∧NSYS® + Andar Technologies

"We mainly use ANSYS HFSS for electromagnetic full wave simulation and circuit design analysis. The ANSYS solution allowes us to achieve fast and highly accurate results of physical models/components used in our mm-wave IC system. Moreover, ANSYS provides solutions for many issues involving radar systems on a chip that are not fully available from other competitors."

Hoang Le
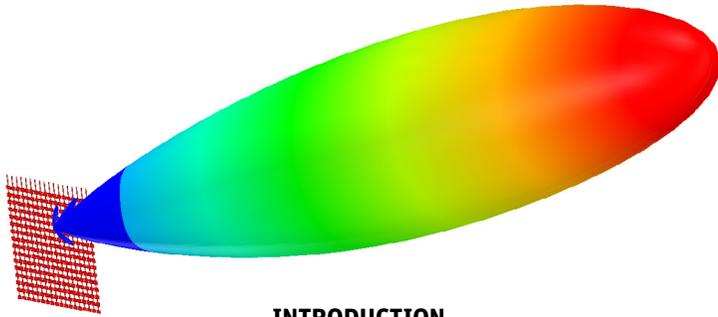*Designer*
Andar Technologies

Fig.1: The antenna pattern of the transmit unit must be steerable with a very high gain in a particular direction. Simulation tools help to achieve this in an automated iterative optimization process.

INTRODUCTION

Millimeter-wave (mm-wave) radar systems for automotive applications will be crucial to the success of autonomous vehicles by aiding in the detection and localization of pedestrians, vehicles changing lanes, and parking and braking events in complex traffic scenarios. The successful development of mm-wave radar systems requires a highly accurate, full-wave electromagnetic simulation tool to accurately model all system components, from inside the IC to the PCB and antennas.

CHALLENGES

Problems in any part in the mm-wave radar system can ruin the functionality of the whole system, potentially costing hundreds of thousands of dollars and months of delays. Several sensors are needed to cover all short-range to long-range tasks, adding costs in a low-margin industry. Andar Technologies' mission is to develop low-cost automotive mm-wave radar on chips exclusively for 79 Ghz — offering a more compact chip and antenna.

TECHNOLOGY USED

Andar intensively uses ANSYS HFSS solvers and high-performance computing for analysis of components like planar inductors, baluns, power dividers and transmission lines. Parametric sweeps and goal-driven optimization is done inside ANSYS Optimetrics.
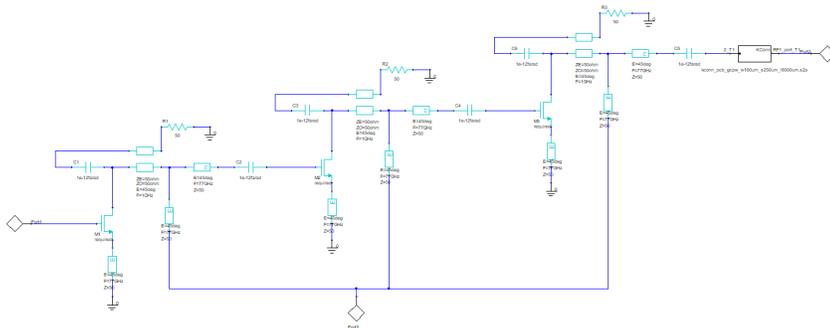

Fig.2: Andar amplifier schematic: Fast design and optimization is achieved with a mix of concentrated circuit elements and 3D HFSS Designs. The ability to integrate the 3D EM models increases the quality of the results.

The efficient hybrid technology FE-BI is used in particular for antenna Design. For larger scenarios, HFSS SBR+ is used to simulate in-the-field antenna performance.

ENGINEERING SOLUTION

For efficient overall workflow, ALinks interacts with the ECAD System for fast design transfer. Parasitics modeling is very important and can be easily achieved by either adding RLC Components directly to the 3D electromagnetic (EM) model or adding lumped components to the exported EM model inside the circuit environment of ANSYS Electronics Desktop. Once the complete circuit models deliver desired results for parameters such as Q factor, inductance and gain, we combine all components into a system simulation using the ANSYS RF option.

BENEFITS

Design and development of a mm-wave system cannot be competitive without accurate simulations. Simulation provides performance insights like antenna patterns, matching characteristics and loss figures early in the design cycle, allowing for a fast turnaround in optimization.

In a competitive industry, testing, prototyping and manufacturing costs need to be as low as possible. Virtual prototypes from ANSYS HFSS allow Andar to create innovative designs and reduce the amount of physical prototyping to a minimum. Andar estimates that simulation has saved hundreds of thousands of dollars for fabrication runs, and has eliminated years from time-to-market metrics.

COMPANY DESCRIPTION

Andar Technologies aims to provide low cost, highly integrated radar systems on a chip for automotive applications. In Australia, we are the only start-up working in the field of mm-wave IC design. Our key personnel are top-class engineers from U.S., Korea, China and Australia. We receive support from top academics and industry experts worldwide.

Andar Technologies is supported by LEAP Australia, ANSYS Channel Partner for Australia and New Zealand.

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