University of Global Village (UGV), Barishal

ELECTRICAL MACHINE PROJECT DEVELOPMENT
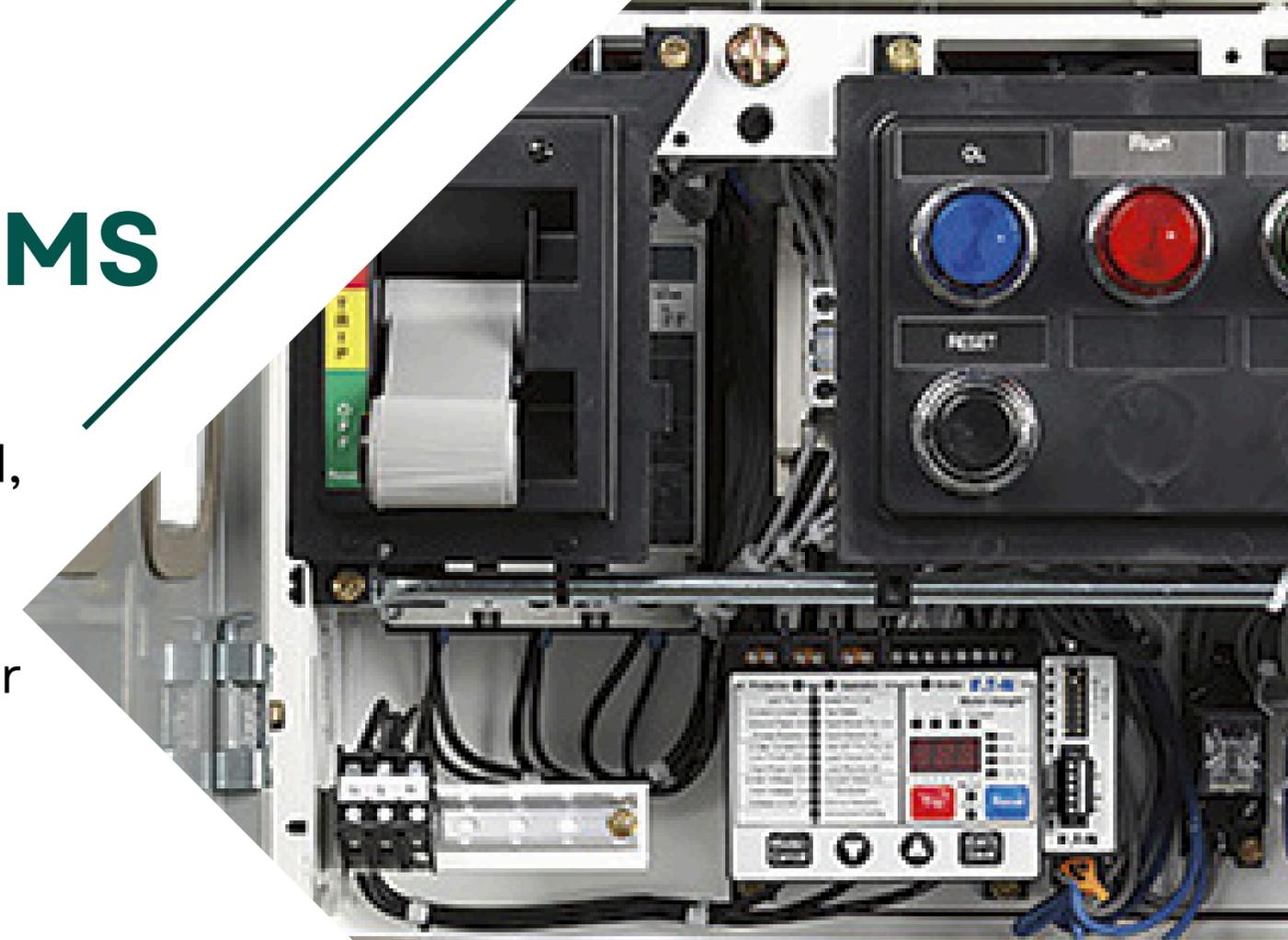
SESSIONAL CONTENT

PROJECT DEVELOPMENT IDEAS #1

SMART MOTOR CONTROL SYSTEMS

- **Objective:** Develop a smart system to control motor speed, direction, and torque using microcontrollers.

