Millar | OEM Solutions

White Paper: Wireless Pressure Monitoring Technology in Medical Devices

WIRELESS TECHNOLOGY IN TODAY'S MEDICAL DEVICES

Wireless sensors have long offered the prospect of easy, convenient patient monitoring. However, it is only now that technology can deliver reliable data and with an energy efficiency that supports long life from small miniature devices.

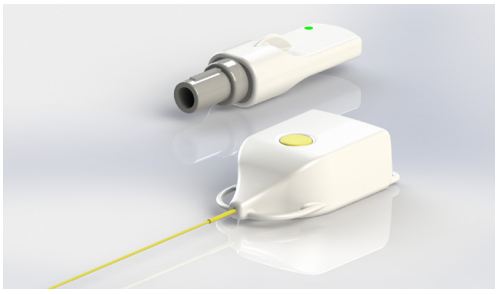
Bluetooth technology is well-aligned with supporting medical device applications. Now with the adoption of Bluetooth 5.0 (BLE - Bluetooth Low Energy), devices can achieve reduced power usage and longer battery life, faster data transfer, and greater range.

Wireless integration often requires the deployment of new hardware to operate existing systems. Millar's patented transmitter-receiver combo removes this hurdle by utilizing existing capital equipment.

WIRELESS MONITORING CLINICAL APPLICATIONS

Potential applications for device integration include:

- Cardiovascular
- Critical care
- Urodynamics
- Respiratory
- Neurocritical care
- Emergency care



Millar Transmitter-Receiver Combo

BENEFITS OF WIRELESS PRESSURE SENSOR TECHNOLOGY IN THE HOSPITAL

With the Internet of Things and connected care becoming readily available for different applications, the concept of recording data to monitor our health status has normalized. Bluetooth wireless connectivity offers an excellent option for wireless medical devices that require high mobility, long battery life, and no infrastructure support.

During a hospital stay, patients are connected and monitored through many tethered connections. The ability to remove one or more of these connections adds comfort and movability for the patient. It can also make a real difference to the quality of data when monitoring physiological pressures over an extended time. In this application, the sensor should not be pulled on or stressed by the entanglement of wires to maintain the accuracy of the pressure readings and device functionality.

Digital Bluetooth transmission enables reliable communications, no interference, and very low noise. Power consumption is also very efficient, so a single battery is likely to last the full patient treatment duration.

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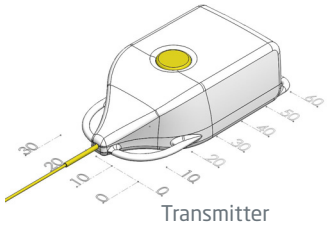
CUSTOM WIRELESS PRESSURE PROTOTYPES

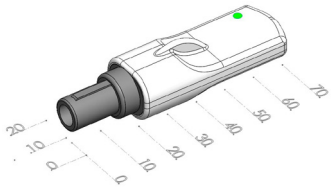
Millar's existing wireless pressure prototypes can be customized in catheter size, length, and transmitter shape and size to meet the required application. To measure pressure, the catheter tip is inserted inside the body at the desired pressure reading location and the transmitter is secured to the patient. Upon activation, the transmitter connects wirelessly to the Bluetooth receiver compatible with an existing patient monitor. In this capacity, it can connect to any existing capital equipment or monitor, reducing the costs of enabling wireless capability.

Additionally, the analog capability of the Millar receiver enables new wireless versions to be fully backward compatible with existing systems in the field.

Based on the pressure reading required, the transmitter can be manufactured with a digital readout. An ideal application for this includes monitoring for specific pressure thresholds, such as in compartment pressure. The digital readout feature does increase the size and weight of the transmitter, and these factors should be taken into consideration when designing for extensive patient monitoring.



Transmitter



Receiver

Digital Transmitter

CONSIDERATIONS FOR WIRELESS TECHNOLOGY INTEGRATION

Millar's out of the box system configuration supports one-to-one automatic communication for ease and immediacy of use. When powered, this enables instant transmitter communication with the paired receiver in the package. The receiver produces an analog output, allowing it to be plugged into an existing patient monitor and provide an immediate equivalence to a tethered sensor system. No intervention is required to set up the devices.

Custom configurations can support the normal parameters of a Bluetooth environment with pairing to smart devices and fully digital transfer into patient record systems. Digital data transfer supports the inclusion of metadata such as link integrity, battery status, and scheduling of data collection. When customized, the system can be backward compatible with analog systems to support integration into patient monitors, removing requirements for new capital deployments to the field.

As with any wireless device, considerations should be made for Cybersecurity to protect sensitive data during transmission. Millar works with companies to maintain compliance with the latest Standards applicable to Wireless Medical Devices.

VALUE OF MILLAR PRESSURE SENSING DEVICES

Millar utilizes proven MEMS piezo-resistive sensors for wireless applications. The sensors can withstand implantable environments for a short duration and measure pressure at the source. Over the years, Millar has perfected integration methods with these sensors to greatly reduce the effects of manufacturing-related drift. The wireless prototypes are built with catheter-based sensor tips and are robust enough to navigate tortuous paths in the human vasculature. Since pressure is measured only at the tip, this technology does not suffer from damping and resonance effects of fluid-filled lines.

Millar's pressure sensor accuracy and wireless platform provide an optimal combination for next-generation pressure monitoring medical devices. Contact Millar to collaborate on your next project.

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