

Patient Monitoring over the Internet

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Abstract

With modern wearable sensor and networking technologies improving, it is becoming possible to continuously monitor patients remotely over the Internet, while they go about their everyday lives, and call them into the hospital only when their conditions deteriorate to the point where hospital intervention is needed. Such is, for example, the case with continuous glucose monitoring of pediatric diabetes patients. We discuss two key complementary problems involved in remote patient monitoring over the Internet. The first is about which wearable sensors to activate (and when) in order to remotely estimate the patient's health state, given that sensors are typically battery constrained; activating all sensors too frequently will simply run them out of battery sooner than normal. The second is about when to call a patient into the hospital for medical intervention, given an observed deteriorating health state and, subsequently, when to discharge the patient from the hospital as the health state improves. We design and analyze two formal stochastic optimization models capturing the tradeoffs in these two complementary problems and glean insights about such novel service operations.

Keywords

Digital Health Services, Remote Patient Monitoring

Biography

Dr. Nicholas Bambos is R. Weiland Professor of Electrical Engineering and of Management Science & Engineering at Stanford University, Stanford, California, USA. He received his Ph.D. in Electrical Engineering & Computer Sciences from the University of California at Berkeley, USA. His research interests and contributions are in modeling and high-performance engineering of computer systems and networks; he has graduated about 40 Ph.D. students and has co-authored over 300 research publications in these areas. He is a co-recipient of the 2022 INFORMS Award for the best paper in Telecommunications and Network Analytics, has received the IBM Faculty Award, the Hewlett-Packard Faculty Award and has been the Cisco Systems Faculty Scholar at Stanford. His research in computer systems and networks includes work in digital health and medical analytics; he has a special interest in novel medical services mediated by wearable sensor and networking technologies.