- **Key Components:** DC/AC motors, Arduino/ESP32, motor driver ICs, sensors (e.g., tachometer, hall-effect sensors).

- **Applications:** Automation systems, conveyor belts, robotics.
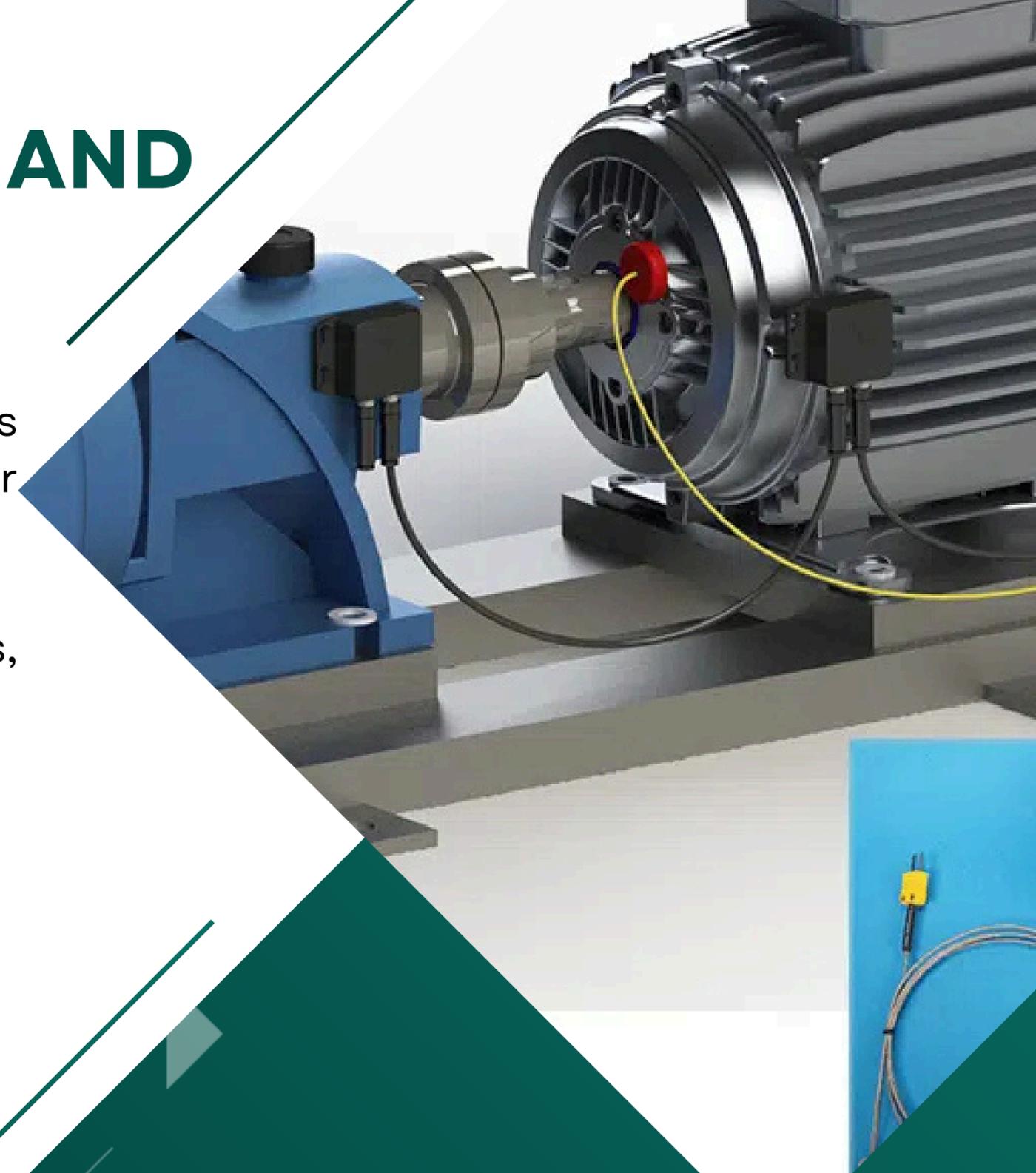
PROJECT DEVELOPMENT IDEAS #2

WIRELESS MOTOR MONITORING AND CONTROL

Objective: Design a wireless system to monitor motor parameters (e.g., speed, temperature, and current) and control motor operations remotely.

