



# **Internship Report**

- Team KJSCE Robocon

## **Hand Cricket using Gesture Recognition**

### Team Members :

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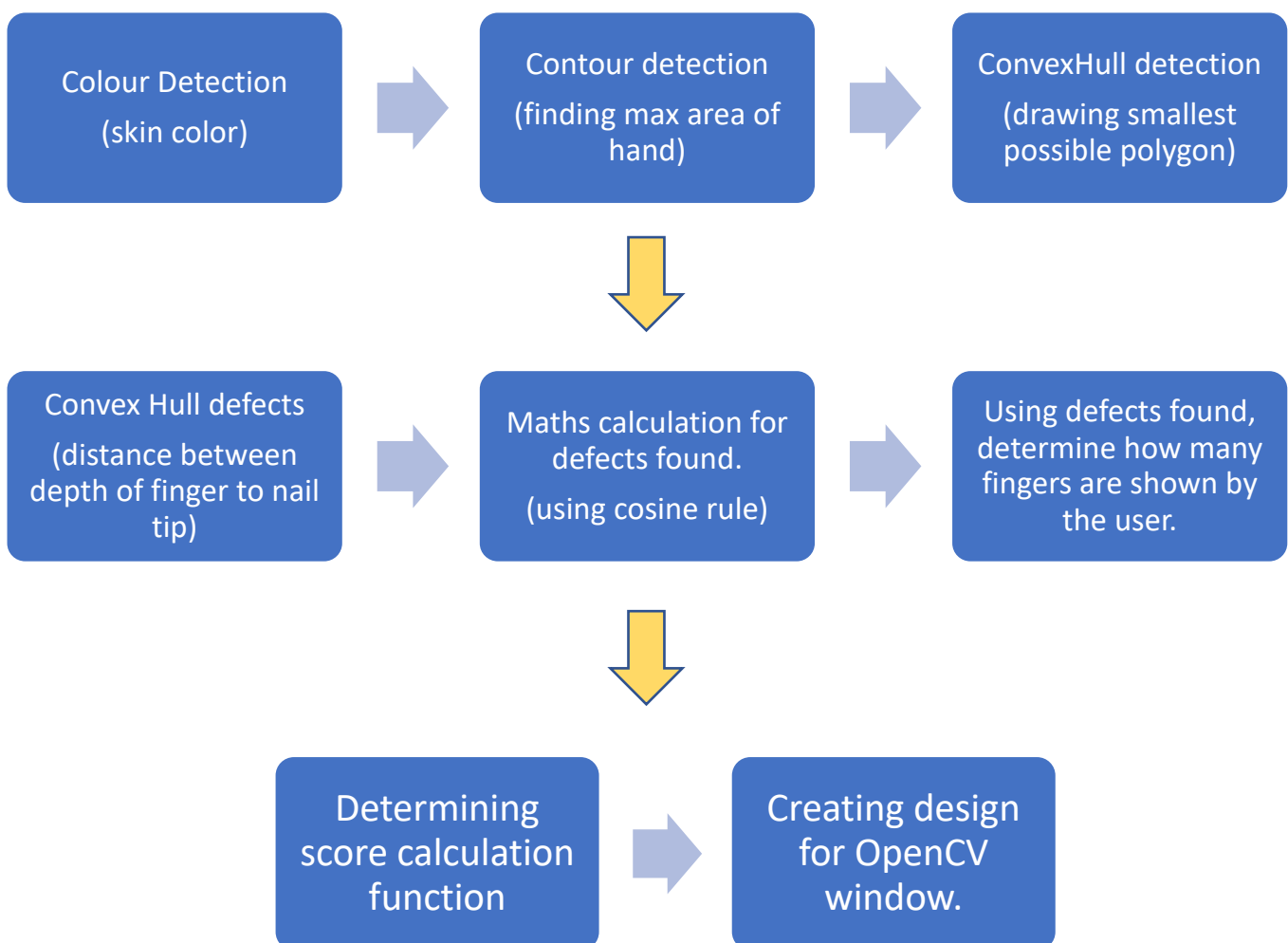
### Faculty Mentor :

