saved image by using PIL library and saving it.



6.6 STEP 6: Improving the Sharpness of the saved image by using PIL library and saving it.

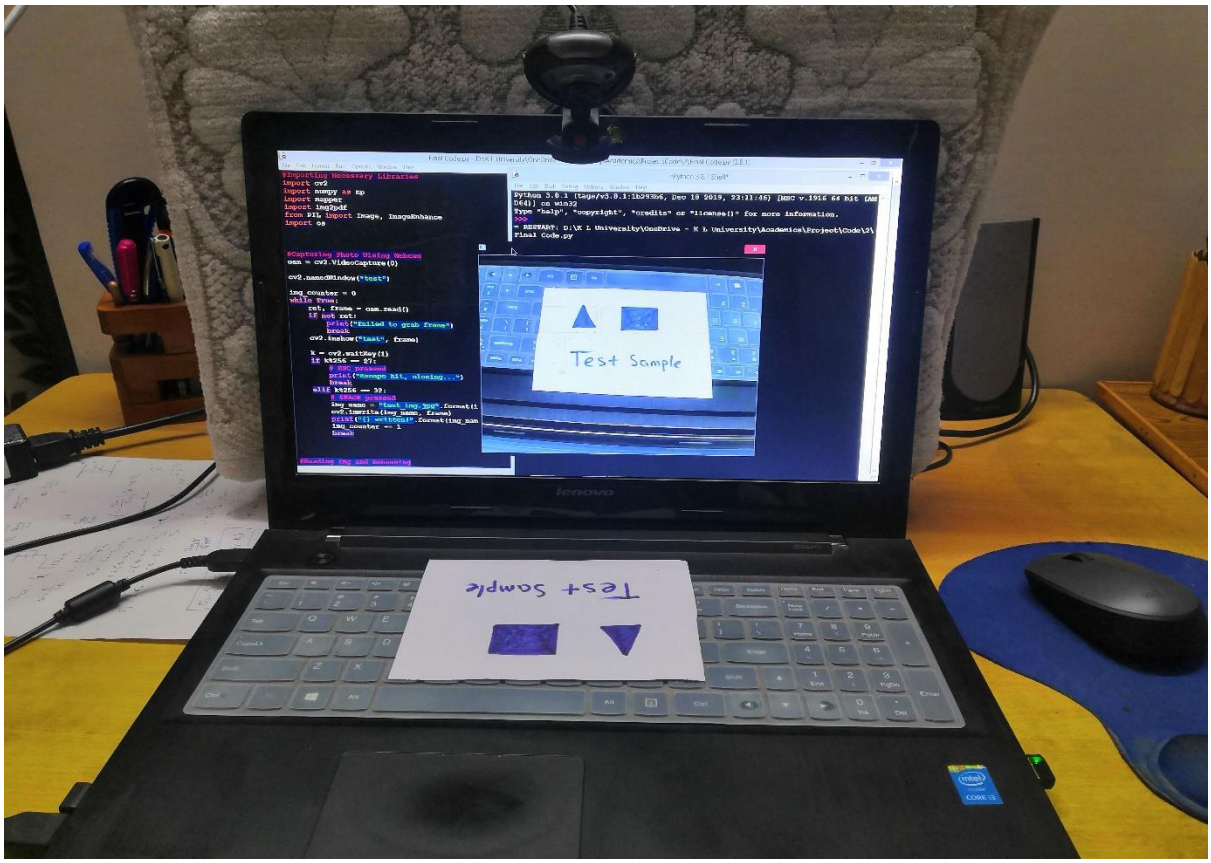


6.7 STEP 7: Converting the saved image of jpg format into pdf format by using img2pdf library and saving it.



7.CONCLUSION

Since, whatever we have designed in solidworks we could not be able to make exact prototype of it So, we are applying patent for this design. Hence, we have executed the functions of the Built-In Scanner in Laptop using external camera through Python IDLE.



8. ADVANTAGES & FUTURE SCOPE

8.1 ADVANTAGES:

8.1.1 Time required for converting hard copy document to soft copy document will be reduced.

8.1.2 User can get full privacy because in this design he camera module will be in closed position when not in use.

8.1.3 No need to carry any scanner for scanning documents.

8.1.4 The same camera can be used for video conferences and as well-as scanning.

8.2 DISADVANTAGES:

8.2.1 Document size for scanning is limited to A4.

8.3 FUTURE SCOPE:

Nowadays many people are scanning documents using cell phones and transferring it to computers and sharing. In Future if Laptop Manufacturers adapt this design for upcoming laptops, we can scan the document without use of any scanner or mobile phone. Completely on the go we can scan and share them. This Design may be very helpful for students, employees, etc.

9. REFERENCES

[1] “Amita, Meenakshi, Simran, Varsha & Ajay (2020)” Object Detection Using Machine Learning. International Research Journal of Computer Science (IRJCS), Volume VII, 41-45. doi://10.26562/IRJCS.2020.APIS10084

[2] “M. Naveenkumar, A. Vadivel” OpenCV for Computer Vision Applications. Proceedings of National Conference on Big Data and Cloud Computing (NCBDC’15), March 20, 2015

[3] “Muhammad Muzzamil Luqman, Petra Gomez-Kra¨mer, Jean-Marc Ogier” Mobile phone camera-based video scanning of paper documents. HAL Id: hal-00946625 https://hal.archives-ouvertes.fr/hal-00946625 Submitted on 13 Feb 2014

[4] “Kristine M. Alpi, James C. Brown, Jr., Jennifer A. Neel, Carol B. Grindem, Keith E. Linder, James B. Harper” Scanning technology selection impacts acceptability and usefulness of image-rich content. doi: 10.3163/1536-5050.104.1.003. PMCID: PMC4722637. PMID: 26807048