

# ELECTRICAL ENGINEERING

WITH PROFESSOR  
RUKMI DUTTA

## Talking points

### KNOWLEDGE

1. What is an electric motor?
2. What does IPMSM stand for?

### COMPREHENSION

3. Why is electrical engineering important for society?

### APPLICATION

4. If you could use Rukmi's device in any piece of technology – real or imaginary – what would it be? Explain why.

### ANALYSIS

5. What makes an IPMSM better than other electric motors?

### EVALUATION

6. To what extent do you agree that it is worth mining rare-earth metals to create high-tech devices? For example, what is the trade-off between damaging the local environment and the wider social benefits of a technology?
7. What do you think is the most challenging aspect of being an electrical engineer? What seems like the most rewarding?

### CREATIVITY

8. Rukmi's novel design was inspired by a bridge. Many new engineering innovations are inspired by animals, plants or bacteria. Design a new electric device inspired by a natural or human-made object.

## Activity

To build a simple electric motor, all you need is a battery, a magnet, some paper clips and a coil of wire. Follow the instructions in this short YouTube video ([www.youtube.com/watch?v=W10pGk0MMhg](http://www.youtube.com/watch?v=W10pGk0MMhg)) or WikiHow page ([www.wikihow.com/Build-a-Motor](http://www.wikihow.com/Build-a-Motor)).

According to WikiHow, "This simple electric motor uses electricity and magnetism to spin a wire coil that is supported by paper clips. It is a fun exercise that helps you learn about the underlying scientific principles found in every motor, no matter how advanced it may be."

## More resources

- UNSW Sydney has a FIRST robotics team, Emu Robotics, for students of all ages in Sydney: [frc.unsw.edu.au](http://frc.unsw.edu.au)
- This video by The Electric Viking demonstrates how Rukmi's new high-speed motor could be adapted to run in a Tesla and increase its range: [www.youtube.com/watch?v=TpXM\\_qi8FbA](http://www.youtube.com/watch?v=TpXM_qi8FbA)
- These two YouTube videos offer a fascinating insight into some technological innovations: 5 New Battery Technologies That Will Change the Future ([www.youtube.com/watch?v=CAZg64946Yw](http://www.youtube.com/watch?v=CAZg64946Yw)) and How Do Quantum Computers Work? ([www.youtube.com/watch?v=pqr1BhoEm\\_Q](http://www.youtube.com/watch?v=pqr1BhoEm_Q))
- Test your knowledge of electrical engineering and discover new facts about the field: [www.unsw.edu.au/news/2021/11/6-things-you-never-knew-about-electrical-engineering-](http://www.unsw.edu.au/news/2021/11/6-things-you-never-knew-about-electrical-engineering-)