Smart VFD pump controlled using Wi-Fi

Background

Global water scarcity, energy conservation, and smart home tech trends are driving innovative solutions for residential water supply, like the Wireless Variable Speed Pump with Variable Frequency Drive (VFD) .

Constraints

1. Integration: Ensuring VFD and IoT compatibility.
2. Security: Implementing robust cybersecurity measures.
3. Reliability: Maintaining consistent performance for energy savings.
4. Interface: Designing an intuitive control website.
5. Compliance: Adhering to industry standards and regulations.

Target Specifications

Pump:
- Model: Pedrollo CP610
- Horsepower: 0.75 HP
- Maximum flow rate: 10-90 m³/h
  Maximum head: 42 meters

VFD:
- Model: ATO Single Phase VFD (2.2 kW) Horsepower Rating: (3 HP) (higher than pump's rating) Input Voltage and Phase: 220V
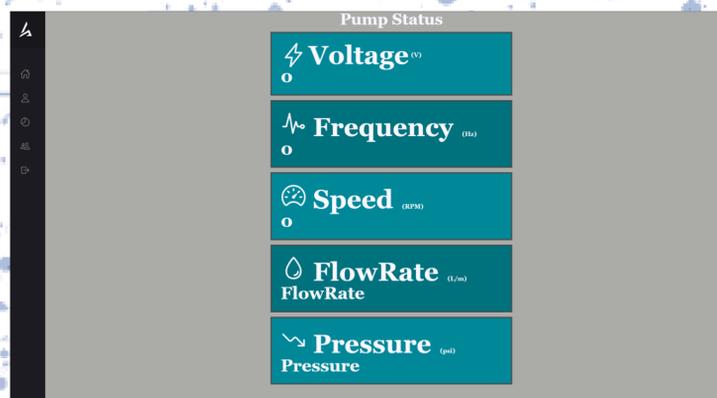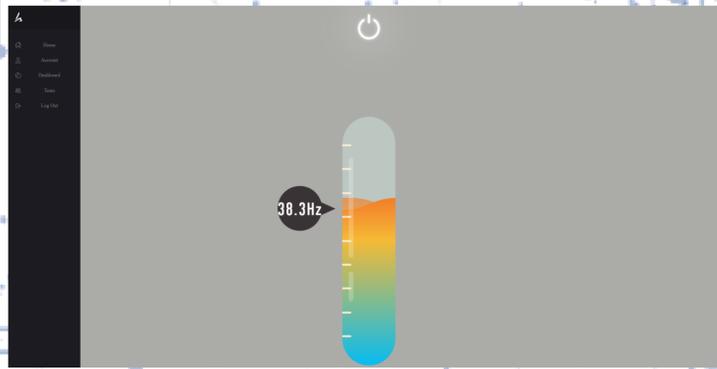
Names and Depts

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Prototype Design

Materials:
- 3/4-inch pipes.
- Elbows.
- Glow pipe.
- Pipe seizor.
- Small tank for water recycling.
- ¾ hp pump.
- Variable Frequency Drive 1.5KW.

38.3Hz

Pump Status

⚡ **Voltage** (V)
0

〰️ **Frequency** (Hz)
0

⚙️ **Speed** (RPM)
0

💧 **FlowRate** (L/m)
FlowRate

〰️ **Pressure** (psi)
Pressure

Testing / Validation

Problem Statement

The project aims to design and implement a Wireless Variable Speed Pump equipped with Variable Frequency Drive (VFD) control, optimizing water usage in residential settings through energy-efficient and remotely-managed water supply systems.

Project Impact

Implementing a VFD IoT pump controlled via a website aims to reduce energy consumption by 50%, leading to significant cost savings and improved sustainability.

Remote monitoring and optimized pump speeds enhance efficiency, offering scalable and adaptable solutions for residential water supply systems.
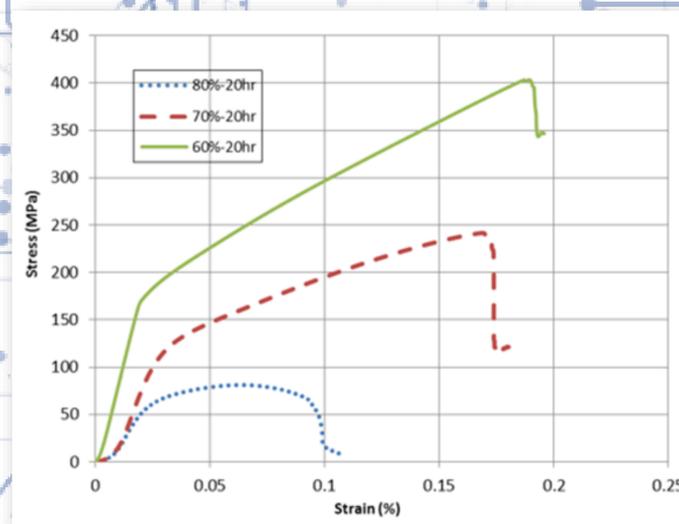
Conclusions & Future Work

- This project demonstrates effective energy reduction with the VFD IoT pump control system.
- Future work will focus on optimizing algorithms, integrating advanced sensors, expanding IoT capabilities, and conducting long-term studies to assess cost savings and environmental impact. This lays the foundation for scalable and sustainable water supply solutions in the IoT era.