Academic Year: 2023-24

Class: S.Y. A

Semester:VII

Course: Industrial Automation and SCADA

Course Code: 1EEPE406 , 1EEPE453

Name of Faculty: Mr. Amit B. Jadhav

Faculty Innovations in Teaching and Learning: Industrial Automation and SCADA/Lab

Introduction

Industrial Automation and SCADA (Supervisory Control and Data Acquisition) are critical subjects in engineering education, providing students with essential knowledge and skills for modern industrial processes. While the subject matter remains consistent, innovative teaching methodologies can greatly enhance student engagement, comprehension, and practical application of concepts. In response to the evolving demands of the industry and the educational landscape, faculty members have been pioneering innovative approaches to teaching Industrial Automation and SCADA. This report highlights some of these innovations, focusing on techniques that promote active learning, hands-on experience, and interdisciplinary collaboration.

1. Simulation-Based Learning

One innovative approach in teaching Industrial Automation and SCADA involves the use of simulation-based learning environments. Faculty members leverage simulation software to create virtual replicas of industrial processes and control systems, allowing students to explore and interact with complex systems in a safe and controlled environment. Through simulations, students can experiment with different control strategies, troubleshoot issues, and observe the dynamic behavior of industrial processes in real-time. By providing hands-on experience with simulation tools, faculty members enhance student understanding and proficiency in industrial automation concepts.

2. Interactive Labs and Workshops

Another innovation is the incorporation of interactive labs and workshops into the curriculum. Faculty members design hands-on activities that allow students to work with actual hardware components, PLCs (Programmable Logic Controllers), and SCADA systems. These labs provide students with practical experience in configuring, programming, and troubleshooting industrial automation systems, reinforcing theoretical concepts learned in the classroom. Additionally,

faculty members organize workshops where students collaborate on projects, solve real-world problems, and showcase their innovations, fostering creativity and teamwork skills.

3. Industry Partnerships and Guest Lectures

Faculty members are forging partnerships with industry organizations and inviting industry experts to deliver guest lectures in Industrial Automation and SCADA courses. These partnerships provide students with insights into current industry practices, emerging technologies, and real-world applications of automation and SCADA systems. Guest lectures expose students to diverse perspectives and experiences, inspiring innovation and career exploration. Furthermore, industry partnerships may lead to internship opportunities, collaborative research projects, and job placements for students, enhancing their professional development and industry readiness.

4. Multidisciplinary Projects and Competitions

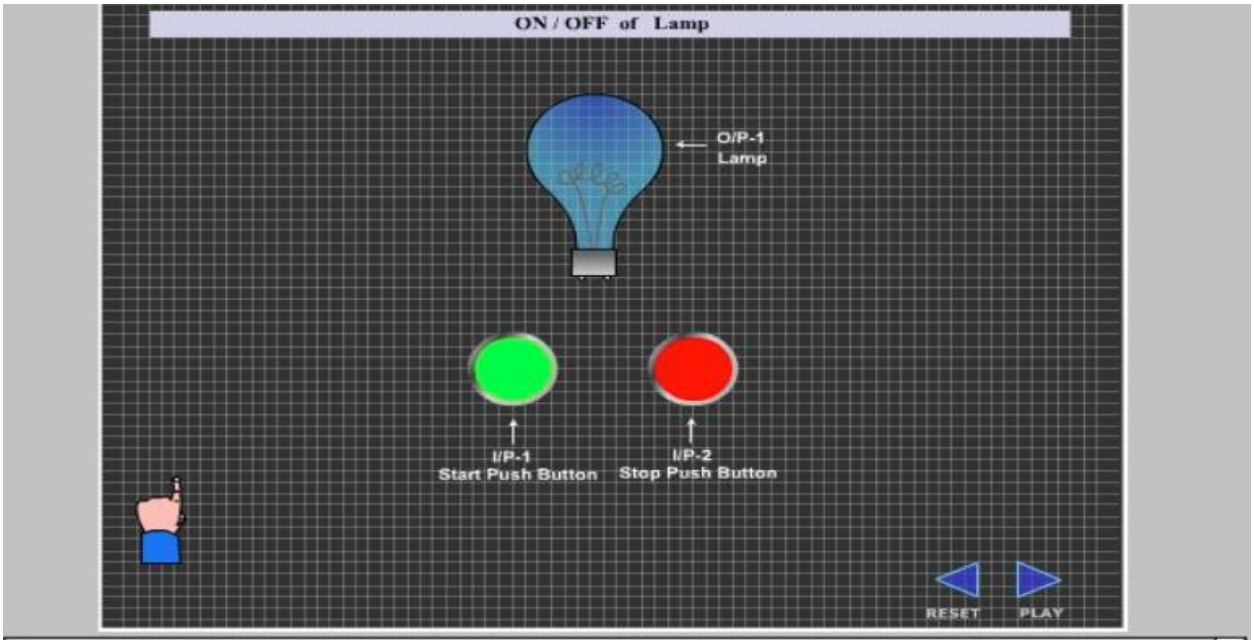
Faculty members are integrating multidisciplinary projects and competitions into the curriculum to provide students with holistic learning experiences. Collaborative projects bring together students from different disciplines, such as electrical engineering, mechanical engineering, and computer science, to design and implement innovative solutions to complex problems. Competitions, such as robotics competitions or automation challenges, encourage students to apply their knowledge and skills in a competitive environment, fostering teamwork, creativity, and leadership abilities. Participation in multidisciplinary projects and competitions equips students with practical skills and prepares them for diverse career pathways in industrial automation and SCADA.

