**PROJECT SCOPE DOCUMENT**

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| **Project Name:** | Website for diagnosing color blindness and hearing problems (Hearing test in 5 languages) |
| **Project Members:** | Kavitha Krishnamurthy, Steven McDonald, Hsueh Yen Neo, Joey Bruno |
| **Prepared by:** | Kavitha Krishnamurthy |
| **Date:** | 23/09/2020 |

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| **Project Scope/Objective** |
| The scope of this project is to develop a web-based system that will help in diagnosing color blindness and hearing problems which a person has. We set out to provide easily accessible hearing and sight tests for rural populations in India who have limited access to medical care. |

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| **Need for this website** |
| Right now, in India we don’t have any web-based tool for diagnosing color blindness and hearing disability. The idea was that by making a lightweight, front-end only application it could be taken by health groups into rural areas without needing expensive equipment or having people come to cities to be tested.  This is not the first test of this kind, but it is the first to be translated into Hindi, Kannada, Telugu, and Tamil so that it's easily available to people living in rural areas of India. This website uses regional languages like Tamil, Telugu, Hindi, Kannada as well as English to test the hearing disabilities which a person may have. The website also carries a frequency /pitch hearing test and also a test for diagnosing color blindness. |

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| **Requirements of the website** |
| Website to be compatible across all devices. Should be able to work in mobile devices and browsers of all kinds. Website to have responsive pages.    Website to load within few seconds. No lagging should be there.    The design of the overall website must please the eyes.    Keep the Navigation Fuss-Free.     Website to give an insight about the color blindness and their types as well as details about hearing disabilities. |

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| **Budget / Cost Factor** |
| Website to be designed using Frontend so that web hosting and domain set up charges will be cost effective. Web hosting to be done using Firebase, Netlify or Versal.    Since website is designed using Frontend framework, every year web hosting renewal charges will be negligible for the NGO to which the website will be given. |

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| **Work Breakdown Structure** |
| Website to be designed using frontend framework, without involving backend. Frontend framework is using ReactJS JavaScript, Html and CSS.    The landing page content should describe what the website is all about.    Home page to have split screen layout with user friendly navigation buttons in the header section and social networking links in the footer section. Home page to have serif-font with section cards that include information along with an image for the information pages. To include two boxes of text: goal, testing idea along the home page itself. For the hearing test page, place the images of each language below the hearing test header along a row to try and indicate that is selecting the language.    Website to have a 2 column layout below the split screen layout in the home page.    Website to have an external link to social media accounts like Facebook, Instagram and twitter accounts of the NGO.    Voice messages in 5 different languages to be incorporated in to the website.    Host and Domain Setup – Host and domain set up needs to be taken care.    Content and pictures for the website, voice recordings to be taken care.    Browser Testing – Website to be tested to ensure that it works at normal speed with all kinds of mobile devices, desktop, laptops and web browsers. We will also make sure that the size does not break when viewed on mobile phone |

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| **Project Deliverables** |
| * Project scope document * Requirement’s analysis document * Resource availability report * Website design * Website coding * Software testing * Website content * Voice messages for the hearing test * Instruction set for the tests * Pictures and icons for the website * Host and domain setup * Browser/Website testing * Testing Strategy |

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| **Project Milestones** | **Remarks** |
| Functional design | Completed on |
| Technical design | Completed on 29.03.2021 |
| Implement color blindness pseudo-isochromatic plates and voice messages | Completed on 14.03.2021 |
| Website styling | Completed on |
| Website content writing | Completed on 25.03.2021 |
| Web hosting and testing |  |
| Deployment |  |
| Hand over the website to NGO and project complete |  |

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| **Date** | **Work Updates** |
| 23/09/2020 | Initial Draft of project scope written - to design a website for diagnosing color blindness |
| 20/11/2020 | Added volunteer Hsueh Yen Neo to the project and revision made to project description, scope and project deliverables. Decided to design the website using front end framework without involving backend |
| 23/12/2020 | Changes made to project scope / objectives and deliverables - added hearing test to the color blindness website |
| 25/01/2021 | Updates to project scope and deliverables section – decided to conduct hearing test in English and 4 regional languages – Tamil, Telugu, Hindi, Kannada |
| 26/02/2021 | 2 more volunteers added to the team – Steven McDonald and Joey Bruno. Website contents prepared and added to the website |
| 06/03/2021 | Added an additional feature to the hearing test section – In addition to conducting hearing test in 5 languages there will a common hearing test which involves testing using a beep sound which is nothing but a pitch ear test |
| 14/03/2021 | Website design/styling methods discussed and finalized. Added contents to the home page and 3 column layouts. Contents for Us section to be written. Pitch sound hearing test to be added. |
| 21/03/2021 | Contents for us section written individually. It was decided that the US column will be taken to a separate page with a description of all four of us and a paragraph about how we all got together for this project will also be written that will go in to this page. |
| 28/03/2021 | Steven showed how frequency/pitch test works, decided to add few extra points to the instructions of pitch test, contents for the team page discussed and finalized, contents for the home page finalized,  Styling for home page, hearing test and color blindness discussed and it was decided to try adding a background image for hearing and color blindness page to see how it looks, discussed about having a provision for including the contents and contact details of NGO, asked Steven to enquire about service providers for web hosting. |

