ELECTRONICS PROJECT

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AIM OF PROJECT

TO DEVELOP A WIRELESS MASK DETECTION DEVICE USING DRONE FOR SURVILLANCE.

COMPONENTS USED

FOR DRONE :-

1.FRAME
2.MOTOR 4 BRUSHLESS PIECES
3.ELECTRONIC SPEED CONTROL(ESC) 4 PIECES
4.FLIGHT CONTROL BOARD (KK2.15 OR ARDUPILOT BOARD)
5.RADIO TRANSMITTER AND RECEIVER
6.PROPELLER(2 CLOCKWISE & 2 ANTICLOCKWISE)
7.BATTERY AND CHARGER (LIPO)
8.GPS MODULE

FOR MASK DETECTION :-

1.CAMERA FOR CONTINUOUS SURVILLANCE
2.SOFTWARE FOR ANALYSIS (PYTHON OPEN CV /MATLAB)

INTRODUCTION

THE COVID19 VIRUS CAN BE SPREAD THROUGH CONTACT AND CONTAMINATED SURFACES. FIRSTLY, A FACE MASK WAS NOT MANDATORY FOR EVERYONE BUT AS THE DAY PROGRESSES SCIENTISTS AND DOCTORS HAVE RECOMMENDED EVERYONE TO WEAR A FACE MASK. SO TO DETECT WHETHER A PERSON IS WEARING FACE MASK OR NOT IS AN ESSENTIAL PROCESS TO IMPLEMENT IN THE SOCIETY CURRENTLY WHICH CAN BE USED FOR VARIOUS APPLICATIONS LIKE AT THE AIRPORT, HOSPITALS, OFFICES, SCHOOLS, ETC. THIS SYSTEM CAN BE OF GREAT IMPORTANCE AT AIRPORTS TO DETECT TRAVELLERS WHETHER THEY ARE WEARING A MASK OR NOT AND AT SCHOOLS TO ENSURE STUDENTS ARE WEARING A FACE MASK FOR THEIR SAFETY.

LITERATURE SURVEY

IN EARLIER DAYS FACE DETECTION MODELS ARE IMPLEMENTED USING EDGE,LINE AND CENTRE NEAR FEATURES AND PATTERNS ARE RECOGNIZED FROM THOSE FEATURE. THESE APPROACHES ARE USED TO FIND BINARY PATTERNS LOCALLY. THESE APPROACHES ARE VERY EFFECTIVE TO DEAL WITH GRAY-SCALE IMAGES AND THE COMPUTATION EFFORT REQUIRED ALSO VERY LESS.
VIOLA JONES DETECTOR PROPOSED AN REAL TIME OBJECT MODEL USED TO DETECT DIFFERENT CLASSES OF OBJECTS. IT USES 24X24 BASE WINDOW SIZE TO EVALUATE ANY IMAGE WITH EDGE ,LINE AND FOUR RECTANGULAR FEATURES. HARR-LIKE FEATURES ARE LIKE CONVOLUTIONS TO CHECK WEATHER GIVEN FEATURE IS AVAILABLE IN THE IMAGE OR NOT. THIS MODEL FAIL TO WORK IN WHEN IMAGE BRIGHTNESS VARIES
EVEN IT EXHIBITS POOR PERFORMANCE WHEN IMAGES ARE IN DIFFERENT ORIENTATIONS.

Satapathy, Sandeep Kumar, proposed a model to detect number plate which is very

important problem helping police to chase many criminal cases. Authors used OCR based

approach to detect characters in the number plate and they are stored and processed to client

server based model for collecting the details of the owner.Pathaket proposed multi

dimension biometric authentication system which will work effectively in low lightening