Vaibhav Vasani

## 1. INTRODUCTION

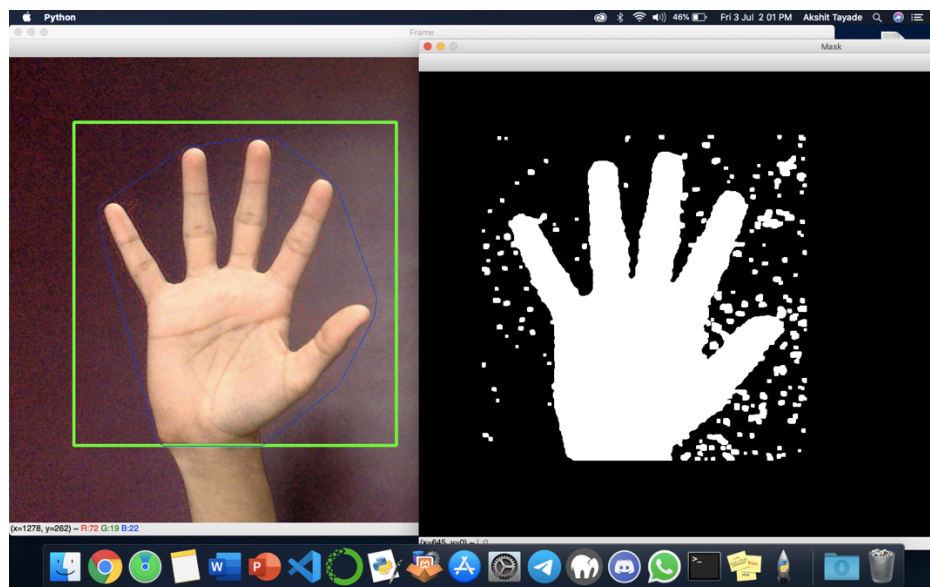
Reminding of old school days where we used to have tournaments for hand cricket. This is just the same using OpenCV Python. Hand gesture recognition like 1, 2, 3,4, 5 and 0. Once this is detected by the program, trained bot will play with you. Depending upon the score scored by both team, program will decide the winner.

## 2. IMPLENTATION

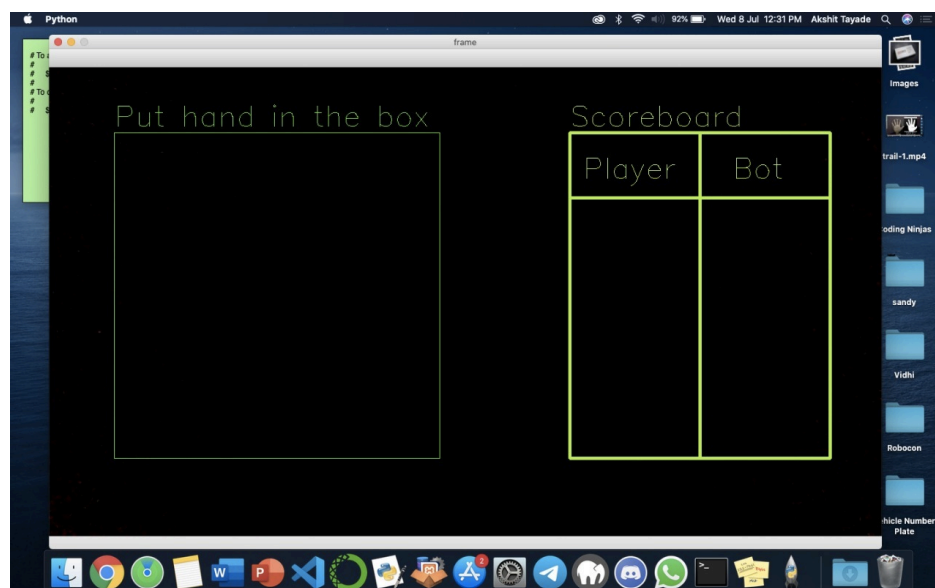


## How does the program work ?

- First place your hand inside the box
- Algorithm will detect your hand, and display the numbers of fingers detected
- Then press button 'm' of keyboard to start playing.
- Each time you change your fingers, repeat the step 3.
- Once you get out, your final score will be displayed on the scoreboard.
- Then player (i.e. user) will start bowling and keep repeating step 3.
- Once the bot is out, final winner will be displayed on the screen !!