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| **Hearing and Color blindness testing** |
| **Testing Idea**  The three things we made tests for are color blindness, hearing loss, and hearing sensitivity to different frequencies. These are a few of the most common problems people may have with seeing and hearing, and helping people diagnose issues can dramatically improve their quality of life. Each test we made was based on existing medical tests for the same issue.    **Testing Methodology**  **Color Blindness:** We made a color blindness test based off of pseudo-isochromatic plates. These are where a circle of colored dots is shown to the viewer and they are asked if they can see the number shown in the dots. If they, can they type it in and hit “Submit”, and it is double checked against the correct answer. If they cannot, they click “Not Sure”. They are shown a total of 15 tests using different color patterns, and at the end the test gives them a score out of 15 saying how many they were able to identify correctly.  **Hearing Loss:** For hearing loss we made a test where users identify words they hear under different volumes and levels of background noise. The user begins by selecting their language of choice, either English, Hindi, Kannada, Tamil, or Telugu. The language names are written in their native format to make it easy for people to choose. They are then shown a screen with 9 icons, a volume control, and a play audio button. When the user hits play, they listen to the word that’s spoken and then select the icon that represents that word. The user can play the audio as many times as they need. If the user needs to, they can increase the volume until they hear the word. After they click an icon, they hit submit and a new audio is loaded. They repeat playing the audio and selecting the proper icon until they have listened to all 9 audio files. At the end the test gives them a score out of 8 saying how many words they were able to identify correctly.    **Hearing Different Frequencies:** The user is shown a screen with a play-audio button as well as submit and pass buttons. When the user clicks play, the application waits for a random number of seconds from 1 to 7 and then play a tone at a specific frequency. When the user hears the tone, they click submit. If they click Submit within two seconds after the tone plays, they get a point. A two second window is used to give the user time to react. If they are too late or early, or if they click pass, it does not give them a point. A new tone is then loaded and they repeat until they receive a score. In order, they will hear tones at 250HZ, 500HZ, 1000HZ, 2000HZ, 3000HZ, 4000HZ, and 8000HZ. This represents the range which almost all adults should be able to hear in. It is also within the range of most computer headphones and speakers to make administering the test easy. At the end the test gives them a score out of 7 saying how many they were able to hear. |

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| **Category** | **Problem/Success** | **Impact/Steps taken to overcome challenges** |
| Project Achievements | Developed a web-based tool for diagnosing color blindness and hearing problems and handed it over to NGO. it is the first test to be translated into Hindi, Kannada, Telugu, and Tamil so that it's easily available to people living in rural areas of India. This website uses regional languages like Tamil, Telugu, Hindi, Kannada as well as English to test the hearing disabilities which a person may have | This website will be of use to a large number of people in India, this website is developed for public consumption |
| Project challenges – Manpower challenges | Had difficulty in finding people with the required programming skills for designing the website | Posted about the project in donatecode website on October 2020, and got 3 volunteers with the required programming skills to work on this project |
| Web hosting cost challenges | The website will be given to an NGO so need to ensure that annual web hosting renewal charges will be affordable for them | Since website is designed using Frontend framework, every year web hosting renewal charges will be negligible for the NGO to which the website will be given. |
| Technical challenges faced in the project - 1 | For the regular hearing test, we encountered issues with getting all of the audio files to import properly and then having the test load the next audio file after a user clicks submit. Since we were using React for the application, the test is written as a functional component. | To solve the load issue audio file links are imported from an object from a separate Javascript file. This object can be indexed by the current selected language (stored as a variable) and the number of the current audio file. The audio file name is then set as the source for an audio component on the page and linked to the play button. Loading the audio files this way makes sure that every word for each language would load at the right time. |
| Technical challenges faced in the project - 2 | We also encountered a couple bugs which prevented the page from updating the audio file after a user clicks submit | These were solved by adding keys to the icon image tags so that React would not confuse the components and update at the wrong time, and by using React’s built in effect hook with useEffect() to tell the page to update when specific variables change. by resetting all of the other variables to default values and making a full copy of the array of links which could be copied back into the main array at the end of the test. |
| Technical challenges faced in the project - 3 | We had similar issues with loading the audio for the frequency hearing test. | The issue here turned out to be that there was a new variable introduced in the frequency test which had not been referenced by useEffect() , so when it changed the page would not update. All of these bugs have been resolved and the tests are working seamlessly now. |