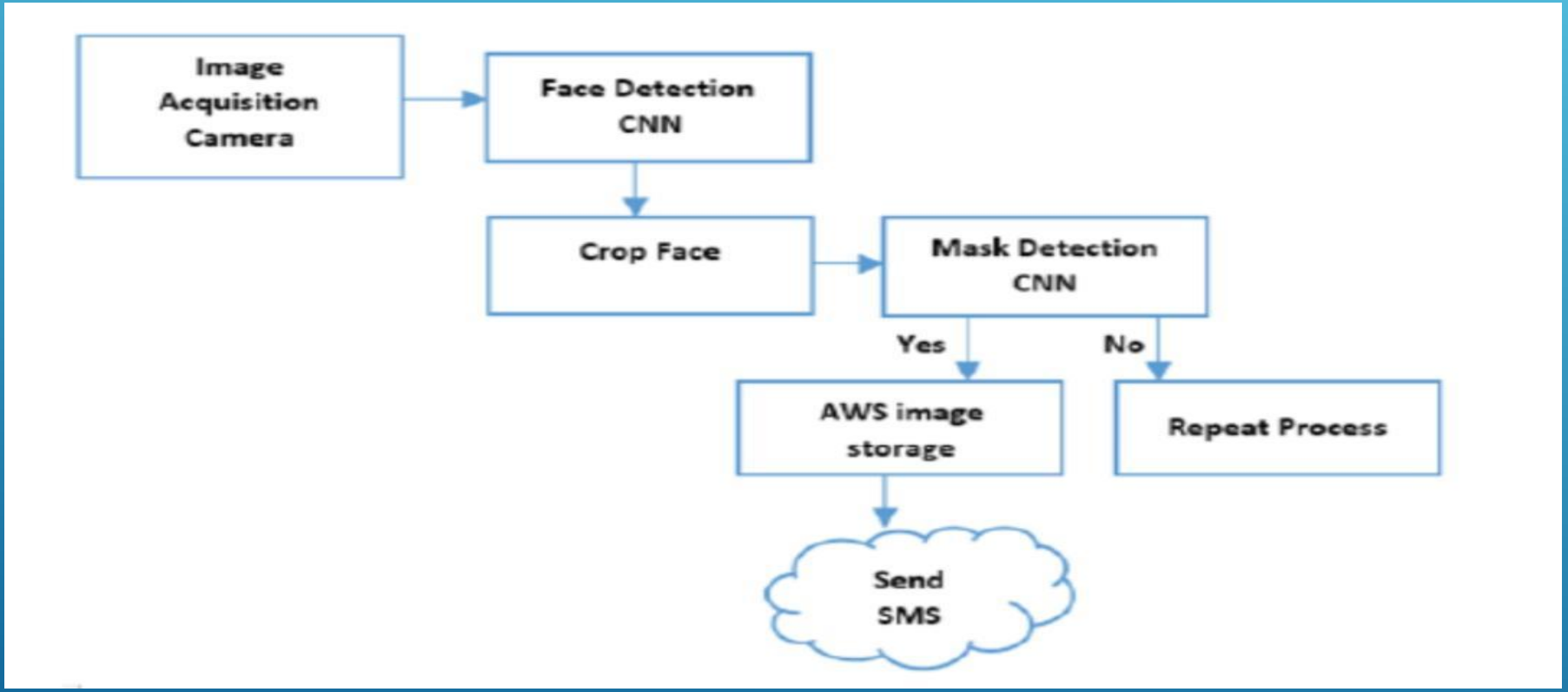
conditions here accuracy was improved by using entropy based CNN.

Ravi, Sunitha, sine language detection was implemented by training a CNN model

which can able to detect signs in the real world video. Which is very much useful in the

driver less cars also. Even it is useful in sign language in machine translation.