Key Components: IoT platforms (ESP8266, Raspberry Pi), sensors, mobile app/web interface.

Applications: Industry 4.0, remote diagnostics.
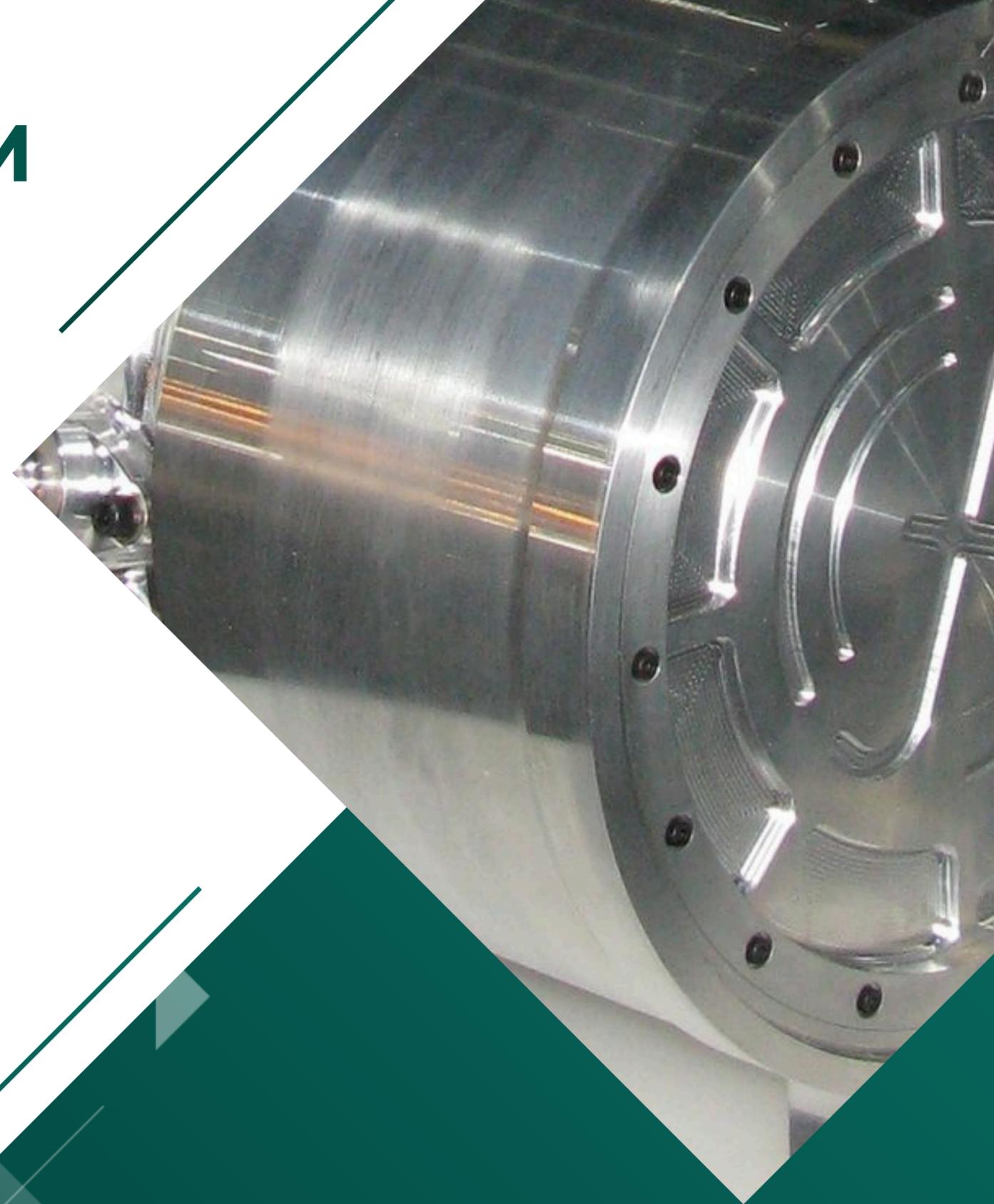
PROJECT DEVELOPMENT IDEAS #3

REGENERATIVE BRAKING SYSTEM

Objective: Implement a regenerative braking mechanism for DC or BLDC motors to recover energy during deceleration.

