

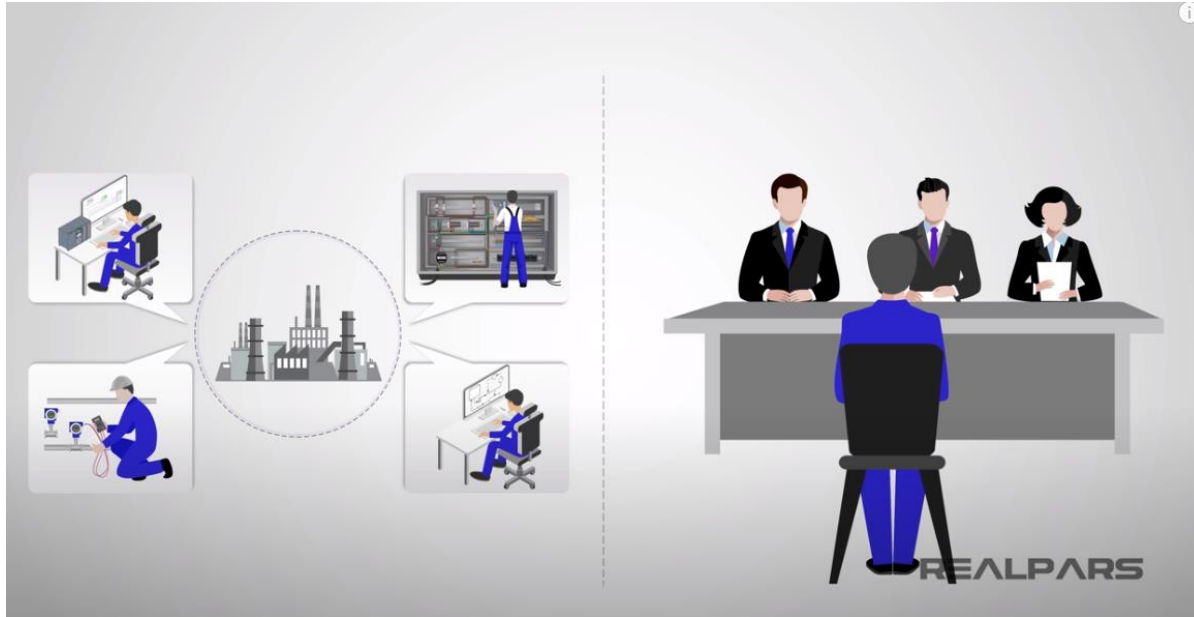
# Industrial Instrumentation



# Industrial Instrumentation

- Define Industrial Instrumentation and give examples.
- Define Process Control (in the broader scope of industrial applications)
- Identify the two main types of process control
- Identify key Industry and Standards Organizations relevant to Industrial Instrumentation

