

Title: Exploring How Automated Teller Machines (ATMs) can become more Accessible for Individuals with Poor Manual Dexterity

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Introduction

This research-based project addresses the problem of ATMs not being sufficiently accessible for users with limited manual dexterity, which is a physical challenge in which a person's ability to move their hands is limited.

This lack of accessibility is largely due to the difficulty of using ATMs physical components with such hand movement challenges.

Therefore, the end goal of this project is to develop a solution of an AI voice control feature for ATMs, to help users complete ATM tasks by only using their voices, as well as a mobile application that will enable users to book their session with the ATM, verify their bank account identification and to set their preferences of how they want the AI voice to function.

Both deliverables will be presented as low-fidelity prototypes.

Objective

To improve the accessibility of ATMs for users with limited manual dexterity. The aim is to deliver this through the development of a technological solution that will enable users to carry out ATM transactions, using only their voice..



Research Philosophy

An interpretivist philosophy was adopted for this project- Upon conducting research on ATM accessibility for limited manual dexterity, the author learnt that opinions of how accessible ATMs are mainly dependent on the physical ability of the users.

Users with limited manual dexterity tended to be more likely to identify issues in the ease of physical interactions with ATMs.



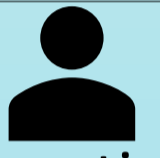
Academic Research



Before the stage of conducting participant-based research, academic research was conducted, which revealed that:

- The purpose of ATMs is to allow users to do bank transactions, independently and without difficulty
- A reduction needs to be made in the physical components present in ATM interactions, which strain users with limited manual dexterity.
- There is an unfair pressure felt to not make any mistakes felt by ATM users with limited manual dexterity
- Evidence of low usability is causing some ATM users to risk being victims of crimes like fraud.
- Social tension tends to arise as users with limited manual feel urgency to complete ATM tasks quicker in situations where there is a queue forming behind the them

Participant-based Research



After the academic research section of the project was complete, four participant-based studies were conducted:

- Two online, Google forms, surveys- the first for all abilities and the second for those with limited manual dexterity
- Goal: Obtain insight on ATM use and opinions on the proposed solution
- Two in-person interviews- the first with a medical doctor and the second with an individual with arthritis.

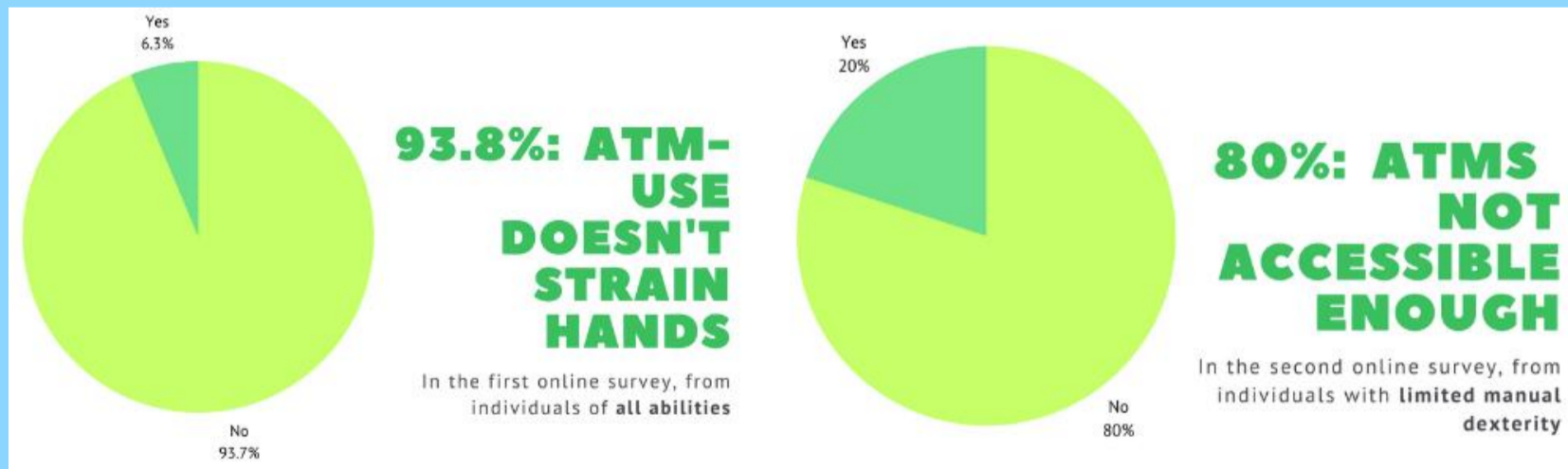
Goal: Obtain opinions on importance of sufficient ATM accessibility and the viability of the project's proposed solution