Conclusion

Innovations in teaching Industrial Automation and SCADA are enhancing the educational experience for students, fostering hands-on experience, interdisciplinary collaboration, and industry engagement. By leveraging simulation-based learning, interactive labs, industry partnerships, and multidisciplinary projects, faculty members are equipping students with the knowledge, skills, and competencies needed to thrive in the field of industrial automation. As technology continues to advance and industry demands evolve, faculty members remain committed to innovating their teaching methodologies to prepare students for the challenges and opportunities of the future.

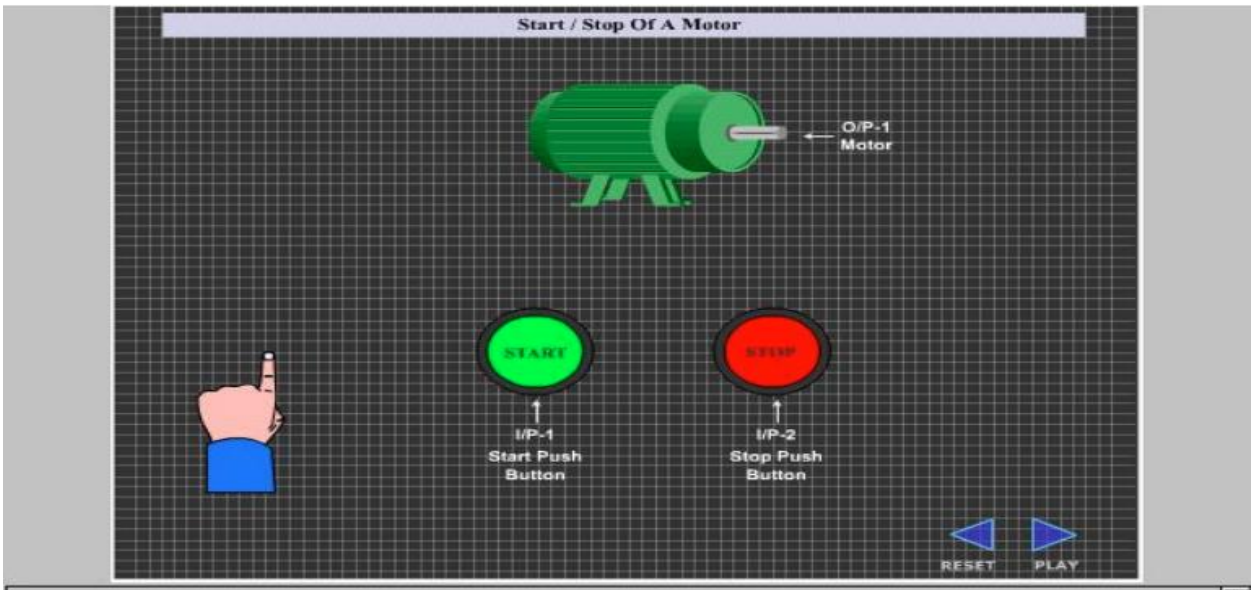
Subject Incharge:
Mr.A.B.Jadhav

2. Interactive Labs and Workshops



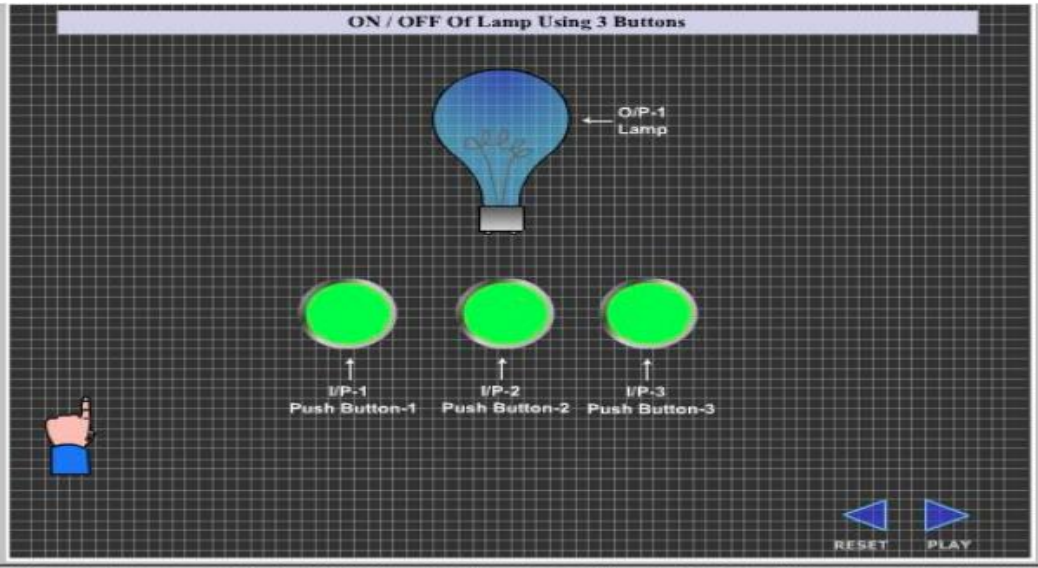
Example Number *1*, Start & Stop of Lamp using different combination of Input Push Buttons.

Here we have 2 inputs, input 1 and input 2 in the form of Push Buttons. We also have one output one output, output 1 in the for
When input 1 is pressed, the lamp is switched ON. When input 2 is pressed the lamp switches OFF.

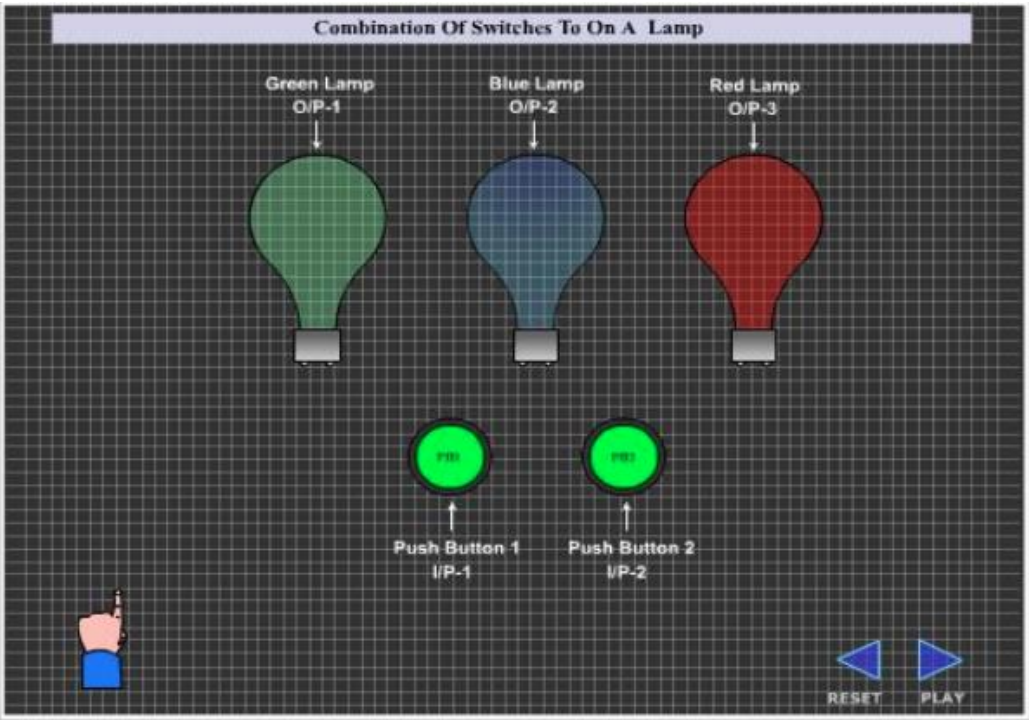


Sequence of operation

When start Push Button is pressed, and Stop is not pressed, the motor Starts running at the preset frequency. Now if Stop Push Button, is pressed, the Motor stops running.

