



National Aeronautics and  
Space Administration



## TECHNOLOGY SOLUTION

### Health, Medicine and Biotechnology

# Digital to Analog Transformation and Reconstruction of ECG Data

[New simple method and device that allows rapid automated second interpretation of 12-lead ECG data](#)

The innovators at the NASA Johnson Space Center have developed a new method and device for specialized digital to analog conversion (DAC) and reconstruction of multichannel electrocardiograms (ECGs), including 12-lead ECGs. Current devices do not have the functionality that allow for the transmission of stored digital ECG data collected from one manufacturer's ECG machine to another for an automated second opinion. With this technology the physician has the opportunity to compare results by transferring the ECG data to another ECG machine regardless of location when a patient's results are difficult-to-interpret for a second opinion. The technology also allows for the use of less expensive 12-lead ECG front ends or analog to digital conversion (ADC) hardware which is advantageous when in remote locations or with patients who are mobile during research studies. The digital to analog transformation and reconstruction of ECG data technology is available for licensing.

#### BENEFITS

- Simple - Uses an algebraically optimized hardware configuration and software format
- Flexible - Inexpensive ECG front end hardware can be used
- Automation - ECG data collection and transfer is automated
- Compatible - Device can transfer ECG data regardless of ECG machine



## THE TECHNOLOGY

NASA innovators developed a method and apparatus for digital to analog conversion and reconstruction of multichannel electrocardiograms. The technology uses an algebraically optimized hardware configuration and software format that re-creates the presence of a connected patient when the patient is no longer actually present. This simplified method makes it easier and possible to transmit stored digital ECG data collected on one machine into another for an automated second opinion. Along with this functionality, the technology would make it possible to share the data collected for difficult-to-interpret 12-lead ECGs and rhythms with others in different locations.

The device allows for very inexpensive ECG hardware front ends to be utilized for data collection since the digital data obtained will always be accurately convertible back to analog for fuller analysis at any central ECG receiving station. This capability would be useful for several situations, such as patients being monitored for heart conditions at home, student athletes participating in ECG screening programs, and individuals being screened in underdeveloped countries or remote areas. The NASA developed technology would be useful in collecting ECG data in environments such as military mobile units, oil platforms, mountaineering, and expeditions.

This NASA Technology is available for your company to license and develop into a commercial product. NASA does not manufacture products for commercial sale.



The NASA-developed technology automates the data collection and transfer of ECG data for use in many setting and applications.

## APPLICATIONS

The technology has several potential applications:

- Oil Platforms
- Expeditions (Mountaineering, Polar, or Other)
- ECG Equipment Testing and Research
- Patient Research Programs
- Extended Care Hospitals
- Home Care Services

## PUBLICATIONS

Patent No: 10085662

Kothadia, R., Kulecz, W., Kofman, I., Black, A., Grier, J., Schlegel, T. "New System for Digital to Analog Transformation and Reconstruction of 12-Lead ECGs" PLOS One Research Journals (2014). DOI: 10.1371/journal.pone.0061076

[technology.nasa.gov](http://technology.nasa.gov)

**More Information**

National Aeronautics and Space Administration

**Agency Licensing Concierge**

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