

# Interactive Arabic CAPTCHAs with Enhanced Usability and Accessibility

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**Abstract**— CAPTCHAs are widely used as a security measure to protect authorized users and prevent unauthorized automated access. Their effectiveness is typically assessed by robustness against robotic programs. Nevertheless, user perspectives on the interactive experience and efficacy of CAPTCHAs have received limited attention, particularly in relation to comparative analyses of CAPTCHA variations across different locations and languages worldwide. This study enhances interactive Arabic CAPTCHA systems by incorporating features to support users with disabilities. To improve accessibility, we introduce audio-based CAPTCHA challenges that present spoken questions instead of text, with background noise added for security while ensuring usability for visually impaired individuals. Additionally, the system integrates localized Arabic accents rather than standard Arabic, making it more intuitive and user-friendly across regions. Extensive experiments with users with disabilities demonstrated improved usability and high success rates. These enhancements foster greater digital accessibility without compromising security, contributing to a more inclusive CAPTCHA system.

**Keyword**— CAPTCHA, Accessibility, Usability, Variability

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