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MobileMark
antenna solutions®

PRĪMSPHERA

CASE STUDY

PrīmSphera launches a Contactless Vital Sign Monitoring System detecting fluid buildup

with sensor commercialized by Mobile Mark, Inc.

THE ANTENNA MANUFACTURER

Mobile Mark, Inc. designs and manufactures mobile, infrastructure and device antennas for wireless applications from 30 MHz – 7.2 GHz. During the customer's development process, Mobile Mark's engineers are available for consultation with RF technical expertise to ensure that the customer's wireless system is utilizing the antenna performance to its fullest potential.

THE CUSTOMER

PrīmSphera is a revolutionary sensor technology company pioneering break-through solutions to solve real-world challenges. Their vision is to create a contactless sensor platform to improve effective decision making by unlocking insights that are otherwise unavailable. Their technology is based on Radio-Frequency Polarization Mode Dispersion (RF PMD) technology developed at, and licensed from, the University of Notre Dame. It has broad applications across aerospace, defense, food processing, and industrial manufacturing verticals.

PrīmSphera has selected Healthcare as its primary beachhead market. The flagship product is a contactless monitoring system that detects fluid buildup. Accurate fluid status monitoring is crucial for managing patients with medical conditions that demand precise fluid management, such as Chronic Kidney Disease (CKD), Congestive Heart Failure (CHF), Cirrhosis, Diabetes, Liver Disease, and other chronic illnesses.

THE TECHNOLOGY

The Contactless Vital Sign Monitoring System detecting fluid buildup operates based on Radio Frequency Polarization Mode Dispersion (RF PMD) and Coherent Signal Dispersion (CSD) principles. RF PMD refers to the polarization changes of RF signals from Transmitter (Tx) after traveling through space via various environments and multiple paths, including reflecting off objects, and eventually recombining at the Receiver (Rx). By positioning multiple transmitters and receivers (MIMO Tx-Rx) in different space variations, additional data can be gathered on space-domain Coherent Signal Dispersion (CSD). The data extracted from RF PMD and CSD methods are correlated, analyzed, and optimized to greatly improved sensor accuracy.

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PrīmSphera's patented technology leverages on PMD signature in two very distinct ways. Capturing the full PMD signature allows for full integration across frequency sub-bands to significantly increase Signal-to-Noise Ratio (SNR) sensing capabilities. The integration across PMD sub-bands in frequency-domain also improves sensor's SNR without compromising sampling rate. PMD signature also provides a unique fingerprint that is visually displayed of the complete Tx-channel-Rx propagation path on Poincare Sphere – useful for mapping Polarization States. Any deviations at the target will affect the illumination of RF signal which will alter the propagation multi-path and will thereby produce a measurable change in the PMD signature.

THE CHALLENGES

To commercialize this technology, PrīmSphera needs a partner with deep knowledge and experience in the following areas…

- Expertise in RF Antenna Design and Theory, specifically RF Polarization Mode Dispersion
- Reliable supply chain networks with access to RF sensitive materials and processes
- Decades of RF Antenna Design experience advising on design solutions, improvements & optimizations, and design for manufacturing
- Access to Anechoic chamber to characterize RF Antenna performance
- Manufacturing capability to mass produce RF sensitive products

THE SOLUTIONS

Mobile Mark, Inc. is a leading RF Antenna designer and US. manufacturer with more than 40 years of experience. Their global headquarters is located in Itasca, IL. Chris Rauh, Co-Founder & Chief Technical Officer (CTO) of PrīmSphera stated: "*their highly skilled Engineering team brings deep expertise in RF theory and practical antenna design — including complex domains such as Polarization Mode Dispersion (PMD).*" *With a proven track record of advising clients across the full product development lifecycle, Mobile Mark specializes in optimizing RF system performance from initial concept through to scalable, production-ready solutions.*

He continues: "As a key technology development partner to PrīmSphera, Mobile Mark played a critical role in advancing our Contactless Vital Sign Monitoring System from early-stage concept to a fully engineered solution ready for clinical and regulatory advancement. Their team not only delivered a custom antenna design tailored to our unique sensing modality, but also provided essential design-for-manufacturing support, including iterative optimization, prototyping, and pre-production readiness — positioning us for seamless transition to mass production upon FDA clearance."

Chris Rauh affirms: "*What truly set Mobile Mark apart was their nimble, collaborative approach. They consistently demonstrated technical agility, rapid response times, and an ability to under-promise and over-deliver — a rare and invaluable quality in early-stage product development. Their integrated Engineering and Manufacturing teams, co-located under one roof, allowed for quick feedback loops and rapid iteration. Combined with access to specialized RF materials and a state-of-the-art in-house anechoic chamber, Mobile Mark's contributions significantly accelerated our development timeline while de-risking future scale-up. Their partnership exemplifies how the right vendor relationship can drive innovation, execution, and commercial readiness in parallel — and we look forward to continuing this collaboration as we bring our product to market.*"

By John Suarez, Vice President of Marketing
and Cham Phoy, Product Management