Analysis

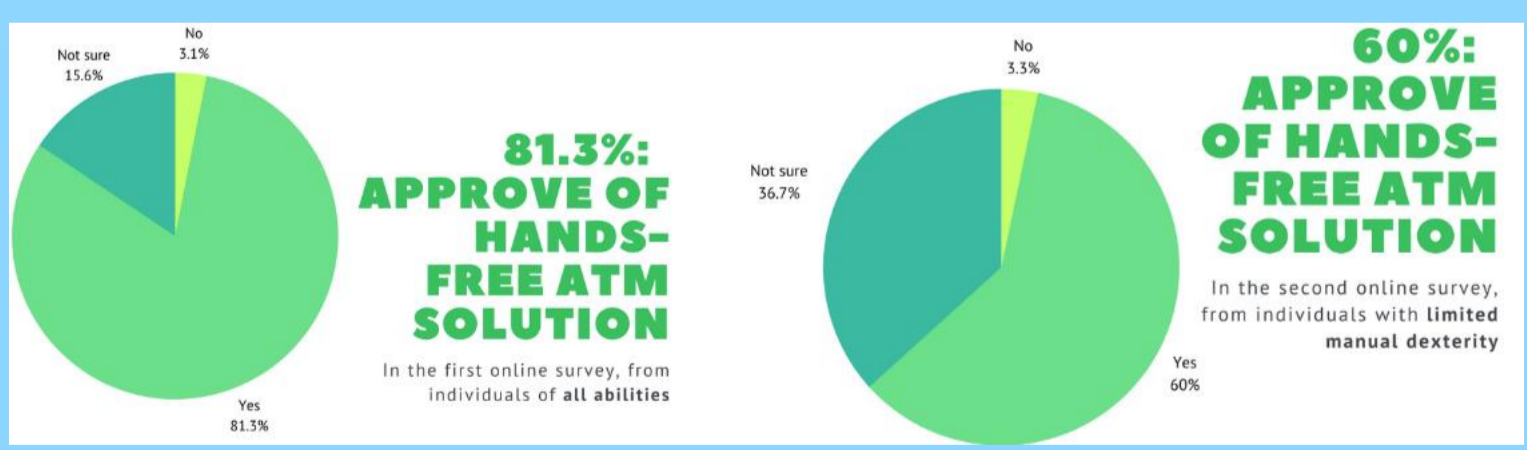


*The graphs displayed below are summarisations of the data collected within the Google Forms surveys and written interviews that were conducted in the project. They are genuine, as evidenced in the project's log book.

Serving as proof to the interpretivist philosophy of this project, the analysis conducted across the four studies carried out in the research stage revealed that issues regarding the accessibility of ATMs are most commonly noticed, and suffered from, by individuals with limited manual dexterity problems, due to the burden of their physical restrictions.



The studies, amongst both participants with and without limited manual dexterity, showed approval of and agreement that the project's proposal of a hands-free, AI voice-controlled ATM feature would be a viable solution for improving the accessibility level of ATMs for users with such physical limitations.



Results and Findings

Summatively, as a result of carrying out research described above, along with the appropriate preliminary planning (i.e. paper prototyping user persona and journey designs etc.), the author was able to design two low-fidelity prototypes using the online Figma design software: the mobile application for booking the ATM sessions with AI (hands-free) voice control and the AI wireframe with the AI voice control feature- both being named 'HandyVoice', as they handily prevent users with limited manual dexterity from having to navigate ATMs with their physically limited hands. Although the mobile application prototype is meant to be used on mobile phones and the ATM wireframe is meant to be used on real ATMs, both prototypes were, notably user tested on a desktop computer, in the interest of time for the project's academic submission. These two prototypes were user-tested and proven, through the conduct of a usability test survey, to fulfil the goal of improving accessibility of ATMs for users with limited manual dexterity.

Conclusion

Overall, through the implementation of a hands-free ATM use solution (the 'HandyVoice' voice control feature), the project author effectively improved the accessibility of ATMs for users with limited manual dexterity, by reducing the need for them to physically use their hands.

Notably, it is through the conduction of thorough research that the author was able to ascertain that it was the unusable nature of current ATMs physical components (such as button-pressing and physical card insertion) that was making it difficult for the physically challenged ATM user to carry out their desired transactions; hence the removal of such actions being necessary in this project's resulting solution.