Mini Projects for EEE Students PDF

A good EEE mini project is small, safe and measurable: a regulated power supply, a buck or boost converter, a motor speed controller, an inverter for a small load or an IoT energy monitor. Plan 1 to 4 weeks, work at low voltage, and record readings such as efficiency or ripple so you can explain your results in the viva.

Key takeaways

- Keep mini projects at low voltage, usually below 24 V DC, unless your lab in-charge supervises mains work.
- Each idea lists parts, modules, steps, viva points and a rough cost.
- All costs are approximate and vary by city and vendor.
- Simulate in LTspice, Proteus or Simulink before building.
- One clear reading table and one graph can lift a simple project to a strong grade.

How to choose an EEE mini project

- **Link it to your subjects.** Basic electrical, analog electronics, machines and power electronics each suggest natural projects.
- **One concept per project.** For example, ripple and regulation, or duty cycle and output voltage.
- **Use lab instruments.** A multimeter, CRO and rheostat are enough for most ideas here.
- **Think about the next step.** A good mini project can grow into your final year project.

Power supply and converter mini projects

1. Variable regulated DC power supply (1.25 to 12 V)

- **Parts:** transformer, bridge rectifier, filter capacitor, LM317, potentiometer, heat sink.
- **Steps:** design for the output range, measure ripple, test load regulation with a rheostat.
- **Viva points:** LM317 output formula, ripple factor, why a heat sink is needed.
- **Approximate cost:** Rs 300 to 700 (varies by city and vendor).

2. Buck converter for 12 V to 5 V

- **Parts:** MOSFET, Schottky diode, inductor, capacitor, PWM from a 555 or Arduino.
- **Steps:** calculate duty cycle, inductor and capacitor values, measure efficiency at three loads.
- **Viva points:** continuous conduction mode, duty cycle relation, switching losses.
- **Approximate cost:** Rs 500 to 1,200 (varies by city and vendor).

3. Boost converter for LED driving

- **Parts:** MOSFET, inductor, diode, capacitor, LED string, PWM source.

- **Viva points:** boost relation, why current control suits LEDs, overvoltage risk with no load.
- **Approximate cost:** Rs 500 to 1,200 (varies by city and vendor).

4. Square wave inverter for a small load (12 V DC input)

- **Parts:** CD4047 or Arduino, MOSFETs, centre-tapped transformer, battery.
- **Viva points:** push-pull topology, square versus sine wave, why output must stay low-power for a lab demo.
- **Approximate cost:** Rs 800 to 1,800 (varies by city and vendor).

5. Battery level indicator with LEDs

- **Parts:** LM3914 or comparators, LEDs, resistors.
- **Viva points:** voltage divider design, comparator thresholds, why voltage is only a rough guide to charge.
- **Approximate cost:** Rs 200 to 500 (varies by city and vendor).

Machines and control mini projects

6. DC motor speed control with PWM

- **Parts:** small DC motor, MOSFET or L298N, Arduino, potentiometer, tachometer or IR speed sensor.
- **Steps:** vary duty cycle, measure speed, plot speed against duty cycle.
- **Viva points:** PWM, back EMF, freewheeling diode.
- **Approximate cost:** Rs 600 to 1,300 (varies by city and vendor).

7. Single-phase motor soft starter model

- **Parts:** TRIAC, DIAC, RC network, small fan motor, isolation transformer for testing.
- **Viva points:** phase angle control, inrush current, safety with AC.
- **Approximate cost:** Rs 400 to 900 (varies by city and vendor).

8. Stepper motor position control

- **Parts:** stepper motor, ULN2003 or A4988 driver, Arduino, keypad.
- **Viva points:** step angle, full and half step, holding torque.
- **Approximate cost:** Rs 600 to 1,300 (varies by city and vendor).

9. Over-voltage and under-voltage protection circuit

- **Parts:** comparator IC, Zener reference, relay, LEDs, low-voltage test supply.
- **Viva points:** reference voltage, hysteresis to stop relay chatter, response time.
- **Approximate cost:** Rs 300 to 700 (varies by city and vendor).

