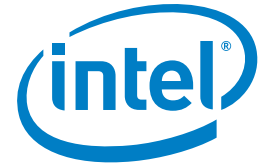


## CASE STUDY

Intel® Atom™ Processor

A N D Technologies\* AI-EKG Device

Healthcare Industry



# Faster Detection of Cardiac Arrhythmia for Remote Patients

A N D Technologies\* develops a portable healthcare device based on the Intel® Atom™ processor that captures and analyzes EKG data, thus speeding up diagnosis.



## CHALLENGES

- **Reduce reliance on cardiac specialists:** Enable general practitioners to interpret the data and diagnose arrhythmias.
- **Improve care for remote patients:** Allow patients experiencing an irregular rhythm to quickly inform a hospital, clinic or physician – at any time, from anywhere.

## SOLUTIONS

- **AI-EKG:** Captures and analyzes EKG data and sends it to healthcare providers at another location.
- **Intel® Atom™ processors:** Provide the computing power needed to simultaneously analyze EKG data, run the user interface (UI) and communicate with physicians wirelessly.



“Our device allows both cardiologists and non-cardiac physicians to quickly identify arrhythmia in patients who are in remote locations.”

Ameen Faraz  
Director, A N D Technologies Pvt Ltd

## Healthcare Solution Provider

A N D Technologies\* is a solution provider delivering computer hardware and software for embedded systems in healthcare, energy, and test and measurement, among other application areas.

## Business Challenges

Heart arrhythmia occurs when the heart’s normal rhythm is disrupted, causing it to beat too fast, too slow or irregularly. Most heart arrhythmias are harmless while others may result in cardiac arrest or stroke, particularly for patients with weak or damaged hearts. In the United States, more than 850,000 people are hospitalized for an arrhythmia each year.<sup>1</sup>

Prompt detection and response to heart-related problems can significantly reduce patient fatalities. Diagnosis is typically performed by cardiologists, who are often in short supply at healthcare facilities, especially in rural and remote areas.

“The Intel® Atom™ processor permitted us to greatly simplify our hardware platform,” said Ameen Faraz, Director at A N D Technologies.

## Technology Solutions

Breaking new ground in healthcare, the AI-EKG from A N D Technologies eliminates the need to have a cardiologist read an electrocardiogram test — also called an EKG or ECG. This is because the device collects, analyzes and sends the EKG data to a healthcare facility where general practitioners (non-cardiac specialists) can interpret the data and determine the proper course of action.

The AI-EKG is a portable heart diagnostic system that patients carry around with them. When they feel an irregular heartbeat, the device can be used to immediately take a standard, resting EKG. In the majority of cases, patients will send their data to healthcare clinics and physicians via email or an Internet portal.

Physicians can also remotely control the AI-EKG in order to change settings and view the data live (Figure 1). This feature enables physicians to better assess the condition of the patients and reach a more accurate diagnosis.

In addition to performing heart diagnostics, the AI-EKG functions as a personal computer, running Microsoft\* Windows\* and applications such as Internet browsing and file storage. By offering dual-functionality, the device provides patients a high level of utility at home or away.

## Device Features

The battery-operated AI-EKG shows patients what they need on a multi-angle 7-inch color display controlled by a friendly user interface that makes reading waveform data easy. The device supports three, six or eight leads to deliver excellent image quality. Avoiding expensive, thermal ECG paper, the device sends waveform data to home or office printers with standard paper. Other device features include:

- High-performance dual-core Intel® Atom™ processor
- Dual-function:
  - Heart monitoring
  - Basic PC
- Data connectivity:
  - USB and Ethernet standard
  - Wi-Fi and 3G/4G mobile broadband optional
- Storage capacity up to 3000 digital ECG records
- Windows Embedded Standard 7 operating system



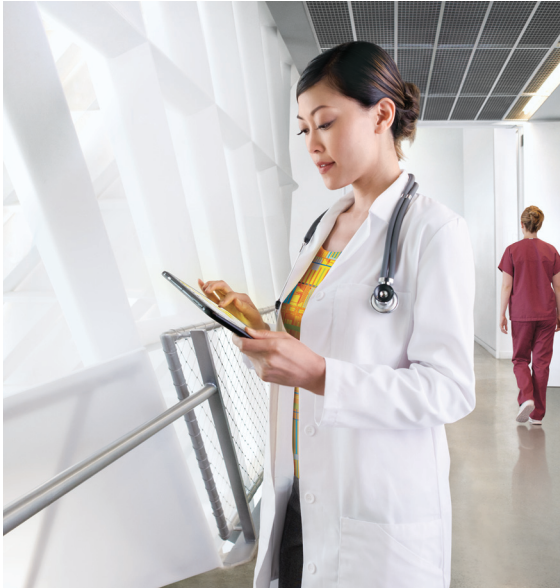
Figure 1. Eight EKG signals displayed simultaneously

## Innovative Design

A N D Technologies recently redesigned the AI-EKG using a dual-core Intel Atom processor, which allowed the elimination of a digital signal processor (DSP). Removing the DSP translated into lower power consumption, longer battery life, and lower overall system cost and complexity. Now, one of the Intel® processor cores measures the outputs of the EKG electrodes, and the second core runs the user interface. When the device operates as a PC, both cores are available to run user applications.

