**Project Report**

**Computational Thinking and Programming (ECSE105L)**

**Caught You!!!**

**By – Tech Odyssey**

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**Bennett University**

**School of Engineering & Applied Sciences**

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Secondly, we would also like to thank our parents and friends who helped us a lot in finalizing this project within the limited time frame.

The completion of this project has motivated us and deeply inspired us to carry out the research and to present the work clearly as possible, we are extremely grateful for what this course has offered us.

Sincerely,

Team

Tech Odyssey

**ABSTRACT**

**Introduction/Background:** From the moment we were given this project we knew that it had to be something that could benefit the masses. The sole purpose of making a python program for a project was in order to utilise its automation prowess. Going through the coronavirus symptoms and its problems ourselves we know that COVID-19 prevention was a very necessary and buzzing problem. We wanted to do our share of work as well. Hence we decided to make a mask detection software which will help to identify those who don’t wear masks properly and help to avoid spread in public spaces.

**Objectives:** Odyssey objectifies the Vision software as a tool used by retailers , public places , Railway Stations, Airport ,Bus stands to pulse out individuals without masks in order to protect public spread of deadly Covid-19 .

**Methods**: First, We would be using python to make the main logic and vision of our service. We will use Python libraries called Open-cv which enables computer vision. This would help us to identify whether a person is wearing a mask or not. We will also be designing a WebApi for the same using Python and use frameworks like Django or Flask for our website development. If possible we would also try to integrate it with Raspberry Pie making it a complete combination of hardware and software.

**Keywords** : Health, Automation ,Open CV ,Masks ,COVID-19, Corona Virus

Looking at the current scenario of the world during the pandemic with the constant increase in the number of coronavirus cases and the new mutation of the virus in the United Kingdom the virus is now spreading much faster than before. For the time being, there are some vaccines that have been given the approval to be used for treating coronavirus but the citizens are afraid of side effects of the vaccine. Hence for the time being the only way to prevent the coronavirus is by wearing a mask and maintaining social distancing but there are people who don’t follow these guidelines and put people around them in a dangerous situation and therefore to prevent this we introduce you to our project.

CAUGHT YOU!! is a software that verifies whether a person is wearing a mask or not. This software will be used at the entry point of supermarkets, malls, and grocery stores, and places where people visit regularly, If the person is not wearing a mask the owner of the shop/ place will get a notification about it and it won’t allow the person to enter into the shop/place. This will prevent widespread.

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# Introduction

From the moment we were given this project we knew that it had to be something that could benefit the masses. The sole purpose of making a python program for a project was in order to utilise its automation prowess. Going through the coronavirus symptoms and its problems ourselves we know that COVID-19 prevention was a very necessary and buzzing problem. We wanted to do our share of work as well. Hence we decided to make a mask detection software which will help to identify those who don’t wear masks properly and help to avoid spread in public spaces.

For the time being, there are some vaccines that have been given the approval to be used for treating coronavirus but the citizens are afraid of side effects of the vaccine. Hence for the time being the only way to prevent the coronavirus is by wearing a mask and maintaining social distancing but there are people who don’t follow these guidelines and put people around them in a dangerous situation and therefore to prevent this we introduce you to CAUGHT YOU!!.

## Problem Statement

Not wearing masks is one of the major reasons spreading not only covid-19 but many other diseases, to prevent that your store will be gifted with Caught You!!! Which will allow entry only when the customer will be wearing a mask properly, temperature mapped below 99.14"F, and cleaned his/her hands with sanitizer provided by us.

When this pandemic started we all had to adjust to the new style of living starting with a lockdown, which felt never-ending. Slowly the lockdown was removed in different stages and ways. Whenever we go out, there is always a fear haunting us that maybe we might catch the virus and infect our family members or our friends. When we go grocery shopping after seeing the crowd there we are afraid to go there. The chances of catching the virus increases when we are standing among a lot of people. On top of this, we all have seen people who break rules by not wearing a mask, not taking the sanitizer when asked to. This further increases the risk for us. ​

## Objectives

CAUGHT YOU!! will prevent people who are not wearing a mask to enter public areas so that the extent to which the virus can spread can be decreased. This will help all of us to feel much safer while we are buying basic necessities. If some certain pre-decided conditions are met then a certain instruction protocol will be initiated. We will use this in opening a shop door automatically if someone is detected wearing a mask properly, and if not then the doors won’t open….