FLOWCHART FOR MASK DETECTION

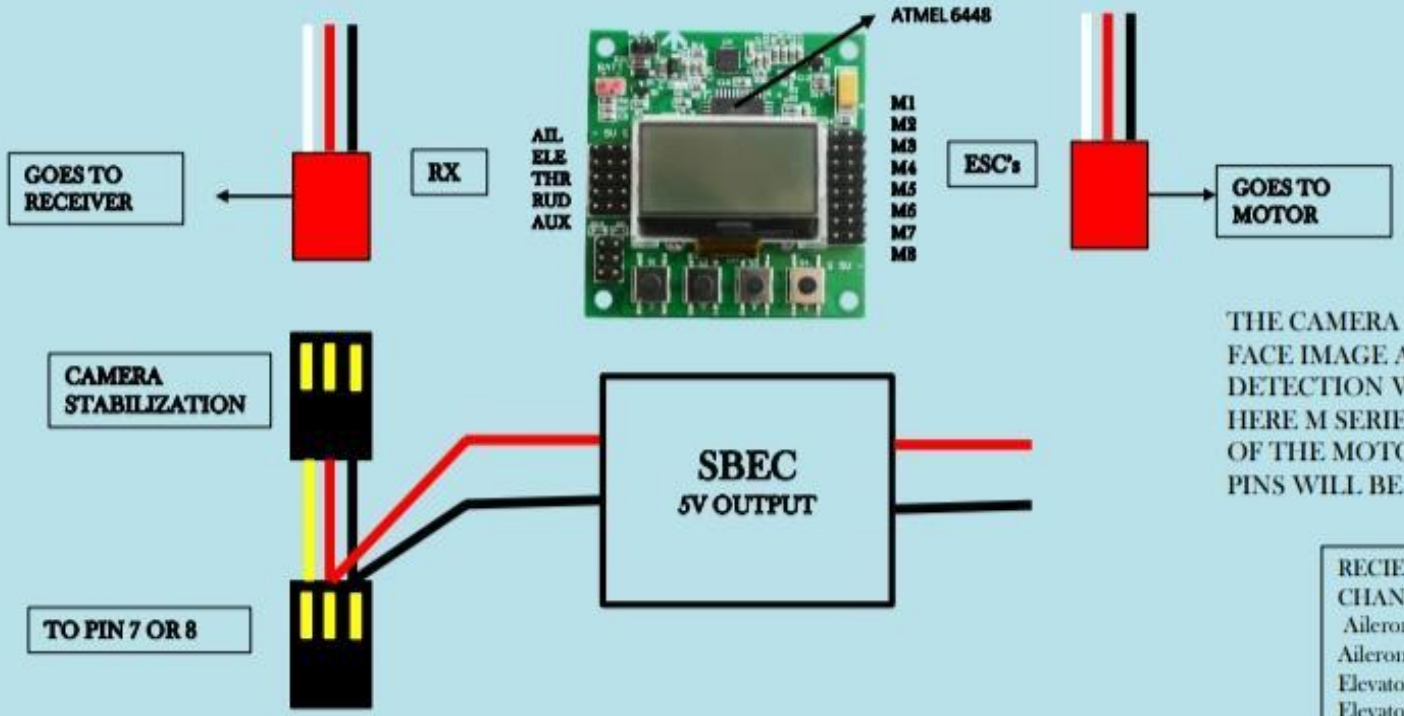


THEORY

MASK DETECTION IN OUR PROJECT USES A COMPUTER VISION ALGORITHM TO DETECT IF A PERSON IS WEARING A FACE MASK WHILE ACQUIRING AND ANALYSING FACE DATA BEFORE ACCESS GRANTED. MAINLY FOCUSING ON THE FOLLOWING STEPS: AUTOMATIC IMAGE LABELING, COMPARING TRAINING ALGORITHMS, AND GENERATING CODE TO ACCELERATE INFERENCE. TO CREATE AN AUTOMATION ALGORITHM, WE NEED TO TEST WITH SAMPLE IMAGES FROM OUR DATASET. WE WRANGLE ALL IMAGES BY CREATING AN IMAGE DATASTORE, AND DOWNLOAD AND IMPORT APRETRAINED FACE DETECTOR. USING MATLAB LIVE EDITOR CONTROLS, YOU CAN QUICKLY SWITCH BETWEEN NETWORKS AND CUSTOMIZE THE DEEP LEARNING TRAINING OR TESTING WITH MINIMAL CODE CHANGE FOR TRAINING ALGORITHMS. BASICALLY THE MAIN CHALLENGE LIES IN TRAINING THE MODEL FOR GETTING THE EXACT RESULT. USING IMAGELABELER, WE CAN AUTOMATE THE PROCESS OF IMAGE LABELLING OBTAINED FROM THE DATASET. WE CAN USE CUSTOM ALGORITHMS TO LABEL AND IDENTIFY REGIONS OF INTEREST - QUICKLY MODIFY ANY BOUNDING BOXES THAT
AREN'T PERFECT - AND EXPORT THE BOUNDING BOXES FOR ALL TRAINING IMAGES. THE ALGORITHM WORKS FASTER THAN ANY NORMAL ALGORITHM.

