Slide 2: Embedded System Characteristics Applied

1. **Processing Capability**: Arduino processes sensor data in real time.
2. **Reactive & Real-Time**: Immediate leak detection and valve shutoff.
3. **Hidden Controller**: Arduino embedded within the system (not visible to users).
4. **Input/Output**: Sensors (input), valves/pumps (output).
5. **Memory**: Stores usage patterns and fault logs.

Embedded System Characteristics in Our Project

- ✅ Unique Functionality: Water monitoring + auto control
- ✅ Real-time: Immediate leak detection
- ✅ Energy Efficient: Works on low power
- ✅ Compact: All fits in a small box
- ✅ Reactive: Acts on environmental input
- ✅ Safe & Maintainable

Slide 3: Quality Metrics in Design

- **Energy Efficiency**: Low-power sensors and sleep modes for battery operation.
- **Safety**: Automatic shutdown during leaks;
- **Unit Cost**: Cost-effective Arduino and modular sensors.
- **Time-to-Market**: Off-the-shelf components (Arduino, standard sensors).
- **Functional Updates**: Firmware updates via USB/OTA for future improvements.

Slide 4: Versatility Factors

- **Expandability**: Add more sensors (e.g., pH sensors for water quality).
- **Customizability**: Adjust thresholds for leak detection via software.
- **Modularity**: Separate sensor/pump modules for easy replacement.

- **Context-Awareness**: Adjusts distribution based on usage patterns and weather data.

Slide 5: Hardware/Software Co-Design

Hardware Tasks:

- Sensor signal conditioning.
- Valve/pump actuation.

Software Tasks:

- Leak detection algorithms.
- Data logging and user alerts.

Slide 6: Technologies Involved

- **Processor**: Arduino (application-specific microcontroller).
- **Sensors**: Flow sensors (input), solenoid valves (output).
- **Platform**: IoT integration for cloud data storage.