KEYSTROKE DYNAMICS

2FA in web apps
An authentication factor is a category of credential that is intended to verify, sometimes in combination with other factors, that an entity involved in some kind of communication or requesting access to some system is who, or what, they are declared to be.
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Authentication factors

something you **know**

password, passphrase, PIN
something you **have**

and can **not** be easily duplicated:
smartcard, token, OTP generator
Keystroke dynamics or typing dynamics refers to the automated method of identifying or confirming the identity of an individual based on the manner and the rhythm of typing on a keyboard. Keystroke dynamics is a behavioral biometric, this means that the biometric factor is 'something you do'.

something you are
fingerprint, retina, iris
keystroke dynamics (typing pattern)
Keystroke dynamics

something you do

behavioral biometric
Keystroke dynamics

typing pattern

dwell time: KeyDown - KeyUp
travel time: KeyDown - KeyDown
## Keystroke dynamics

<table>
<thead>
<tr>
<th>+</th>
<th>-</th>
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</thead>
<tbody>
<tr>
<td>uniqueness</td>
<td>lower accuracy</td>
</tr>
<tr>
<td>low implementation and deployment cost</td>
<td>lower permanence</td>
</tr>
<tr>
<td>transparency and noninvasiveness</td>
<td></td>
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<tr>
<td>continuous monitoring and authentication</td>
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Keystroke Dynamics

User name:

Enter your username

Type this below

If you haven’t got anything nice to say about anybody, come sit next to me. Alice Roosevelt Longworth

Text Input

If you haven’t got anything nice to say about anybody, come sit next to me. Alice Roosevelt Longworth

When done

Submit
Keystroke dynamics

deaf flea
Keystroke dynamics

brain - notion - word

notion: concept, idea
Graphs:

Word: POWER

[Graph showing POWER with multiple series]
Keystroke dynamics

mobile devices: android
Key: 229

DWELL TIME FOR KEYCODE 229 [Å]

Milliseconds

- Standard deviation

229  Recently

Highcharts.com
Travel graphs
Key: 229-229

TRAVEL TIME FROM Å TO Å

Milliseconds
Keystroke dynamics

confidence factor

tired
injured
drunk/drugs
moody
Keystroke dynamics

```javascript
$('body').on('keydown', function(evt) {
    var key = evt.keyCode;
});

$('body').on('keyup', function(evt) {
    var key = evt.keyCode;
});
```
Keystroke dynamics

Possible uses

- enhance authentication
- detect user change
- identify trolls
Keystroke dynamics

Countermeasures

typing pattern randomization

hardware: FPGA
software: keyboard driver
THE END