Authentic brain waves improve driver security

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One-time entry authentication methods, such as passwords, iris scanners and fingerprint recognition are fine for simple entry whether to a protected building or a private web page. But, a continuous biometric system is needed in some circumstances such as authenticating drivers of vehicles carrying valuable commodities and money, and even public transport vehicles and taxis. Now, such a system based on scanning the driver's brain waves described in a forthcoming issue of the *International Journal of Biometrics* could make hijacks of such vehicles a thing of the past.

Isao Nakanishi of the Graduate School of Engineering, at Tottori University, and colleagues explain that conventional biometric systems commonly assume that authentication is "one-time-only", but if an imposter replaces the authenticated user in a hijacked car, for instance, such systems have no way of verifying that the person currently driving the car is the legitimate driver and that the hijacker hasn't thrown the owner from the car or tied them up in the boot. An authentication system based on password entry or iris scanning that repeatedly checks that the driver is the legal driver of the vehicle would be not be safe and so would be wholly unviable.

However, measuring the driver's brain waves continually - via sensors in the headgear of the driver's headgear - would be straightforward and would allow authentication that could not be spoofed by an imposter. If the wrong brain waves are measured, the vehicle is safely immobilized.

The Tottori team has now developed a system that can process electroencephalogram (EEG) signals in the alpha-beta band of the brain's electrical activity and verify the signals it receives against a pre-programmed sample from the legitimate driver. "Brain waves are generated by the neural activities in the cerebral cortex; therefore, it is hidden in the body and cannot be bypassed," the team explains.

Fundamentally, the system records the pattern of alpha-beta brain waves of a driver with their eyes open carrying out the normal functions of driving, given that this is the condition in which authentication is required. An alternative brain wave scan might have them with eyes closed and not carrying out any task. Importantly, the ongoing authentication of drivers using their brain waves would facilitate a simple way to preclude starting the engine if the driver is intoxicated with drugs or alcohol, or even just too tired because their brain waves would not match their normal pattern under such circumstances.

More information: "Using brain waves as transparent biometrics for on-demand driver authentication" in Int. J. Biometrics, 2013, 5, 288-305

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