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**Team 10**

**Research on Unique User Authentication via Behavioral Metrics**

**Abstract**

This paper takes a look at the possibility of alternative solutions to authentication problems on the internet. Instead of using a password, facial or fingerprint authentication (biometric), we look at the actual movements and actions of the user to see if we can create a profile that would uniquely identify them on the web.

**Introduction**

This experiment deals with the collection and analysis of user data in order to draw conclusions about possible alternative authentication methods. We aim to see if there is any reasonable profile we can build of someone based on their movements and keystrokes. These unique metrics, if found, would then be the basis for a possible new way to verify one’s identity online. We set out to find if there is a unique and individual correlation between different movements that we can then use to identify unique users.

When looking at this possible avenue for research we consulted online sources to examine the body of research that might have already been conducted in this field. These included, but are not limited to, studies on mouse movements, keystroke authentication, behavioral authentication. All articles and research we consulted are listed in our Literature Consulted section.

We created our own testing environment where we could set up the exact test we wanted. This includes different fields and actions for the user to interact with. We also have software implemented within the site to track such movements and interactions by the user. Combining these two tools allows us to look at the user inputs and determine if/to what extent there is behavior that could be traced to a single person and thus provide the basis for a new method of authentication.

**Materials and Methods**

*Hotjar*

In order to conduct this experiment we need a tool to track the movements and other key metrics of the survey’s subject. We could have created our own tool that was designed perfectly to suit our exact needs. This would provide us with the most tailor-made experience for our survey. However, this is not realistic for the scope of our project. Designing this software alone would take away too much of our time that could have been spent on the survey design and other important project aspects. We simply could not stay on schedule to finish our research if we had to design the mapping tools from scratch.

In order to preserve our resources, namely time, we decided to find a mapping tool on the internet that we could then use to conduct our own research. It had to have the functionality that we required for our experiments, mainly heat mapping and keystroke tracking. We also wanted to not have to pay for this as we would not know how useful the software would be until we actually bought it and tested it out. We used some free trials of software that we ultimately decided against and tried many free software options that either lacked a key feature we required or was too difficult or time consuming to implement on our tight schedule.

Finally we settled on Hotjar, a behavioral analytics tool that we decided met all of our needs for this project. This tool uses heatmaps and recordings that allows us to collect the necessary data from users for our research. This tool will be implemented into our testing website which will be designed to utilize all the necessary features of Hotjar.

*Testing Website*

We also needed to implement a testing website. The point of this site is to integrate our tracking software and create a user experience which we can collect data on. Hotjar can be plugged in directly into our website environment for an easy implementation of its functionality and features.

Once implemented we designed a website that we wanted the user to interact with. The user would spend time on the website as part of the research process. They would test out buttons and text fields on the website as if they were normally interacting with it. While they were doing this, Hotjar would be collecting data on the site that we could then analyze.

*Survey*

The actual study itself revolves around the user interacting regularly with the website. We want to simulate normal interactions that someone may have while visiting the site. This may include scrolling through text, typing in fields and clicking on buttons or other prompts.

Once participants have participated in this for a long enough time, and we have collected data on all of their actions, we can then analyze it for patterns. We can look at all of their actions, as well as the speed and repetition associated with them and determine whether or not they produce meaningful patterns.

**Results**

Need Data

**Discussion**

Need Data

**Literature Consulted**

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