# hand detection

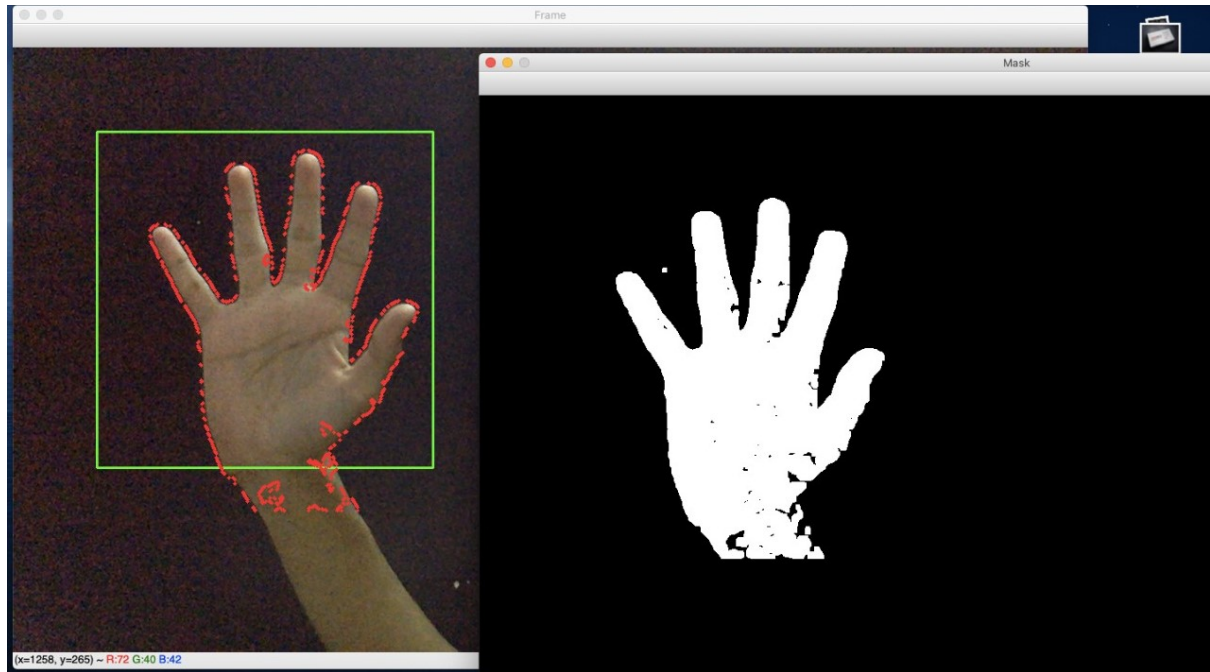


# OpenCV window

### 3. RESULT

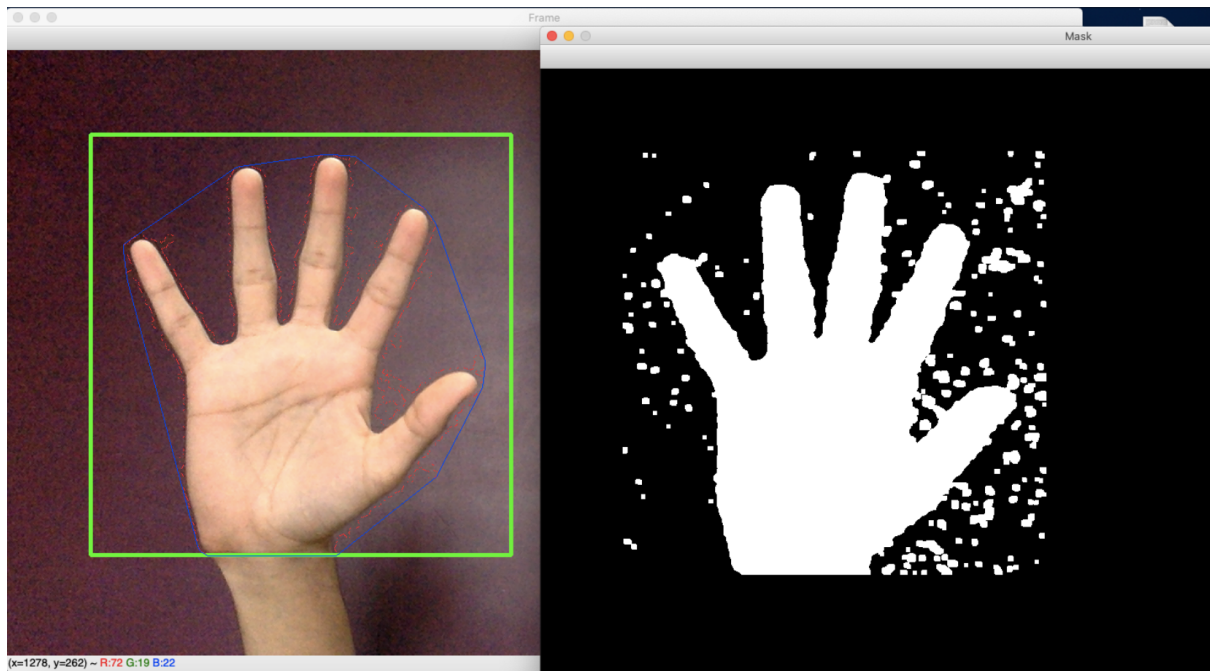
A series of successive steps were followed in achieving the desired program and its functionalities.

