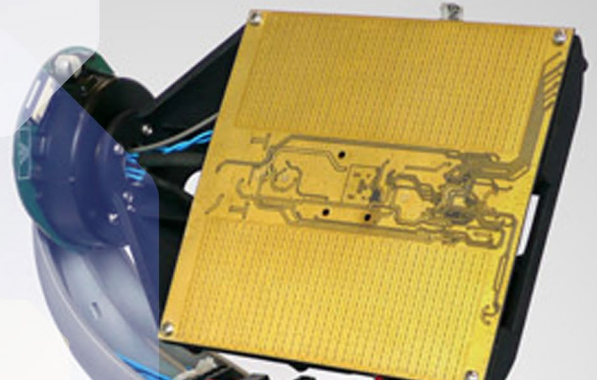# Cost Effective mm-Wave Radar Devices

With over 30 years of experience in complex RF and antenna design, Plextek has dominated the mmWave technology market from addressing challenges in autonomous vehicles, to object detection and security systems. Solutions have included both research projects through to product development, covering radar sensors, communication systems and monitoring capabilities.

Often, our customers require highly cost-sensitive mm-Wave radar devices without compromising on performance. Plextek has investigated this approach using an inexpensive, highly integrated single chip mm-Wave radar sensor with embedded processing by Texas Instruments. Combining this chip with an optimized antenna solution produces devices which are more cost-effective with low power consumption.

Previously, Plextek has implemented a sectoral horn antenna array with TI's IWR6843 radar-on-chip can be seen on the **Texas Instrument's website**. This allows the detection of moving objects at a consistent range across the entire wide field of view.

Plextek has also utilized TI's radar-on-chip capabilities to combat the challenges from using camera systems. These systems are in widespread use as sensors that provide information about the surrounding environment. Whilst the human brain can easily interpret the images created, it is difficult for software algorithms to do so in some scenarios and a solution that can solve this in a package that is of sensible size and cost still seems a long way off. High resolution radar can be a viable alternative to a camera sensor. The output it produces lacks the exquisite detail that a camera creates but it more readily reflects the geometry of the world it views. A radar that scans in both azimuth and elevation also measures the range to any target it detects so a direct, 3-dimensional estimate of its location is provided. In addition, radar is virtually impervious to adverse environmental conditions, working reliably in dark, wet or even foggy weather. This is very effective while assessing traffic flows of vehicles in cities or train traffic monitoring, for example, at crossings to improve safety under all weather conditions.

A combination of both camera and radar has also been integrated into a single hardware platform to produce an optimized intelligence transport sensor for smart city applications. The radar allows all motion to be detected under all weather and lighting conditions, whereas the camera allows additional metadata (i.e. vehicle type) to be added to the detected radar tracks.

Another obvious issue with camera sensors is privacy. As an alternative, we have developed a privacy preserving gesture recognition system using TI's radar. This work was presented at **IEEE WCCI 2020**. Unlike camera-based sensors where an individual could be identified in frames, a radar sensor "sees" the world in terms of time varying radar reflections which do not form an image and cannot be used to distinguish individuals. Since the sensor is unaffected the light conditions, it is a prime candidate for use in applications such as fall detection in care homes. An alternative use case would be the use of gesture control for household appliances.

By integrating high accuracy sensing with intelligent processing and optimized antenna design in a single package, mm-Wave sensors solve problems in a wide range of other industrial applications in manufacturing, building security and public settings where it complies with both privacy and GDPR regulations, while being effective under any environmental conditions.

About Plextek

We have a 30 year history of providing technology solutions to a variety of organisations.

Plextek understands today's key challenges for smarter technology development and can generate both the ideas and deliverable solutions to the assured level of security, performance, resilience and ergonomics that you need. We are a product development & consulting company that works with clients to achieve results based on their specific requirements. Our engineering experience, supported by our library of IP for key technology elements, aids accelerated time to market and greater cost effectiveness.

Contact

If you are interested to know more about how Plextek can help you achieve your technology goals, please contact hello@plextek.com to discuss your objectives further.

email us   visit our website