# What are the Leading Industrial Automation Job Types?



<https://www.youtube.com/watch?v=rJvThzbMmHE> 6:29

# What is Industrial Instrumentation?

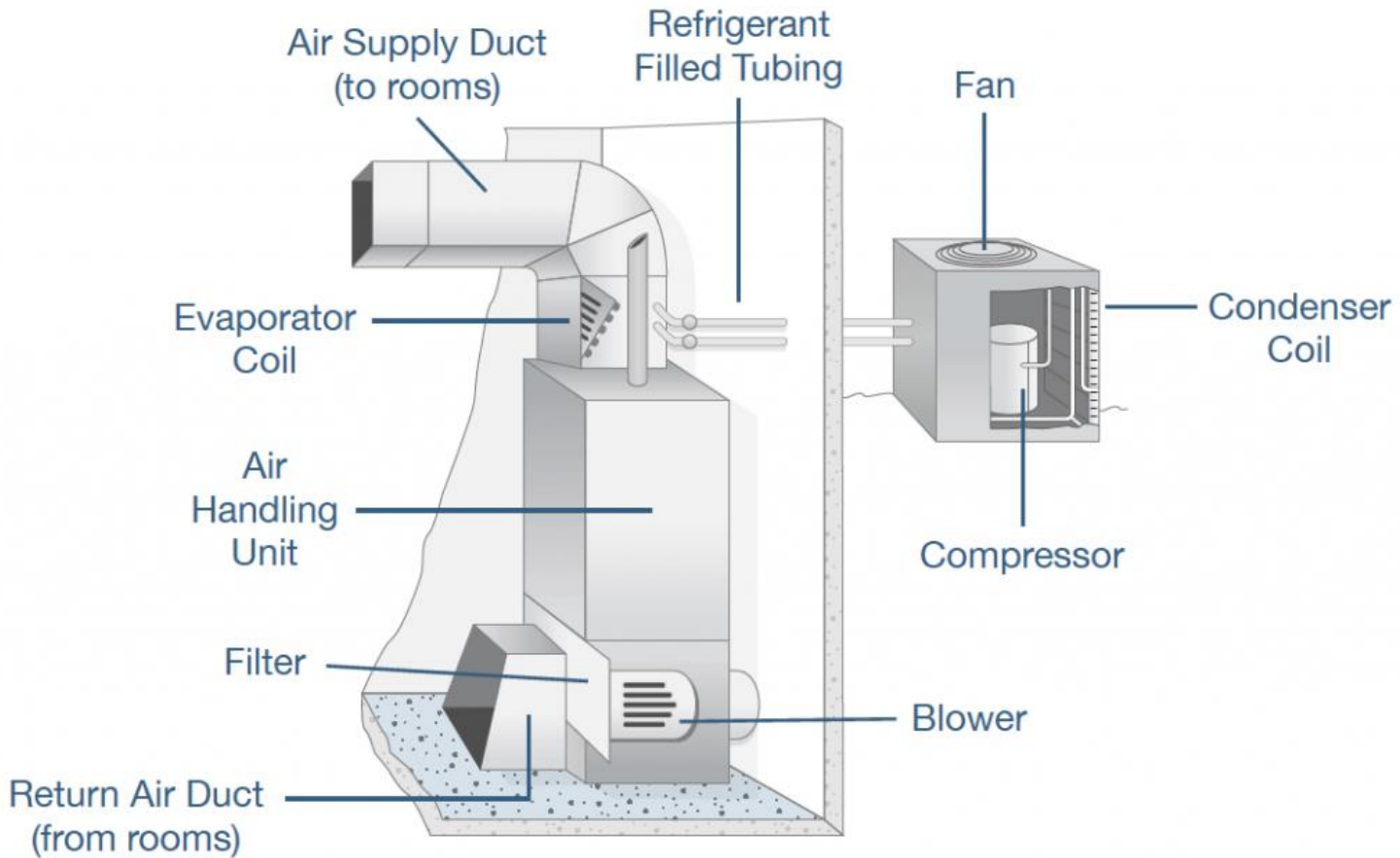
**Industrial Instrumentation** is the process of utilizing instruments to measure and control process variables to manufacture products safely and efficiently.



