

ABSTRACT

College name:- KJ Somaiya Institute of Engineering and Information Technology

Team Details:-

Name	Member/Leader	Year
Nayan Bhatia	Leader	Third Year
Juhi Gori	Member	Third Year
Keval Dave	Member	Third Year
Dharmin Chothani	Member	Third Year

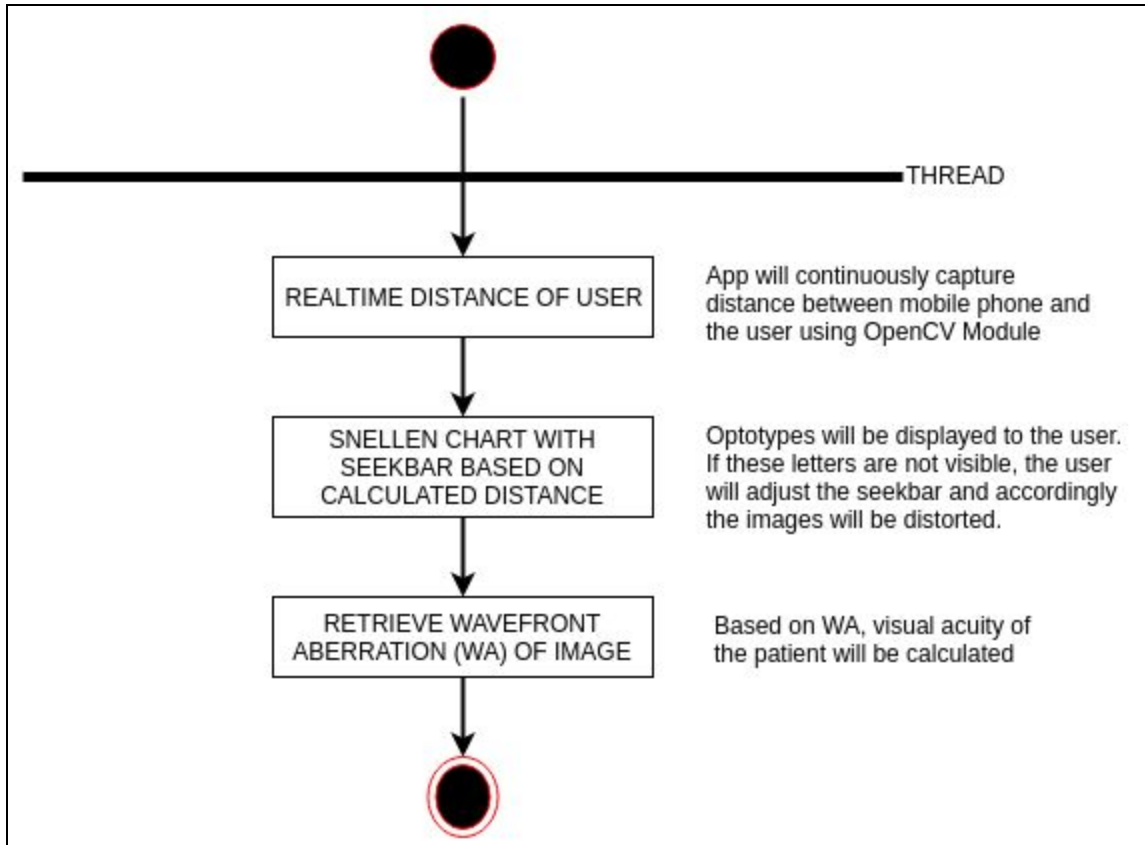
Problem Statement:- Measure Visual Acuity (MVA)

1. Kindly elaborate on your understanding of the problem chosen?

- Visual acuity (clearness of vision), usually measured by an eye doctor using an eye chart, is one of the most commonly applied clinical tests in the world.
- With the patient's participation, it measures the smallest letters that can be reliably identified at a specified distance, and thereby test the resolving power of our eyes.
- The result, often quoted as a pair of numbers like 20:20, lets us know how we perform relative to population norms, and determines if corrective lenses or refractive surgery can help us better perform tasks like reading or driving.
- The traditional test for acuity requires the patient to look and report which letters they see.

