

# WEARABLE HEALTHCARE TECHNOLOGY:

Accelerating the Development  
of Smart Algorithms



**1** Overview

**2** Designing a New Means  
of Prevention, Diagnosis,  
and Treatment

**3** Speeding the  
Development of  
Wearables and Apps

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## Wearables and Apps Are Shaping the Future of Medical Care

Motion analysis sensors and apps can precisely capture, measure, or record users' movements. These devices provide doctors, researchers, and patients with biometric data that would otherwise be difficult to collect, such as minute changes in a patient's breathing pattern, gait, and range of motion.

However, the proliferation of these devices poses a new problem: How do you analyze data collected with wearable technology and ensure that it is being put to good use?



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## Designing a New Means of Prevention, Diagnosis, and Treatment

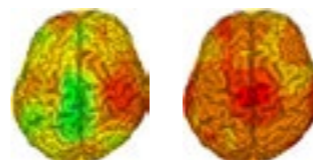
By developing smart algorithms, engineers and scientists can help doctors, researchers, and patients manage the large amount of biometric data generated by wearable devices. Smart algorithms make it possible for users to visualize their data and gain new insight into their, or their patients', health.



For example, [engineers at iSonea](#) developed acoustic respiratory monitoring algorithms in MATLAB® to help diagnose asthma in patients. Users breathe into the device, which analyzes the sound and detects wheeze patterns.



[Researchers at dorsaVi](#) developed algorithms for evaluating whether an athlete is well enough to return to a particular sport or activity. Wireless motion analysis devices measure and track movement while the user moves freely in any environment. Algorithms developed in MATLAB filter and process this raw data. This analysis can give physicians a better understanding of how their patients are recovering from injury and if these athletes are ready to return to their sport.



In addition, researchers and doctors can now use wearable devices to get an ongoing look [into their patients' EEG signals](#). Smart MATLAB algorithms classify and filter the data and offer a means of profoundly improving brain research.

Researchers can add the data collected from wearables and apps to a vast repository of information that they analyze and use as reference points in future research.<sup>1</sup> Doctors can compare patients' biometric data with that of a larger group in order to predict how an individual might respond to certain medications. Healthcare professionals then have a better understanding of which treatments are most effective for different populations.<sup>2</sup>

Health tracking devices and apps can also act as an incentive for patients to take charge of their own wellness. Patients see results in real time, tracking heart rate or muscle movements. They can refine their technique or view how far they've come in their training.

<sup>1</sup> Nilay D. Shah and Jyotishman Pathak, "Why Health Care May Finally Be Ready for Big Data," *Harvard Business Review*.

<sup>2</sup> Bernard Marr, "How Big Data Is Changing Healthcare," *Forbes*.

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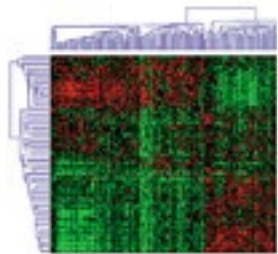
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## Speeding the Development of Wearables and Apps

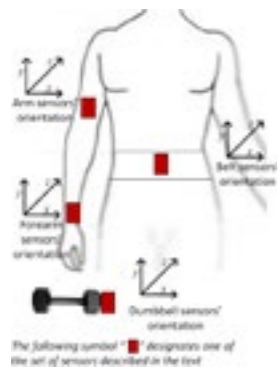
The development of these wearable devices, and the process of analyzing recorded data, is time consuming and complex.



Use MATLAB and Simulink® to speed this process and develop algorithms capable of analyzing large amounts of data.

The benefits of using MATLAB to develop algorithms at iSonea and dorsaVi included:

- Reduced manual coding effort
- Accelerated algorithm development iteration
- Reduced time spent recoding algorithms
- Faster response to customer requests
- Reduced code maintenance overhead



Still not sure? Explore [an example](#) that illustrates how to use MATLAB to develop an appropriate algorithm for analyzing your data.