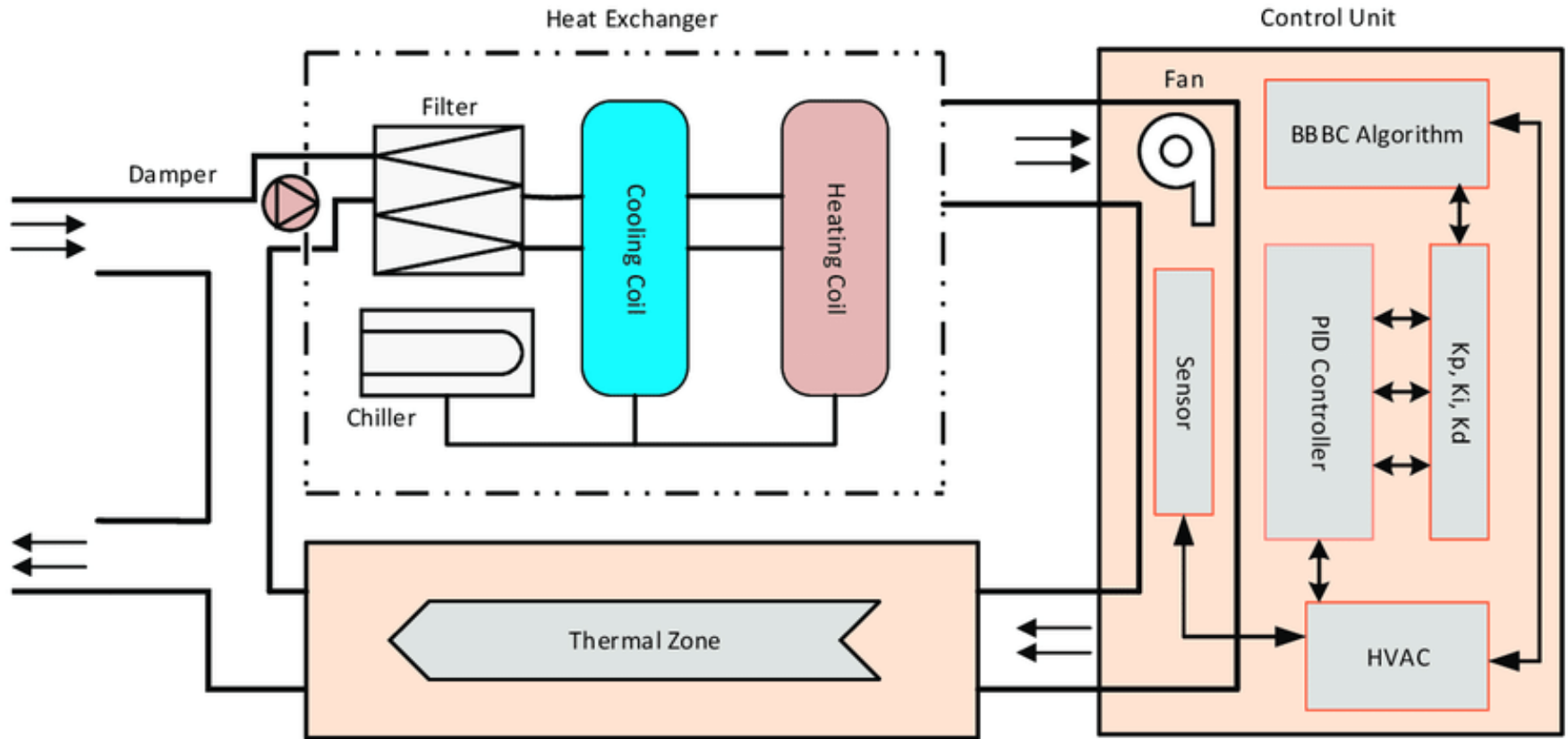
# Example of Instrumentation

- Take a washing machine for instance.
  - How does the washing machine start the water flowing into the tub?
  - How does it know when the correct level has been reached?
  - How does the machine stop the water flow?
- All this is done with instrumentation.





<https://www.standardheating.com/hvac-maintenance/hvac-diagram/>



HVAC System

[https://www.researchgate.net/figure/Block-diagram-of-conventional-HVAC-system-and-control-unit-structure\\_fig1\\_327944491](https://www.researchgate.net/figure/Block-diagram-of-conventional-HVAC-system-and-control-unit-structure_fig1_327944491)

# What is Process Control?

**Process Control** is a system that combines measuring materials and controlling instruments into an arrangement capable of automatic action.

## Airflow Measurement



An HVAC technician measures airflow to troubleshoot an air-handling system.