Key Components: Energy storage devices (batteries, supercapacitors), controllers, motors.

Applications: Electric vehicles, elevators.

PROJECT DEVELOPMENT IDEAS #4

ENERGY-EFFICIENT TRANSFORMER DESIGN

Objective: Design and test a high-efficiency transformer with reduced core losses and better thermal management.

Key Components: Custom core materials, winding optimization, thermal sensors.

Applications: Power transmission, renewable energy systems.

PROJECT DEVELOPMENT IDEAS #5

FAULT DETECTION IN ELECTRICAL MACHINES

Objective: Create a system to detect common faults in electrical machines (e.g., bearing wear, insulation failure) using vibration and current analysis.

Key Components: Sensors (vibration, current), signal processing, machine learning for pattern recognition.

Applications: Predictive maintenance.
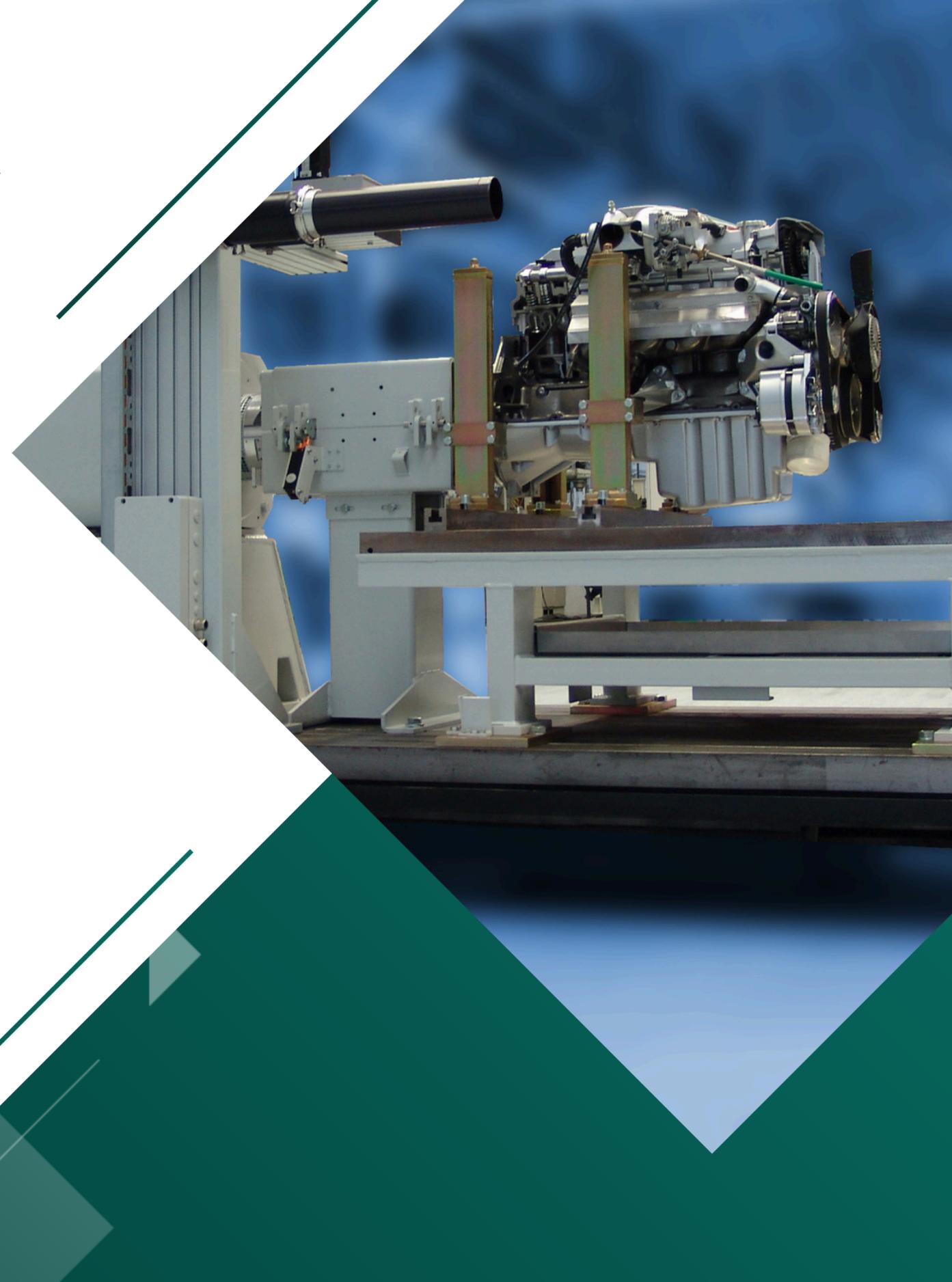
PROJECT DEVELOPMENT IDEAS #6

