Stepper Motor 1: Basics
TI Precision Labs – Motor Drivers

Presented and prepared by James Lockridge
What is a stepper motor?

• Basic function: uses electrical signals to control rotor position

• Advantages:
  – Hold rotor in place for long periods of time
  – Precise positioning without sensors
  – Low cost
  – Easy to control
Brushed DC (BDC) motors

Commutator on rotor for brushes
Brushless DC (BLDC) motors
Stepper motor
## Stepper motor construction

### Permanent magnet
- Permanent magnet in rotor [2]
- Teeth on stator only [2]
- Typically 2 phases [1]
- Step angles 3.6°-18°
- Low torques

![Permanent magnet](image)

### Hybrid
- Permanent magnet in rotor [2]
- Teeth on stator and rotor [2]
- Typically 2 phases [1]
- Step angles 0.9°-1.8°
- Wide range of torque options

![Hybrid](image)

### Variable reluctance
- No magnets [1]
- Teeth on stator and rotor [2]
- Rotor made of magnetic steel [1]
- ≥3 phases [1]

![Variable reluctance](image)
Bipolar vs. unipolar

Bipolar motor

Unipolar motor
Basic stepper driving
To find more stepper driver technical resources and search products, visit http://www.ti.com/motor-drivers/stepper-driver/overview.html
Resources

