freescale™ Kinetis

Case Study

Freescale MCUs Power Mobile-Accessible Blood Glucose Meter to Help Ease the Burden on Diabetics

With the Dnurse blood glucose meter smart handset, diabetics can track and analyze their condition from almost anywhere

Introduction

With traditional blood glucose monitors, patients have had to make notes of their blood glucose levels and physically hand these to their doctor upon each visit. This method is not only cumbersome; it also makes it more difficult to observe trends in changes of blood glucose levels instantaneously.

With Dnurse, the diabetic's measurement data is recorded directly into their smartphone and in the cloud, where it can easily and conveniently be displayed in chart or graph format for their doctor to analyze. Doctors are able to access the data remotely via the internet, and recommend any adjustments to the patient's diet, exercise routine or medication as necessary.

Using the Dnurse software, patients can also record and track their daily diet and exercise, as well as set notifications to remind them to measure their blood glucose levels and take their medication.

Sourcing the Perfect Technological Partnership

Beijing Dnurse Technology Chief Technology Officer Brent Zheng says, "To develop the Dnurse, we needed to find an MCU capable of processing information quickly with low power consumption, something the available 8/16-bit MCUs were unable to provide. Just when we thought we were not going to be able to find what we needed, we discovered the Kinetis KL05 MCU, which was perfect for our requirements on both counts: processing speed and low power consumption. In addition, the Kinetis KL05 MCU also supports 12-bit ADC and 12-bit DAC, saving us the need to include an external analogue component, thereby helping us reduce costs while enabling us to keep the size of the product down. At the same time, the Product Longevity Program* eliminated any concerns we had for the ability to upgrade in the future."

The Innovative Dnurse Smart Handset Blood Glucose Meter

By leveraging the latest technology, the Dnurse smart handset blood glucose meter, together with the Dnurse app and the cloud, provide diabetics the freedom to track and analyze their condition from almost anywhere.

Dnurse automatically records and collates the blood glucose values for every single measurement, and adds these to the daily diet, exercise and medication data to help patients understand and control their everyday routine and eradicate non-beneficial habits. In addition, Dnurse will provide blood glucose level and medication notifications to remind the patient of their levels and of when to take medication, enabling them to maintain their blood glucose at normal levels.

Dnurse takes advantage of the effective processing power and telecommunications functions of smartphone handsets so that family members can have real-time access, wherever they are, at any time, of the blood glucose level results, so that they can travel for business or go about their everyday life without a worry. At the same time, Dnurse allows the patient, even when overseas, to send comprehensive blood glucose level data to their doctor, and ask for a distance diagnosis when needed, so the patient doesn't need to worry about going on business trips or vacationing with family.

Freescale: Long-Term Support for the Medical Sector

Semiconductor technologies play a crucial role in the development of new technologies that will help patients monitor, diagnose, treat and understand their condition. Medical device designers need to achieve a balance between processing power and power consumption to help bring their products to market quickly, while ensuring that the products meet the various policy and legal requirements. Freescale is a reliable supplier providing MCUs, microprocessors, analog and sensor components, frequency amplifiers, and wireless technologies designed to satisfy the special requirements of the healthcare industry. These critical technologies, paired with Freescale's innovation, enable clients to develop groundbreaking medical treatment

*For Terms and Conditions and to obtain a list of available products within the Freescale Product Longevity Program, please visit: **freescale.com/ProductLongevity**.

systems and applications. In addition, Freescale offers a Product Longevity Program* for the medical sector, promising to supply components included in the plan for a minimum of 15 years, freeing developers of concerns about future availability.

Challenge:

To move beyond traditional outdated, non-integrated diabetes management systems and design a lasting mobile-accessible system with a comprehensive suite of healthcare applications.

Solution:

Kinetis L series MCUs, built on the ARM® Cortex®-M0+ core, feature ultra-low power consumption and a wealth of analog, communications and control peripherals. Dnurse uses the Kinetis KL05 MCU for the perfect balance between functionality and low power consumption. Design engineers are no longer limited to the power consumption constraints of 8-bit or 16-bit MCUs. The Kinetis KL05 MCU is optimized for both static and dynamic currents, while maintaining outstanding processing performance. This impressive product line simultaneously provides a broad selection of on-chip flash memory densities together with extensive analog, connectivity and HMI peripherals for engineers to choose from.

Advantage:

Traditionally, commercially available blood glucose monitors have been independent devices requiring diabetics to carry yet another battery powered electronic device in addition to their smartphone. Now, powered by the Freescale Kinetis KL05 MCU, Dnurse is able to offer a mobile device that can connect to your smartphone via an earphone socket, eliminating the need for a standalone blood glucose monitor. The innovative Dnurse device is a full featured blood glucose monitor that utilizes the processing power and the high resolution graphic display of your smartphone, while keeping size, weight and additional power consumption to a minimum. The engineering team at Dnurse predicts that during normal use, a single 50mAh button-cell battery can last up to five years, or 4000 blood glucose measurements. Equally impressive, the entire device, including battery, weighs only 9 grams. This product has been accredited by the China Food and Drug Administration (CFDA) and has been given Hunan FDA certificate no. 2014 2400052.

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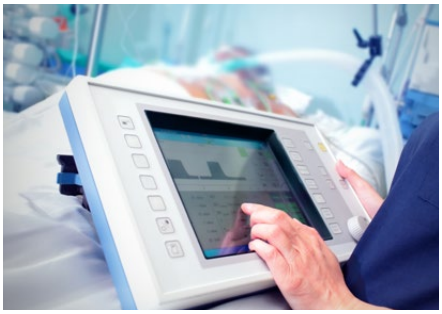
With data management using traditional blood glucose monitors, patients have had to make notes of their blood glucose levels and hand these to their doctor. This method is not only cumbersome; it also makes it more difficult to observe trends in changes of blood glucose levels directly.



With Dnurse, the diabetic's measurement data is recorded directly into their smartphone and in the cloud, where it can easily and conveniently be displayed in chart or graph format for doctors to analyze. Doctors are able to access the data from afar using the internet, and recommend any adjustments to the patient's diet, exercise routine or medication as necessary.

Using the Dnurse software, patients can also record and track their daily diet and exercise, as well as set notifications to remind them to measure their blood glucose levels and take their medication.

More on Beijing Dnurse Technology

Beijing Dnurse Technology Ltd. is an innovative company specializing in mobile internet diabetes management. Through the advanced Dnurse smart handset blood glucose meter and comprehensive diabetes self-management system, the company offers the terminal and smartphone apps, together with a cloud-based database and an innovative "equipment + applications + service" business model, to enable diabetics to simply and conveniently take their own blood glucose measurements, store and share the results, seek distance diagnoses, receive notifications and advice on daily diet, exercise, and medication, and share their experiences of coping with their condition among friends in similar circumstances on social media sites.

For more information on Freescale's healthcare solutions, visit freescale.com/healthcare

To learn more about how Dnurse e-readers are powered by Freescale technology, visit freescale.com/Dnurse

Document Number: DNURSECS REV 0