DYNAMIC LOAD SIMULATOR FOR MOTORS

Objective: Develop a simulator to mimic variable load conditions for testing motor performance.

Key Components: Load motors, controllers, data acquisition systems.

Applications: Motor design testing, training setups.
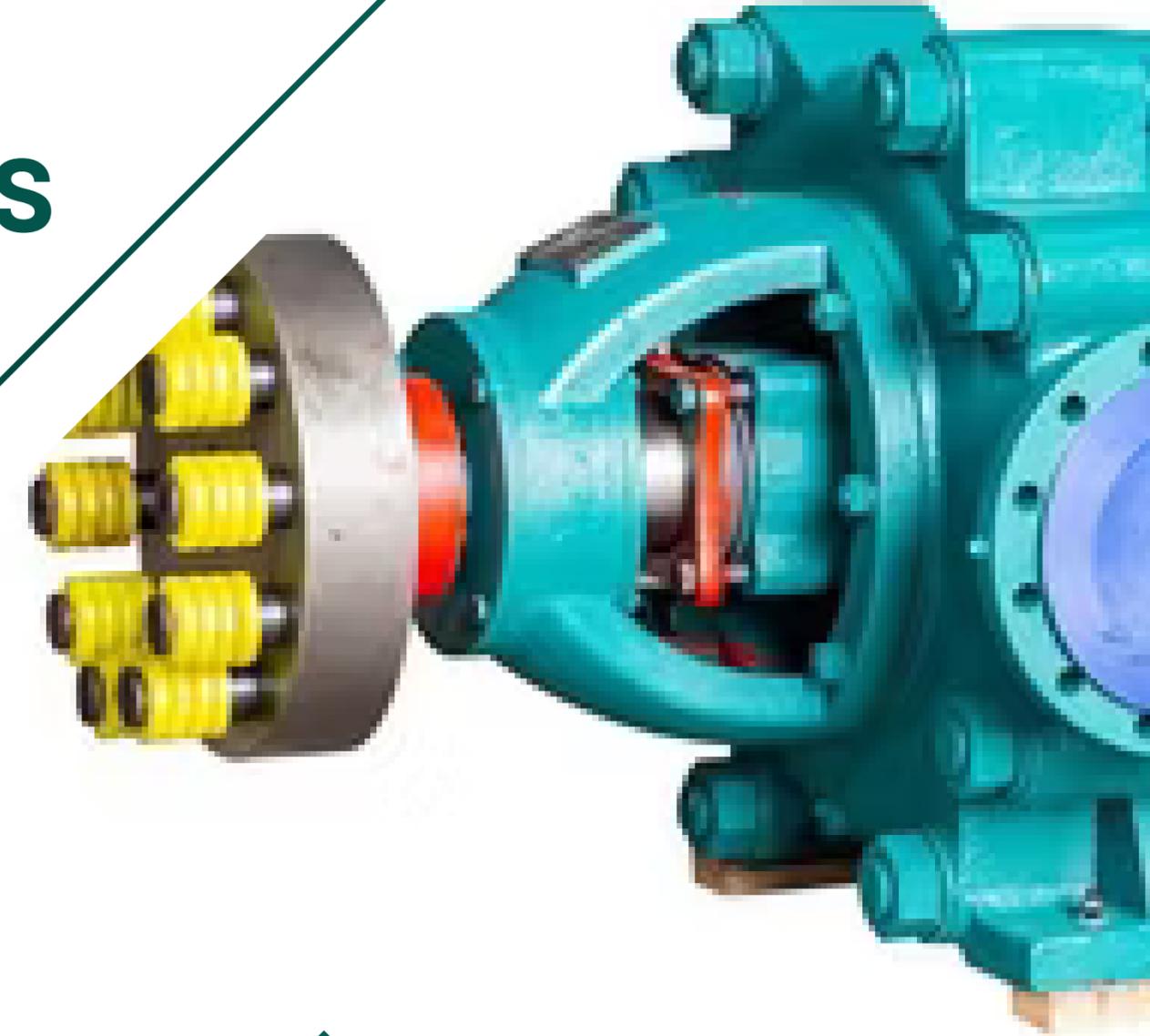
PROJECT DEVELOPMENT IDEAS #7