## Electrical Troubleshooting



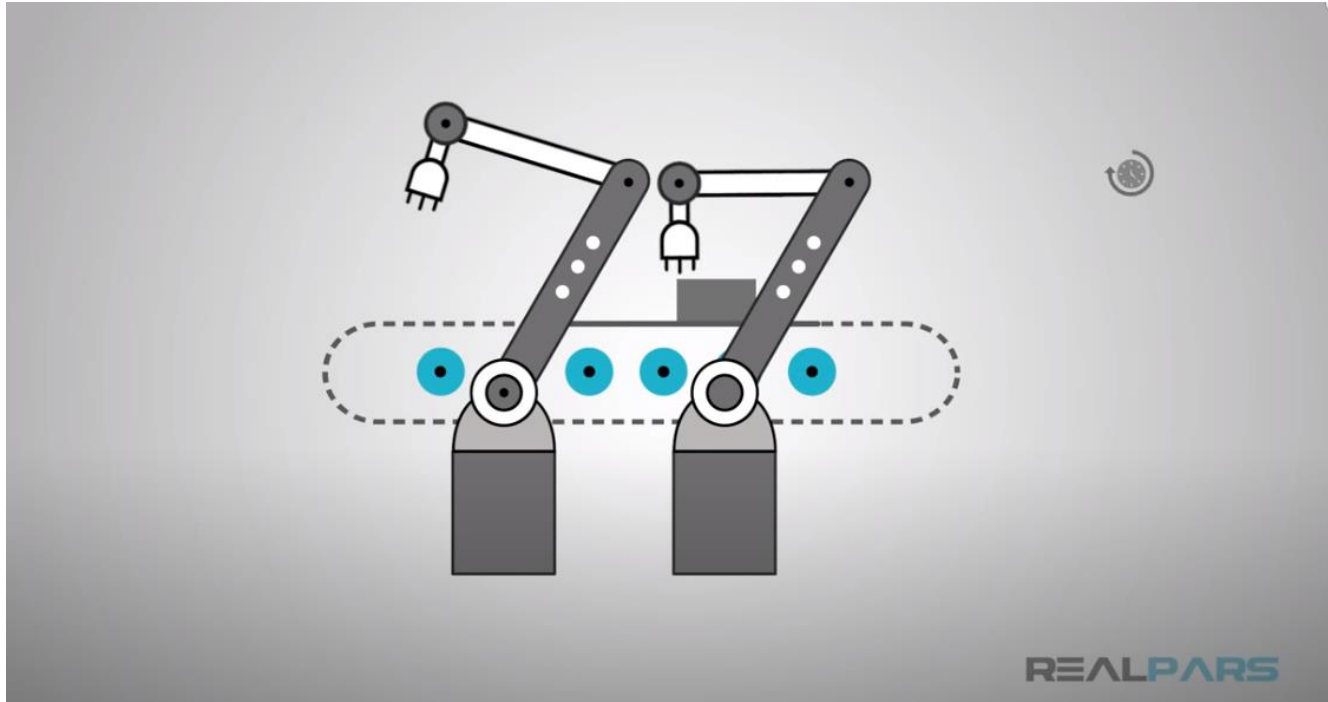
An electrician is often required to troubleshoot electrical systems related to instrument systems.



## 2 Basic Types of Process Control

- **Manual Control:** An operator must monitor a process and make corrections as needed.
  - Example: Operator monitors tank fill level and throws a switch when desired level is reached.
- **Automatic Control:** Instruments are used to measure and control a process.
  - Example: Sensor measures tank fill level and sends a signal to to throw a switch (relay) / close a valve when desired level is reached.

# What is Process Automation?



<https://www.youtube.com/watch?v=uEhuxYXPTOE>

# Industry and Standards Organizations

<https://www.osha.gov/aboutosha>

- **Occupational Safety and Health Administration (OSHA):** Federal agency that enforces safety and health regulations. <https://www.nist.gov/about-nist>
- **National Institute of Standards and Technology (NIST):** Develops measurement Standards for industry. <https://www.ansi.org/default>
- **American National Standards Institute (ANSI) :** Facilitates the development of American National Standards (ANS) by accrediting the procedures of standards developing organizations (SDOs). These groups work cooperatively to develop voluntary national consensus standards.
- There are also a number of Technical Societies, Private Organizations and Trade Associations involved in Instrumentation and Process Control.

# Automatic Washing Machine Control

- Create a process control / programming diagram for a washing machine, given a set operations, provided in writing from your team's concept designers.
- Use standard, process control flow charting diagrams
- Properly indicate all control
  - Input/Output Blocks
  - Process / Operation Blocks
  - Decision Blocks (IF – THEN)
  - Connectors / Loops (including FOR – NEXT)
  - Terminals



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