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**ABSTRACT**

In this paper, we address the problem of accessibility for elderly web users.

**Keywords**

VOITCHA: name of our app. Voice + CAPTCHA

# **INTRODUCTION**

We designed a CAPTCHA that is more user friendly. Our solution involves an audio prompt of a simple question and speech to text to get the user’s answer.

# PROBLEM

There is a lack of accessibility in the design of web and mobile applications for older adults and others with sensory and motor impairments. This problem is especially prevalent in CAPTCHA. To combat cyber-attacks, CAPTCHA has advanced to a point where they are almost impossible to answer correctly even for human users.

# SOLUTION

## Speech Recognition

We decided to create a CAPTCHA that asks the user a simple arithmetic question. For example, “What is 5+7?” We would like to add more non-arithmetic questions in order to improve security.

After asking the question, the user is prompted to tap a button when they are ready to speak their answer, so it is clear when they can begin saying their answer.

## Alternative Text

Alternative text replaces images when screen readers are used or when the image can’t be displayed on the screen. People who are visually impaired or blind require this feature to understand the context of the image. We kept the graphics simple and to a minimum for improved accessibility.

## Further Accessibility

We allow the user to replay the question in case they didn’t hear it. We also allow the user to skip questions if they don’t know the answer. The user is allowed three incorrect answers before they are locked out. After an incorrect answer is given, the app notifies how many tries are left.

Our model addresses the needs of older adults who are visually impaired as well as those who lack fine motor skills. We used large fonts, and simple graphics and colors to increase accessibility.

We also have a settings page to change the colors from dark on light to light on dark background.

# MODULARITY/PORTABILITY

We tried to design our code in a way that its parts could be reused. We made a separate Java file for the random question generator so it could be reused or modified. We commented our code so the team could easily understand each other's changes. This is also helpful for future users who want to utilize our code. We made it easy to be able to change the amount of incorrect answers for flexibility.

# USER STUDY

We had 10 people try our CAPTCHA and asked them to rate the ease of use. Each person was asked to complete 5 trials. We measured the amount of time it took each user to reach the victory screen. We also recorded whether the person repeated the question and how many tries it took them to answer correctly. For the time to complete, repeats, and skips data, we averaged the five trials.

**Table 1. User Trials**

|  |  |  |  |
| --- | --- | --- | --- |
| **Age** | **Time to complete** | **Repeats** | **Skips** |
| 57 | 30s | 2 | 0 |
| 24 | 33s | 0 | 0 |
| 20 | 27s | 0 | 0 |
| 22 | 12s | 0 | 0 |
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## User Testimonials

## Person1:

Person2:

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