2. How do you intend to solve this problem?

- The user will be provided with an interface. The distance of the user from the **mounted device** will be calculated by the **OpenCV module**. Based on the distance, the width and height of the **optotypes** will be decided(Ideally distance should be 20 feet).
- To simulate the effect of lenses, we will be using the concept of **wavefront aberration(WA)**.
- Our solution to this problem is to simulate the observer performing the acuity task with an eye possessing a particular set of WA.
- When a letter is presented, we first distort a digital image of the letter by the specified WA, and add noise to mimic the noisiness of the visual system.
- We then attempt to match the blurred noisy image to similarly blurred candidate letter images, and select the closest match.
- We repeat this for many trials at many letter sizes, and thereby determine the smallest letter than can be reliably identified: the visual acuity. We will be incorporating **optical and neural filtering, neural noise, and an ideal decision rule**.
- This will be **useful for Prediction of acuity following laser surgery**.



3. Reason for Choosing this problem.

- We had a brainstorming session on each of the problem statement and we found the problem statement, “**Measure Visual Acuity (MVA)**” to be the most appealing one.
- The current method of measurement involves the use of **Snellen’s chart** and the involvement of skilled technicians for measuring visual acuity.
- We have thought of a solution which **eliminates the need of a skilled technician** and can be used by the naive users.
- This approach provides an automated system to estimate visual acuity based on objective measurements of the **eye optics and wavefront aberrations (WA)**.
- Wavefront aberration are represented in a particular form known as the **Zernike Polynomials**.
- A typical measurement on the eye of a patient will consist of a list of approximately 16 numbers that constitute the coefficients of the polynomials.
- The **WFAMetric** is an algorithm that converts the list of numbers into an estimate of the visual acuity of the patient. If changes are planned to the WA of the patient (through surgery or optical aids) the predicted change in acuity can be calculated.

4. Most Challenging aspect of the problem:

Our prime focus will be to keep the accuracy as high as possible. Although external factors such as distance and ambience are major issues, we will be focusing on not letting the accuracy get affected.

5. What platform do you intent to use,which coding language and which framework?

We will be using **OpenCV module** to calculate the distance of the person from the Camera. For implementing the concept of Wave Front Aberration, we will be using **Image processing** and calculate the visual acuity based on it. The backend will be built using **NodeJS** which is a server side language. The data obtained from the client will be handled by the server for major data operations. The client to be used for mobile will be **React Native** which is an industry standard. Considering a desktop product, **ElectronJS** will be used as a framework for the same.

6. Fortnightly targets:

Days	Target
3-5 Days	Creating the front end design for desktop and mobile
10 Days	Implementing the Python backend and testing with test case
20 Days	Implementing the API and connecting it to the front end
10 Days	For debugging and testing the functionalities
30 Days	Buffer period considering emergencies and exams

7. Why do you think your team can implement a winning solution?

All members are fully committed to achieving the team's mission and goals. Each member has devoted a reasonable amount of time and energy to advancing the team's mission. Our Team possess a wide range of professional competencies and we are fully equipped to meet a wide range of challenges.

About Us:-

1) Nayan Bhatia

- A practical thinker and a knack for data visualisation.Part of the winning team of **Smart India Hackathon 2019(Software Edition)** as well as **Idea Competition** organised by MHRD innovation cell.
- Completed a summer Training and internship program in '**Data Analytics in Python**'. Selected in the top 10 teams for **AI Hackathon '19** conducted by CDAC(The final event will be conducted at the end of September '19).
- Worked as an Intern with **Software Development Cell** in KJSIEIT, Sion in the field of **Web Development**.

2) Juhi Gori

- A *passionate enthusiast* having a well-developed interest in back-end development.
- Part of the winning team at **Smart India Hackathon 2019 (Software Edition)** as well as **IDEA Competition** by MHRD Innovation Cell.Completed a Summer Training and Internship Program in '**Data Analytics in Python**'.
- Worked as an Intern with **Software Development Cell** in KJSIEIT, Sion in the field of **Web Development**.

3) Keval Dave

- A deep learning enthusiast, has learnt about neural networks from the fundamentals along with the mathematics involved and the terminologies. Keval is *highly proficient* in **Python programming** and can solve any problem you throw at him.
- Part of the winning team at **Smart India Hackathon 2019 (Software Edition)** as well as **IDEA Competition** by MHRD Innovation Cell.
- Completed a **Summer Internship Program in Soham engineering services**. Another summer **internship program in AlogicData**.
- Worked as an Intern thrice with **Software Development Cell in KJSIEIT, Sion** in the field of **Web Development(twice) and cloud computing**.

4) Dharmin Chothani

- The coder who can work all night without complaining. He is a *quick learner* and is accustomed with **C and Python**. A task assigned to him is guaranteed to be completed.
- Winner of **Smart India Hackathon 2019(Software Edition)**. Selected in the top 10 teams for **AI Hackathon '19** conducted by CDAC(The final event will be conducted at the end of September '19).