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Web-Connected Pacemakers: The Next Step In Remote Patient Monitoring

An efficient new security protocol for the wireless transmission of data from medical devices has been developed by researchers at the UPV/EHU-University of the Basque Country in northern Spain. Soon, sensors from implantable devices like pacemakers may be connected to the internet, allowing doctors to safely and securely monitor patients even when they are away from the hospital.

The use of implantable medical devices such as cardioverter defibrillators (ICDs) and pacemakers is growing rapidly as the population ages. The devices work by recording heart activity and regulating heart rhythms for patients with abnormal cardiac patterns. The data are transmitted wirelessly to an external device, usually in a hospital where physicians can monitor patients and plan treatment.

The connection of pacemakers and other medical sensors to the internet represents the next natural step in remote monitoring and patient management. However, concerns about the privacy and protection of patients' data must be addressed before the promise becomes a reality. Furthermore, the devices themselves must be energy efficient, have enough memory and appropriate latency.

Ladon Security Protocol

To address the need for privacy protection in the transmission of patient data via the internet, the Ladon security protocol was developed by Jasone Astorga of the Department of Communications Engineering at UPV/EHU, in the 12T (Telematics Research and Engineering) research group. The protocol is considered an efficient mechanism for ensuring the authentication, authorisation and establishment of end-to-end communication keys, so that medical data is made available only to legitimate requestors.

Energy, Memory, Latency

Astorga addressed the energy efficiency of the new protocol, an essential component of success in implantable devices since battery replacement requires surgery. “The energy consumption of this Ladon protocol is negligible in comparison with the usual consumption of a pacemaker or ICD when applying its therapy (stimulating or defibrillating), and has no significant impact on how long the batteries last.” Memory consumption and latency are also lower with the new security application in the sensors.

The protocol has not been tested on real patients yet. "We have carried out our validation on a commercial sensor, not on a real pacemaker," said Astorga. ”In any case, we believe that it is a step forward down the road along which the remote monitoring of patients using implanted medical sensors can go on advancing."

The checks carried out to determine the protocol's suitability for authentication and access control may make it an appropriate tool for other applications, such as remote surgery, farther into the future.

Source and image credit: University of the Basque Country

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