Circuit Representation

BASIC SCHEMATICS OF THE DRONE CIRCUIT



THE CAMERA WILL OBTAIN THE FACE IMAGE AND HENCE THE DETECTION WILL BE FEASIBLE. HERE M SERIES DENOTE THE WIRES OF THE MOTOR, WHEREAS THE RX PINS WILL BE USED BY THE ESE'S.

RECIEVER CHANNEL	FLIGHT CONTROLLER
Aileron	Throttle
Aileron	Rudder
Elevator	Rudder
Elevator	AUX1
Throttle	AUX

DRONE PROGRESS

FUTURE SCOPE

THE PRESENT SITUATION DEMANDS OF A WIRELESS SURVEILLANCE OF PEOPLE WEARING MASK OR NOT, SO AS TO REDUCE
THE CHANCE OF SPREADING THE CORONA VIRUS. ACCESS CONTROL WITH MASK DETECTION IS A SIMPLE SOLUTION TO HELP
REDUCE THE RISK OF GETTING INFECTED, AND ALSO A GOOD REMINDER TO WEAR MASKS BEFORE ENTERING THE
CONTROLLING AREAS. FOLLOWING ARE THE ATTRACTIVE FEATURES OF THE PROJECT:

SAFER: TOUCHLESS MEASUREMENT TO AVOID PHYSICAL CONTACT

FASTER: MASK DETECTION IN HALF A SECOND PER PERSON

SMARTER: DETECTION WITH COMPUTER VISION, SIGNIFICANTLY REDUCING THE FAR

The use of drone has led to much wider access due to its feature of mobility. Hence a large area can be
covered within a small time. This project is a combination of several features of image detection and
robotics.
The solution can be widely used in many practical scenarios, including hospitals, educational institutes,
factories, construction sites, shopping malls, IT parks, public transportation, banks, business
organizations, small to medium enterprises, government organizations and so on

KEY POINTS

ABSTRACT: THE COVID-19 IS AN UNPARALLELED CRISIS LEADING TO A HUGE NUMBER OF CASUALTIES AND SECURITY PROBLEMS. TO REDUCE THE SPREAD OF CORONAVIRUS, PEOPLE OFTEN WEAR MASKS TO PROTECT THEMSELVES. THIS MAKES FACE RECOGNITION A VERY DIFFICULT TASK SINCE CERTAIN PARTS OF THE FACE ARE HIDDEN. A PRIMARY FOCUS OF THE RESEARCHERS DURING THE ONGOING CORONAVIRUS PANDEMIC IS TO COME UP WITH SUGGESTIONS TO HANDLE THIS PROBLEM THROUGH RAPID AND EFFICIENT SOLUTIONS. THIS PROJECT AIMS TO PRESENT ALGORITHM USED FOR HUMAN RECOGNITION WITH A FACE MASK. WITH THE ADVANCEMENT OF TECHNOLOGY AND TIME MORE RELIABLE METHODS FOR HUMAN RECOGNITION WITH A FACE MASK CAN BE IMPLEMENTED IN THE FUTURE. FINALLY, IT INCLUDES SOME OF THE APPLICATIONS OF FACE DETECTION. THIS SYSTEM HAS VARIOUS APPLICATIONS AT PUBLIC PLACES, SCHOOLS, ETC. WHERE PEOPLE NEED TO BE DETECTED WITH THE PRESENCE OF A FACE MASK AND RECOGNIZE THEM AND HELP SOCIETY.

