# DESIGN AND FABRICATION OF AUTOMATIC CHUCK

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WHAT IS CHUCK???

A chuck is a clamp that holds a rotating workpiece in place on a lathe machine. Lathe chucks are used to accurately clamp a workpiece on a lathe for turning operations or can be used on an indexing fixture for milling operations.
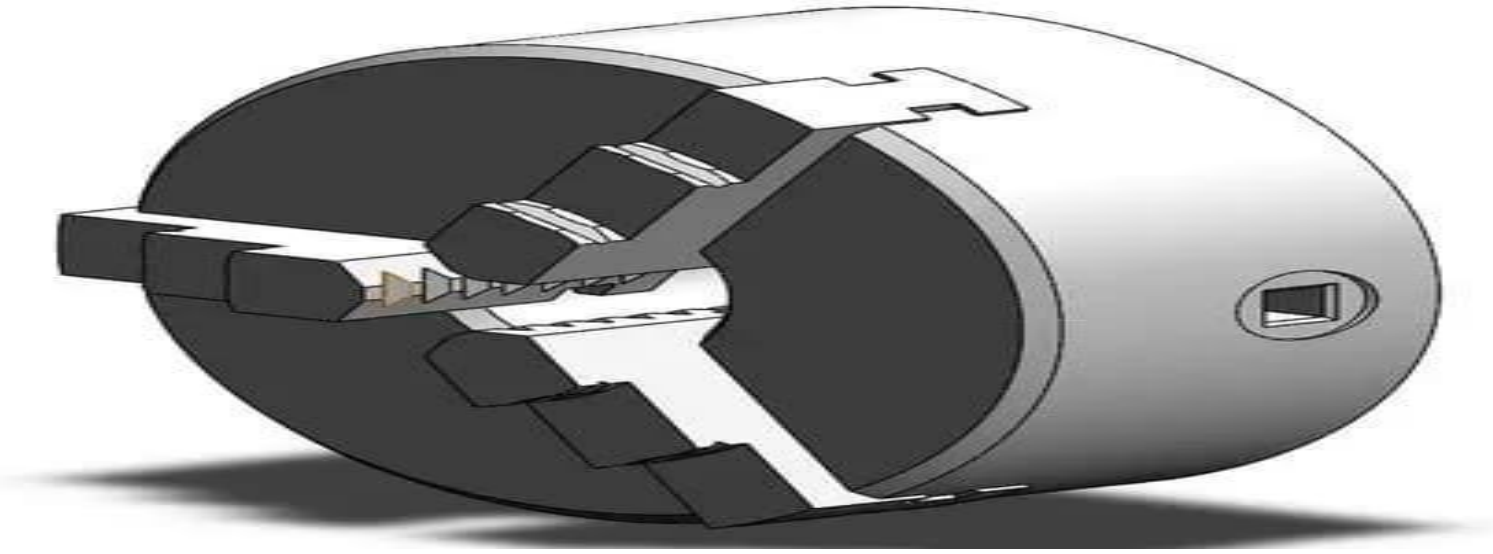
USAGE OF CHUCK INTEGRATED WITH SENSOR:

- Conventional chuck requires manual efforts to clamp and tight the component in lathe or any cylindrical clamping machine.

- In CNC machine they have automatic chucks it does not requires much human efforts to clamp the product.

NOVELTY OF OUR PROJECT!!!

- Our project aims to clamping of products with chuck by completely eliminating of manual efforts.

WORKING PRINCIPLE:

- When we place the cylindrical component in the chuck the proximity sensor senses it and using the actuators the jaws clamp to the component.

- To remove the component from the chuck,This chuck has a touch sensor on the cover when we held our hand and hold it for few seconds it automatically the jaws are unclamps the component from the chuck.

Sensors
1. Proximity Sensor (PS)
2. Optical Sensor (OS)
3. Force Sensor (FS)
4. Position Sensor (PoS)

Control Unit
1. Microcontroller (MCU)
2. Programmable Logic Controller (PLC)

Actuators
1. Electric Motor (EM)
2. Hydraulic Cylinder (HC)
3. Pneumatic Cylinder (PC)

Mechanical Components
1. Chuck Jaw
2. Clamping Mechanism

Signal Flow:

1. Sensors → MCU/PLC (Input Signals)
2. MCU/PLC → Actuators (Control Signals)
3. Actuators → Mechanical Components (Motion)
4. Mechanical Components → Sensors (Feedback)

Sequence of Operation

1. Workpiece detection by Proximity Sensor (PS)
2. Size measurement by Optical Sensor (OS)
3. Chuck jaw positioning by Position Sensor (PoS)
4. Clamping force adjustment by Force Sensor (FS)
5. Clamping mechanism activation by MCU/PLC
6. Chuck jaw closure by Electric Motor (EM) or Hydraulic/Pneumatic Cylinder
7. Workpiece clamping and holding
8. Release sequence initiated by MCU/PLC