

# POWER ELECTRONICS LABORATORY (NOGUCHI LAB.)

## SHIZUOKA UNIVERSITY

GRADUATE SCHOOL OF INTEGRATED SCIENCE AND TECHNOLOGY, DEPARTMENT OF ENGINEERING

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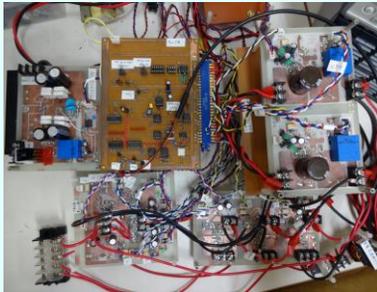
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**Members : Professor Dr. Toshihiko Noguchi, Secretary Ms. Rie Omura  
Doctor Students 3, Master Students 8, Senior Students 4, Research Scholar 1**



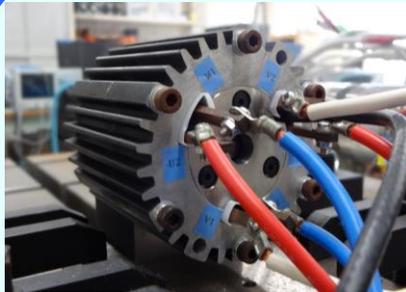
Our research interest includes power converters and motor drives in power electronics field. The power electronics is an academic and technical field that focuses on power conversion using semiconductor devices. The most typical power converter is an inverter, which is widely employed as a motor drive system to various applications such as a high-speed train, a local railway, an electric vehicle, a hybrid vehicle, an elevator, an escalator, a robot, an air-conditioner and more. All these applications contribute to save system energy and to make control performance more sophisticated.

### Multilevel Power Converters



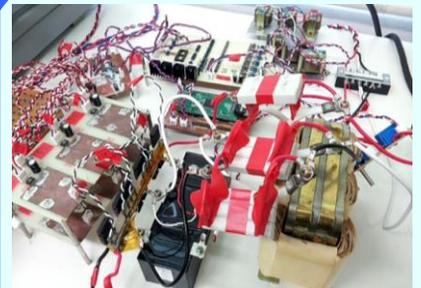
Current-Source Inverters with New Topologies,  
Hybrid CSI with Perfect Sinusoidal Output

### Ultra High-Speed Motors



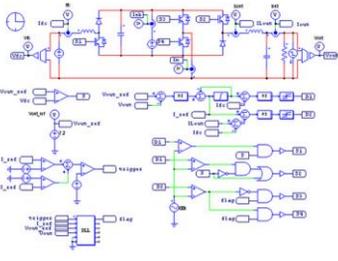
FEM Based Electromagnetic Analysis,  
High-Efficiency and High-Power Density Technologies,  
Low-Voltage High-Current Drives

### Matrix Converters



Indirect Matrix Converter with Unidirectional Switches,  
Three/Two-Phase Direct AC/AC Converters,  
High-Frequency Converters

### Electric Circuit Simulation



Control Algorithm for  
Power Converters and Motor Drives

### POWER ELECTRONICS

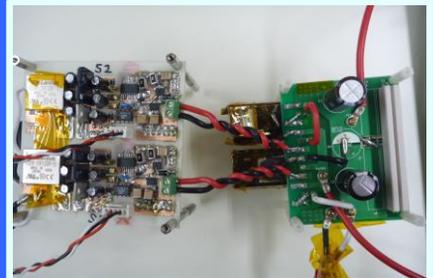
Semiconductor  
Engineering

Control  
Engineering

Power  
Electronics

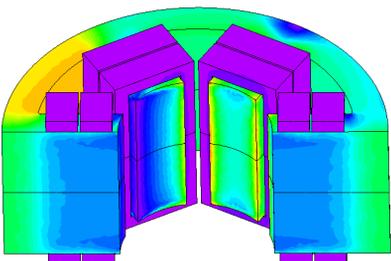
Power  
System  
Engineering

### Applications of Next Gen. Devices



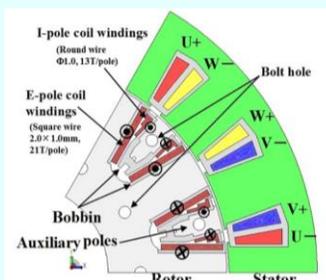
Implementation of SiC Devices,  
EMI and EMC Related Technologies,  
High-Speed and High-Efficiency Switching

### 3D Electromagnetic Analysis



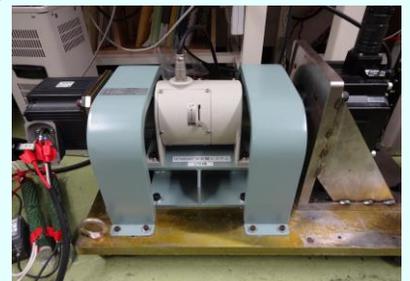
3D-FEM Analysis,  
3D-Magnetic Circuit Design,  
3D- Power Loss Analysis

### New Generation Motors



Wound-Field Self-Excited Motors,  
Flux-Switching Motors

### Motor Drives



Mechanical Sensorless Control,  
Current Sensorless Control,  
Maximum Efficiency Control