

# Managing Diabetes with Wireless Connectivity

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Rates of diabetes (particularly type 2 which is caused by the onset of insulin immunity often triggered by obesity) are increasing in developed countries due to an ageing and increasingly overweight population. In the U.S., for example, according to the Center for Disease Control (CDC), about 23.6 million people, or 8 percent of the population, have diabetes of which 95 percent suffer from type 2.

Uncontrolled diabetes can cause severe long-term health problems such as renal failure, blindness, and arterial disease. These problems are expensive to treat and as the number of sufferers climbs the medical authorities are finding it increasingly difficult to pay the bill.

Good management of diabetes is one way to mitigate the cost of treatment because it delays or even prevents the onset of related health complications. Management depends on frequent and accurate measurement of blood glucose using a blood glucose meter (BGM).

This device measures blood glucose levels from a blood sample deposited on a test strip. Modern units hold information in a memory for later recall at regular health checks. Patients are advised to record blood glucose levels several times a day – more frequent measurements result in better control as diet, exercise, or insulin injections can be adjusted quickly to stabilize high or low levels.

### **The wireless advantage**

Equipping a BGM with a wireless connection offers several advantages in the management of diabetes. Data from the BGM could be uploaded frequently to the patient's cell phone and from there to the physician's computer for review. An analysis of blood glucose measurement trends would allow the physician to spot persistent out-of-normal-range episodes much earlier than the typically quarterly

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reviews allow, and advise on modifications to the diet either via phone call or SMS to a cell phone, for example, on a weekly basis.

Bluetooth low energy wireless technology will be suitable for this application because the BGM typically runs on low capacity batteries and the wireless link only requires infrequent transmission of small amounts of data. In addition, the Bluetooth low energy single mode chip in the BGM will be able to communicate with the next generation of (dual mode) Bluetooth chips likely to be adopted by many cell phone makers.

The computing power of the cell phone allied to an Internet downloadable application could then be used to highlight unusual blood glucose trends and advise the diabetes sufferer to modify their exercise regime to, for example, take a twenty-minute walk just after lunch. As a complement to regular medical consultation, such feedback would help the patient to better manage the condition. And management of diabetes is the critical step in preventing complications and drastically cutting long term health care costs.

In addition, Bluetooth low energy is capable of communicating with a web-based application without using either a cell phone or a PC by using a Bluetooth router (a device that acts as a 'gateway' between the Bluetooth low energy device and the Internet). The web-based application can also send messages back to the Bluetooth low energy device. This functionality would be useful if, for example, the diabetic has left their cell phone at home.

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