The AI-EKG incorporates signal processing algorithms from National Instruments\* LabVIEW\*, which contains powerful tools in denoising, analyzing and extracting ECG signals. The software helped reduce development time by around 70 percent compared to writing the signal processing code in-house. Additionally, LabVIEW enables developers to make quick upgrades.

The device also incorporates a number of leading edge technologies to enhance security and operation. McAfee\* Embedded Control software protects the device against malware infections and attacks. Intel® Solid-State Drives (Intel® SSDs) enable the device to boot up in under 10 seconds,<sup>2</sup> and Intel® WiFi tools provide flexible and convenient connectivity.



## Medical Innovation And the Intelligent Systems Framework

The Intel® Intelligent Systems Framework is a set of recipes for connected devices which helps simplify the deployment of intelligent systems and enables equipment manufacturers to shift their investments from achieving interoperability to unlocking the value of data for their end customers. The framework brings together hardware, OSs, and tools for connectivity, security, manageability including software and middleware from Microsoft\*, McAfee\* and others. The new approach will provide advantages to end users as it will help to lower deployment costs and ease integration.

AND Technologies\* AI-EKG\* device meets the basic Intelligent Systems Framework criteria.

**Processor platform** - Intel® Atom™ Processor

**OSs** - Microsoft Windows\*

**Security** - including McAfee Embedded Control

**Storage** - Intel® Solid-State Drive

**Connectivity** - Intel® Wi-Fi Tool

In addition to these key ingredients, Intel is working with system vendors, ISVs, and system integrators to create cloud-to-device services that build on the framework. This solution also supports Advantech\*'s SUSIAccess\* which facilitates and centralizes monitoring of devices. When a device fails or behaves abnormally, the system will send a message so that a user can remotely diagnose and resolve problems. Most issues can be resolved by remote control which can drastically reduce maintenance effort.

More information on the Intel® Intelligent Systems Framework can be found at [www.intel.com/intelligentsystemsframework](http://www.intel.com/intelligentsystemsframework).

More information on Advantech\*'s SUSIAccess\* can be found at <http://www.advantech.com/IndustrialCloud/susiaccess.aspx>.

## Benefits

**High performance:** The design, based on the Intel Atom processor, accurately measures the input from the ECG electrodes.

**Convenience:** Records can be exported to network drives, USB or electronic medical records (EMRs) in different formats.

**Ease of use:** The user-friendly device has an easy-to-clean keyboard, dedicated function keys, Microsoft Windows operating system, intuitive menus and on-screen Quick Tips.

**Connectivity options:** Multiple wired and wireless network standards are supported.

**Compact design:** Support for external printers eliminates the need to integrate a thermal printer.

## Saving Lives and Cost with Faster Diagnoses

According to Andrew Crocker, AgriLife\* Extension gerontology health specialist, "Each year, about 1.1 million people in the U.S. have heart attacks, and almost half of them die. Many more people could recover from heart attacks if they got help faster."<sup>3</sup> The AI-EKG from A N D Technologies was developed to do just that.

When patients experience heart attack symptoms, they can use the AI-EKG to send EKG test data to cardiologists or general practitioners, allowing them to render a fast, accurate diagnosis remotely. In the case of a heart attack, steps may be taken to get the patient to a hospital as quickly as possible. If the test is negative, physicians can tell the patient, via the AI-EKG, how to alleviate the symptoms, thus avoiding a costly trip to the emergency room.

For more information about A N D Technologies, visit [www.andtechnologies.co.in](http://www.andtechnologies.co.in).

To learn more about Intel solutions for healthcare, visit [www.intel.com/go/healthcare](http://www.intel.com/go/healthcare).

<sup>1</sup> Source: MedicineNet.com, [www.medicinenet.com/arrhythmia\\_irregular\\_heartbeat/article.htm](http://www.medicinenet.com/arrhythmia_irregular_heartbeat/article.htm).

<sup>2</sup> System boot times may vary due to other system factors.

<sup>3</sup> Source: "Quick response can reduce heart attack-related deaths," by Kay Ledbetter, Texas A&M, <http://www.huntregional.org/Archives/hosarchive3rdqtr10.htm#response>.