PROGRESS REPORT

UNDER THE SINCERE GUIDANCE OF OUR MENTOR AND COOPERATIVE OF OUR TEAM WE ARE ALMOST AT THE END OF THE OBJECTIVE SET AT THE BEGINNING OF 2020. OUR PROJECT CAN APTLY BE DIVIDED IN TWO SEGMENTS—HARDWARE AND SOFTWARE .

IN THE YEAR 2020 WE WERE ABLE TO BUILT UP THE BASIC FRAMEWORK OF THE DRONE SURVILLANCE AND WERE AT THE TESTING PHASE OF IT.

IN THE ONGOING ACADEMIC SESSION WE HAD SUCCESSFULLY TESTED THE WORKING OF DRONE AND ARE IN THE SOFTWARE IMPLEMENTATION PART.

EARLIER WE TRIED TO IMPLEMENT FACE DETECTION USING VIOLA JONES ALGORITHM USING MATLAB BUT WITHOUT ANY SUCCESS.

Presently we are working to imPlement mask detection using open cv and we are in the testing phase. Regardless of the various hurdles we are quite optimistic regarding the completion of the project.
We are left with the creation of a small datasheet of our group members.

KEYWORDS

VIOLA JONES ALGORITHM:- THE VIOLA–JONES OBJECT DETECTION FRAMEWORK IS AN OBJECT DETECTION FRAMEWORK WHICH WAS PROPOSED IN 2001 BY PAUL VIOLA AND MICHAEL JONES. ALTHOUGH IT CAN BE TRAINED TO DETECT VARIOUS OBJECT CLASSES, IT WAS MOTIVATED PRIMARILY BY THE PROBLEM OF FACE DETECTION.

COMPUTER VISION: COMPUTER VISION IS AN INTERDISCIPLINARY SCIENTIFIC FIELD THAT DEALS WITH HOW COMPUTERS CAN GAIN HIGH-LEVEL UNDERSTANDING FROM DIGITAL IMAGES OR VIDEOS. FROM THE PERSPECTIVE OF ENGINEERING, IT SEEKS TO UNDERSTAND AND AUTOMATE TASKS THAT THE HUMAN VISUAL SYSTEM CAN DO.

