



## Capacitive Sensor Design Utilizing Conformal Mapping Methods

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*Submitted: Dec. 28, 2011*

*Accepted: Jan. 31, 2011*

*Published: Mar. 1, 2012*

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*Abstract-In this work we demonstrate the advantages of conformal mapping methods for the design of capacitive sensor setups. If the setups are modeled appropriately, the respective Laplace equations can be solved utilizing conformal mapping methods. These methods yield the equations describing the electric field of the sensor setups. The field equations contain the distinct geometric properties of the sensor setups. An in depth analysis of these equations permits the optimization of the sensor setups with respect to their sensitivities. This approach also facilitates the application of efficient signal processing methods. In addition, we propose a method which expands the application range of conformal maps produced by the Schwarz-Christoffel transform. This method permits the analysis of more complex sensor setups.*

**Index terms:** Conformal mapping, Schwarz-Christoffel transform, Joukowski transform, capacitance sensor, electric field, blade geometry, edge geometry, sensitivity analysis.