(1) STEP 1 : Detection of hand using contour –



Approach : From live webcam feed we captured frames and did some basic pre-processing on them( used Gaussian blur for smoothening ) . Then we performed bitwise\_and operation between the frame and a mask( array containing all white values) using which we defined our ROI and extracted skin colour [ which is displayed in the mask window of above image ]. Also some dilation was done to remove noisy values. Next , we found contours , from which the max contour value was used for detection of hand [ can be seen in frame window in above image ].

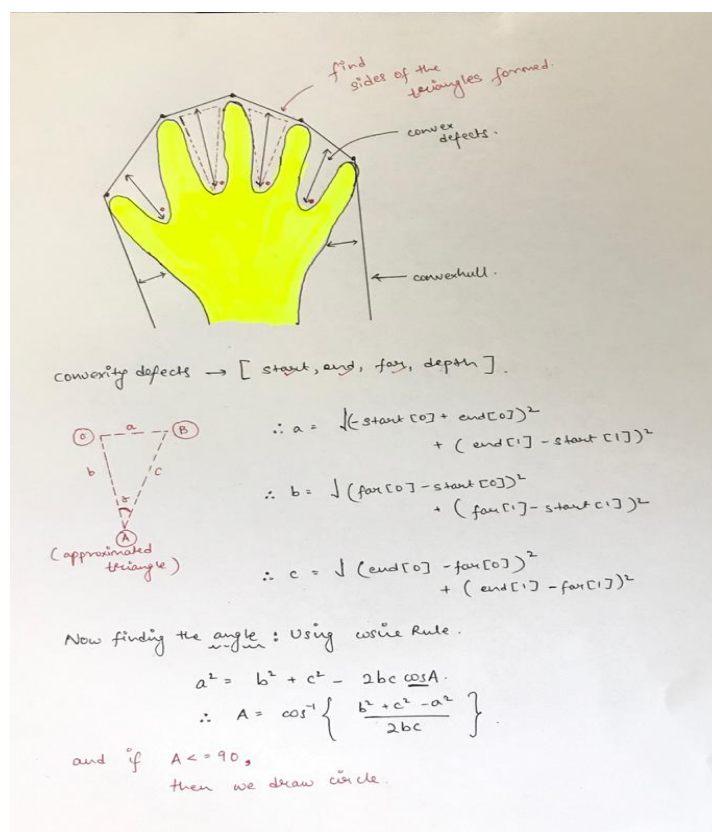
## (2) STEP 2 : Convex hull –



Approach : Since in Step 1 the hand detection is already done , we draw convex hull over the area of hand detected .

## (3) STEP 3 : Finding out convexity defects / fingers detection –

Approach : This step uses mathematical approach given below as follows :



We first find the sides of the triangle ( using distance formula ) and then applying cosine rule find the angle. Using the angle we get no of defects which basically determines the no of fingers. ( for more than two , and using the area between hand and convex hull for 0 and 1 finger gesture detection).

(4) STEP 4 : Score calculation –

Approach : The logic used is simple .The user / player will bat first. If the score of user/player equals to that of bot , player is out otherwise we keep on incrementing the score. If the player is out then next bot will bat and same rules will apply. Finally when both are done with batting , the final scores are calculated and the one having more score is displayed as winner.

( NOTE : Each run of player will be equal to the no of defects counted ( i.e the no fingers used ) and that of bot will be randomly generated .)

#### **4. CONCLUSION**

Successfully built a Hand cricket game which is able to recognize hand gestures and give score accordingly.