

**Mathematical Modeling and Modern Control Based Validation  
of Automotive Smart Power Window**

By

**Roushan Kumar**

**(SAP ID- 500020495)**

**SCHOOL OF ENGINEERING**

**DEPARTMENT OF ELECTRONICS &  
INSTRUMENTATION ENGINEERING**

Submitted

**IN PARTIAL FULFILLMENT OF THE REQUIREMENT OF  
THE DEGREE OF DOCTOR OF PHILOSOPHY**

TO



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**

**DEHRADUN**

April, 2018

Under the Guidance of

**Dr. Neelu J. Ahuja**

Professor

UPES, Dehradun, India

**Dr. Mukesh Saxena**

Professor & Vice Chancellor

UTM Shillong, India