CODE FOR MASK DETECTION(OPEN CV)

```
FROM KERAS.OPTIMIZERS IMPORT RMSPROP
FROM KERAS.PREPROCESSING.IMAGE IMPORT IMAGEDATAGENERATOR
IMPORT CV2
FROM KERAS.MODELS IMPORT SEQUENTIAL
FROM KERAS.LAYERS IMPORT CONV2D, INPUT, ZEROPADDING2D, BATCHNORMALIZATION,
 ACTIVATION, MAXPOOLING2D, FLATTEN, DENSE,DROPOUT
FROM KERAS.MODELS IMPORT MODEL, LOAD_MODEL
FROM KERAS.CALLBACKS IMPORT TENSORBOARD, MODELCHECKPOINT
FROM SKLEARN.MODEL_SELECTION IMPORT TRAIN_TEST_SPLIT
FROM SKLEARN.METRICS IMPORT F1_SCORE
FROM SKLEARN.UTILS IMPORT SHUFFLE
IMPORT IMUTILS

MODEL = SEQUENTIAL([
    CONV2D(100, (3,3), ACTIVATION='RELU', INPUT_SHAPE=(150, 150, 3)),
    MAXPOOLING2D(2,2),

    CONV2D(100, (3,3), ACTIVATION='RELU'),
    MAXPOOLING2D(2,2),

    FLATTEN(),
    DROPOUT(0.5),
    DENSE(50, ACTIVATION='RELU'),
    DENSE(2, ACTIVATION='SOFTMAX')
])
MODEL.COMPILE(OPTIMIZER='ADAM', LOSS='BINARY_CROSSENTROPY', METRICS=['ACC'])
```

```
TRAINING_DIR = "./train"
train_datagen = ImageDataGenerator(rescale=1.0/255,
                                   rotation_range=40,
                                   width_shift_range=0.2,
                                   height_shift_range=0.2,
                                   shear_range=0.2,
                                   zoom_range=0.2,
                                   horizontal_flip=True,
                                   fill_mode='nearest')

train_generator = train_datagen.flow_from_directory(TRAINING_DIR,
                                                    batch_size=10,
                                                    target_size=(150, 150))
VALIDATION_DIR = "./test"
validation_datagen = ImageDataGenerator(rescale=1.0/255)

validation_generator = validation_datagen.flow_from_directory(VALIDATION_DIR,
                                                              batch_size=10,
                                                              target_size=(150, 150))
checkpoint = ModelCheckpoint('model2-{epoch:03d}.model',monitor='val_loss',
verbose=0,save_best_only=True,mode='auto')
```

```
history = model.fit_generator(train_generator,
                              epochs=10,
                              validation_data=validation_generator,
                              callbacks=[checkpoint])

import cv2
import numpy as np
from keras.models import load_model
model=load_model("./model-010.h5")

results={0:'without mask',1:'mask'}
GR_dict={0:(0,0,255),1:(0,255,0)}

rect_size = 4
cap = cv2.VideoCapture(0)



haarcascade = cv2.CascadeClassifier('/home/user_name/.local/lib/
python3.6/site-packages/cv2/data/haarcascade_frontalface_default.xml')

while True:
    (rval, im) = cap.read()
    im=cv2.flip(im,1,1)
```

```
rerect_size = cv2.resize(im, (im.shape[1] // rect_size, im.shape[0] // rect_size))
    faces = haarcascade.detectMultiScale(rerect_size)
    for f in faces:
        (x, y, w, h) = [v * rect_size for v in f]


        face_img = im[y:y+h, x:x+w]
        rerect_sized=cv2.resize(face_img,(150,150))
        normalized=rerect_sized/255.0
        reshaped=np.reshape(normalized,(1,150,150,3))
        reshaped = np.vstack([reshaped])
        result=model.predict(reshaped)



        label=np.argmax(result,axis=1)[0]


        cv2.rectangle(im,(x,y),(x+w,y+h),GR_dict[label],2)
        cv2.rectangle(im,(x,y-40),(x+w,y),GR_dict[label],-1)
        cv2.putText(im, results[label], (x, y-10),cv2.FONT_HERSHEY_SIMPLEX,0.8,(255,255,255),2)
```

```
 cv2.imshow('LIVE',   im)
    key = cv2.waitKey(10)

    if key == 27:
        break

cap.release()

cv2.destroyAllWindows()
```

REFERENCE

THROUGHOUT THE PROJECT WORK OUR TEAM TOOK REFERENCE AND GUIDE FROM THE FOLLOWING RESOURCES:

1. M. CRISTANI, A. D. BUE, V. MURINO, F. SETTI AND A. VINCIARELLI, "THE VISUAL SOCIAL DISTANCING PROBLEM,«

2. D. GARG, P. GOEL, S. PANDYA, A. GANATRA AND K. KOTECHA, "A DEEP LEARNING APPROACH FOR FACE DETECTION USING OPEN CV“

3.CODING REFERENCES WERE TAKEN FROM GOOGLE AND LINKED IN.

4.RESEARCH PAPER ON “A NOVEL APPROACH TO DETECT FACE MASK TO CONTROL COVID USING DEEP LEARNING”, BY T.SUBHAMASTAN RAO, S. ANJALI DEVI, P. DILEEP, M. SITHA RAM