## Importance and Need of your Project

Almost for the past one year, we all have been compromising our state of living due to the pandemic. For the initial months, we locked up ourselves inside our houses and went out only to buy our basic necessities. Time passed and we thought that we were getting habitual to it, so we started to go out to malls, restaurants and various other places like we used to go, but actually, due to that we just made it difficult for ourselves as the cases started increasing exponentially. The times have changed now, we have to go to work almost every day so that we can earn and sustain, going out is dangerous for us as well for our family but it has to be done. So what we can do is to make our workplace and our markets safer by ensuring that everyone is wearing a mask. Since humans inevitably break rules therefore it is necessary for us to have software that will ensure our safety. Since the door will open automatically then the points of contact will decrease and hence the chances of spreading will decrease as well. Therefore by using CAUGHT YOU!! We tend to make our environment much safer so that all of us can work peacefully

### proposed Solution/Approach/Technique

### WE AT CAUGHT YOU!! PRESENT OUR SOLUTION TO TACKLE THE PROBLEM OF CORONAVIRUS IN PUBLIC PLACES TO REDUCE ITS RISK OF SPREADING. WE HAVE DEVELOPED A SYSTEM TO ASSIST YOU IN THE PROCESS OF SEGREGATING THE PEOPLE WHO MIGHT POTENTIALLY BE THE CARRIER OF THE VIRUS. TO DO SO WE BRING TO YOU OUR “MODEL-1”. THIS IS IMPLEMENTATION OF SEVERAL HARDWARE EQUIPMENT’S AND AN OPENCV SOFTWARE DEVELOPED BY US WHICH FIRST CHECKS WHETHER A PERSON IS WEARING A MASK OR NOT.

IF THE PERSON IS NOT WEARING A MASK, THEN HIS ENTRY WILL BE DENIED, AND THE OWNER OF THE SHOP WILL RECEIVE A NOTIFICATION FOR THE SAME. WEARING MASK ONLY TILL NOSE OR TILL THE CHIN WON’T ALLOW THE CUSTOMER TO ENTER THE SHOP, THE MASK MUST BE ALL UP TO THE TOP OF OUR NOSE. IF THE PERSON IS WEARING A MASK, THEN HIS/HER TEMPERATURE WILL BE CHECKED USING AN INFRARED BLASTER. IF HIS/HER TEMPERATURE IS NOT UNDER THE OPTIMUM RANGE, THEN HIS ENTRY WILL BE PROHIBITED AND AS USUAL, A NOTIFICATION OF SAME WILL BE SENT TO THE OWNER OF THE SHOP. IF THE TEMPERATURE FALLS UNDER THE OPTIMUM RANGE, THEN THAT PERSON WILL BE OBLIGATED TO TAKE THE SANITIZER THAT OUR MODEL WILL PROVIDE TO IT. IT WILL BE A NO CONTACT SANITIZER DISPENSER AND ONLY AFTER TAKING THE SANITIZER THE CUSTOMER WILL BE ALLOWED TO ENTER THE SHOP, PUBLIC PLACES. THIS WILL HELP US IN REDUCING THE CHANCES OF GETTING THE VIRUS. THIS IS NOT AN ABSOLUTE SOLUTION, BUT IT WILL SERVE THE PURPOSE OF MAKING THE CUSTOMERS FEEL THAT THEY ARE IN A SAFE ENVIRONMENT AND THE CHANCES OF GETTING THE VIRUS ARE MUCH LESSER. ​

# Project Execution

**\* Primary**: When in its full setup Caught you !! will perform digital image processing taken the face as input in use of computer vision / graphics and AI edge to edge mapping would create datasets which is custom made with using real mask images in it with Python script with Keras, and TensorFlow as the backend.

**\* Secondary:** This Will help in reducing the spread of COVID-19 and other communicable diseases as the doors will be automated and will open if the person wears a mask. Thus wearing a mask will become a compulsion. It Will help to increase the trust of customers as they know they will be in safe and conducive premises.