10. Automatic changeover between mains and battery (low-voltage model)

- **Parts:** relays, diodes, two DC sources to model mains and battery, indicator LEDs.
- **Viva points:** break-before-make switching, relay contact rating.
- **Approximate cost:** Rs 300 to 700 (varies by city and vendor).

Renewable, metering and IoT mini projects

11. Solar panel I-V and P-V curve tracer

- **Parts:** small solar panel, rheostat or electronic load, voltmeter, ammeter, or an Arduino logger.
- **Steps:** vary load, record voltage and current, plot both curves, find the maximum power point.
- **Viva points:** fill factor, effect of shade and temperature.
- **Approximate cost:** Rs 800 to 2,000 (varies by city and vendor).

12. IoT energy monitor for a single appliance

- **Parts:** ESP32, ACS712 or PZEM-004T module, cloud dashboard.
- **Viva points:** RMS measurement, sampling, safety of the sensing module.
- **Approximate cost:** Rs 900 to 2,000 (varies by city and vendor).

13. Automatic room light and fan controller

- **Parts:** PIR sensor, LM35, relay module, Arduino.
- **Viva points:** sensor delay setting, relay isolation, energy saved.
- **Approximate cost:** Rs 600 to 1,200 (varies by city and vendor).

14. Earth leakage alarm model

- **Parts:** core-balance current transformer from a salvaged module or kit, comparator, buzzer, low-voltage test rig.
- **Viva points:** how an RCCB senses imbalance, trip current, why testing must stay supervised.
- **Approximate cost:** Rs 500 to 1,200 (varies by city and vendor).

15. Power consumption analysis in Python

- **Software:** Python, pandas, Matplotlib with a public household energy dataset or readings from project 12.
- **Steps:** clean the data, find peak hours, plot daily and weekly patterns, suggest savings.
- **Viva points:** kWh calculation, load curve, load factor.
- **Approximate cost:** close to Rs 0 using free tools (varies by city and vendor if you buy sensors).

A simple 3-week plan

1. **Week 1:** pick the idea, do design calculations, simulate, list parts.
2. **Week 2:** build and test at low voltage, take readings at different loads.
3. **Week 3:** plot results, write the report, prepare a short demo.

Mini project report structure

1. Title page and certificate
2. Aim and objective
3. Theory and design calculations
4. Circuit diagram and components with ratings
5. Procedure and safety precautions

6. Observation table and graphs
7. Result, applications and future scope
8. References

The project report title page generator can set up your cover page in a few minutes.

Common mistakes to avoid

- **Under-rated parts.** A 1 A diode in a 2 A circuit will fail. Check ratings with a margin.
- **No heat sink.** Regulators and MOSFETs need one at higher currents.
- **Missing fuse.** Add one at the input of every power circuit.
- **Only one reading.** Take readings at several loads and plot them.
- **No safety section.** Examiners expect you to explain how you kept the set-up safe.

Building on your mini projects

A buck converter can grow into a solar MPPT charger, and an energy monitor can grow into a smart metering system. If you enjoy the data side, the analysis in project 15 is a good first step towards data analytics skills, which help in both core and IT roles.

Frequently asked questions

What is an easy mini project for EEE students?

A variable regulated power supply, a battery level indicator or a DC motor speed controller with PWM are easy to build and explain.

How much does an EEE mini project cost?

Most ideas here cost between about Rs 200 and Rs 2,000. These are approximate figures and vary by city and vendor.

Can I do an EEE mini project at mains voltage?

Only with your lab in-charge's supervision and proper isolation. Most mini projects in this guide run at low DC voltage for safety.

How long does an EEE mini project take?

Usually 1 to 4 weeks. A 3-week plan covering design, build and report fits most of the ideas here.

Which simulation software is good for EEE mini projects?

LTspice is free and good for converters and analog circuits. Proteus is common in college labs, and MATLAB/Simulink is useful for machines and control.

Is this PDF free?

Yes. Fill in the short form on this page and the PDF downloads right away.

Sources and further reading

- Analog Devices LTspice

- Texas Instruments LM317 product page
- Arduino documentation
- Bureau of Energy Efficiency

About this PDF

Prepared by the Uncodemy trainer team as a practical project guide. Part lists and costs are approximate and change often. Corrections: info@uncodemy.com.

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