SELF-BALANCING ENERGY SYSTEMS

Objective: Implement a system that uses motors and generators for real-time load balancing in a microgrid.

Key Components: Induction/BLDC motors, power electronics, control algorithms.

Applications: Microgrids, renewable energy systems.

PROJECT DEVELOPMENT IDEAS #8

DUAL-PURPOSE MOTOR/GENERATOR UNIT

Objective: Design a motor that can seamlessly function as a generator in specific scenarios.

Key Components: Reversible motor, control circuit, load management.

Applications: Hybrid systems, renewable energy harvesting.

PROJECT DEVELOPMENT IDEAS #9

SOLAR-POWERED MOTOR DRIVE

Objective: Design a motor drive powered entirely by solar panels with real-time MPPT (Maximum Power Point Tracking).

Key Components: Solar panels, MPPT controller, DC motor.

Applications: Water pumps, sustainable agriculture.

PROJECT DEVELOPMENT IDEAS #10

ELECTRIC VEHICLE DRIVETRAIN MODEL

Objective: Build a scaled model of an EV drivetrain, including motor, transmission, and battery integration.

Key Components: BLDC motor, battery pack, motor controller.

Applications: EV research and education.

PROJECT DEVELOPMENT IDEAS #11

AUTOMATIC TORQUE AND SPEED ADJUSTMENT IN MOTORS

Objective: Create a system to adjust motor torque and speed dynamically based on load conditions.

Key Components: Sensors, microcontroller, feedback systems.

Applications: Industrial motors, automation.

PROJECT DEVELOPMENT IDEAS #12

SMART ALTERNATOR SYSTEM

Objective: Develop a more efficient alternator with real-time voltage regulation and fault diagnostics.

Key Components: Alternator, AVR (Automatic Voltage Regulator), monitoring sensors.

Applications: Automobiles, small power plants.

PROJECT DEVELOPMENT IDEAS #13

MOTOR PERFORMANCE ANALYZER

Objective: Design a system to analyze motor performance parameters (efficiency, losses, speed) in real time.

Key Components: Sensors, data acquisition systems, analysis software.

Applications: Motor research, testing facilities

PROJECT DEVELOPMENT IDEAS #14

INDUCTION GENERATOR FOR SMALL-SCALE POWER GENERATION

Objective: Convert an induction motor into a generator for renewable energy applications.

Key Components: Induction motor, excitation capacitor, load management.

Applications: Wind turbines, micro-hydro plants.

PROJECT DEVELOPMENT IDEAS #15

MAGNETIC LEVITATION SYSTEM

Objective: Design a magnetic levitation system for an application such as frictionless bearings or a prototype maglev train.

Key Components: Electromagnets, position sensors, PID controllers.

Applications: Advanced transportation, research setups.

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THANK YOU

END OF THE CONTENT