## Project Setup

**Software Specification:** A full stacked computer with proper internet connection and camera with Python and libraries installed such as OpenCV, tensorflow , NumPy , keras etc.

**Hardware Specification:** Raspberry pie 3 , Arduino uno , OmniVision OV5647 , Sony IMX219., Servo Motor T , LCD liquidcrystallib , I2C , 9V Electric pump , T32 transistor , IR sensors.

Table 1: Sample 1

|  |  |
| --- | --- |
| **#** | **Decision Description** |
| 1 | Windows 8+ or MacOS sierra , Python , OpenCV, Tensorflow ,Git, etc. |
| 2 | Standards that must be followed (default Capstone coding standard, etc.) |
| 3 | Special access privileges needed, nondisclosure forms, release to open source, etc. |
| 4 | A virtual server image will be set up at NDSU that matches the customer environment (image provided by customer) |

## Results and discussion

After in its whole installation caught you !!! can achieve live real time face mask detection along with temperature detection for automatic gates with social distancing monitor, caught you will perform its functions flawlessly and as per programmed by owner. A dedicated website for purchases, promotions and updates is available for everyone. Caught You !!! prioritize its ultimate goal of safeguarding society from the deadly COVID-19.

Tech odyssey believes in technology which benefits healthcare, as technology in this world is only been disrupting with any individual’s health.

COVID-19 is deadly, and this is a known fact now, According to WHO even after vaccination no one is 100% safe so safety measures should be taken until this thing wipes out completely off planet earth.

Regardless of any virus Tech Odyssey will keep making future models in order to keep up with human healthcare community. Apart from business the whole model of Caught You!! Just costs INR 4500 which is highly affordable by any individual or government to be installed in the respected places.

Starting the further implementation of Caught You!! With hardware elements, insertion of Arduino Uno mixed with sensors such as IR and HC-SR04 we will achieve temperature recording feature continuing with the motor driver working with emp dispenser motor dispensing drops of hand sanitizer completing the initiation of command.

# Conclusion and Future Work

Caught You!! Hopes not to see any other pandemic like this one but for sure we would like to be prepared for any challenges to come. Future implementations include installation of device in public places, add a mask dispenser in the following device to create a more ease towards societal defects, projecting proper norms and ensure the norms are followed with the use of image processing and open cv, try to implement artificial intelligence and machine learning in face recognition to find out the person under mask and many more.

Tech Odyssey never stops to cross its mind on silver screen of healthcare.

**Major Contributions**

**Contribution** seems to be very **important** to our spiritual needs. It can be defined as a sense of service and focus on helping, giving to and supporting others. **Contribution** along with growth are strongly linked to fulfilment

The team in tech odyssey worked hard as a team and created a successful outcome for society and a real life problem.

The research and experience we received while pursuing this project was one of a kind and will be memorable forever.

This won’t be possible without the team efforts and dedication seen towards the project.

The respective role each one of us played in this project are as follows :

**Arnav Tyagi:** Say hello! To our developer in charge of the code and conduct of the mask detection model training was contained by him, as well as the creativity department and pursuing model of face mask detection better by better each day with machine learning was carried out by the individual.

**Divyansh Palia:** Model and database training and execution was carried by him as well as software implementations as CNN guide, the hardware and the working execution of the model with Arduino components and various thermal and infrared sensors were made, Management of the team and Documentation and pdf was carried by him.

**Parijat Rai:** The camera input feed and the integration with the face mask detection software, with knowledge of cross-platform working was conveyed to the team by him, a major contribution in Web development for the promotion of the project was carried out, also the YouTube video editor of tech odyssey.

**Dev Rajpal:** Picking out bugs, solving problems while making the software as well as making sure of the proper implementation of the software. In the end, time hassle, and tactics were properly carried out by him, A big contribution in front-end development for the website and documentation was taken care of by this individual.

References

# Introduction to Open CV

# The python library 3.8 documentation

# \* Youtube videos on image processing

\* Matplotlib

\* Open CV 2

\* Tensorflow

\* Keras

\* Leewayhertz.com

\* Database from: KODETR

More basic information from Quora and answeres.opencv.org