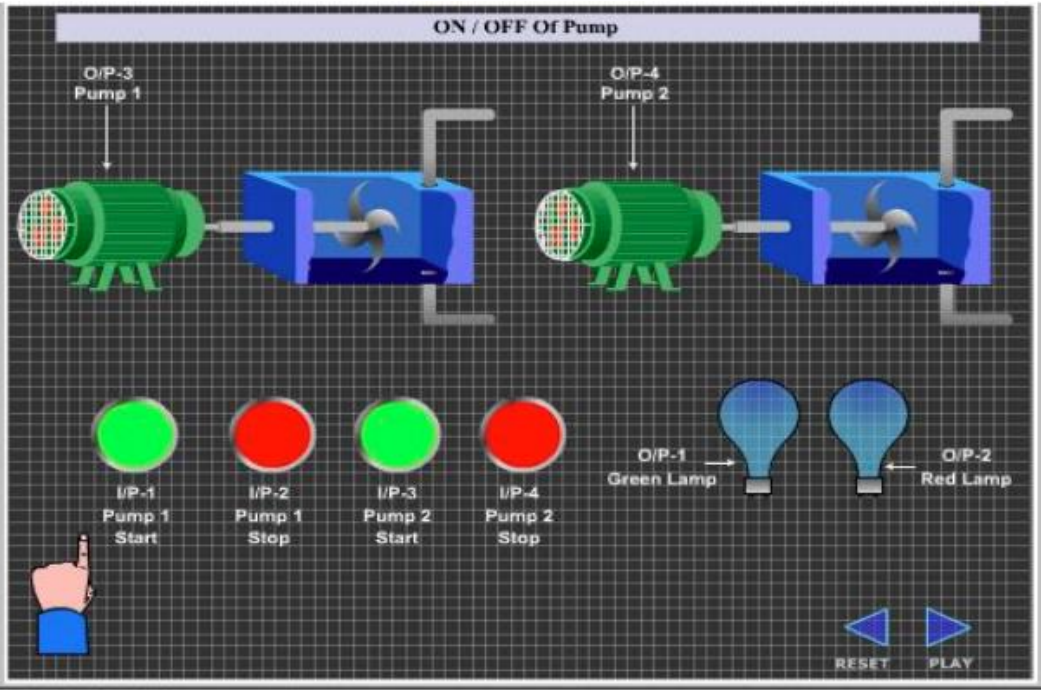


The condition for Lamp to switch ON is that, it will switch ON only if 2 Push Buttons out of the 3 Push Buttons are pressed.
So if Input 1 and Input 2 OR
Input 2 and Input 3 OR
Input 3 and Input 1 are pressed simultanesouly
The output 1 is switched ON
If only single input is pressed OR if all the 3 inputs are pressed the Lamp will not glow.



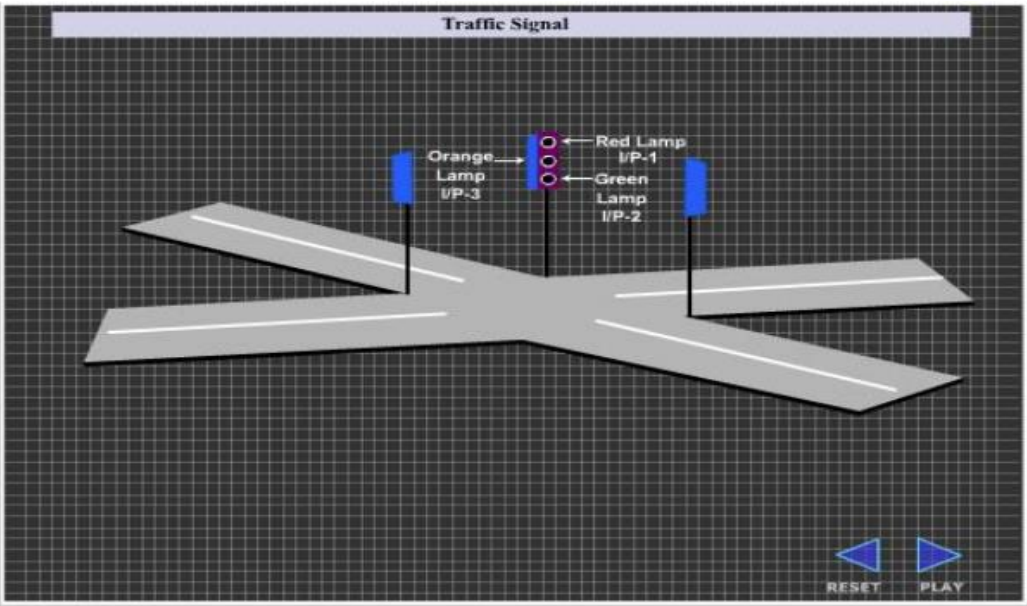
Sequence of operation

When only Push Button 1 is pressed, Green and Blue Lamp glows, When Push Button1 and Push Button 2 is pressed only Red Lamp Glows, When only Push Button 2 is pressed, Blue Lamp glows. Here we can see many different combinations.



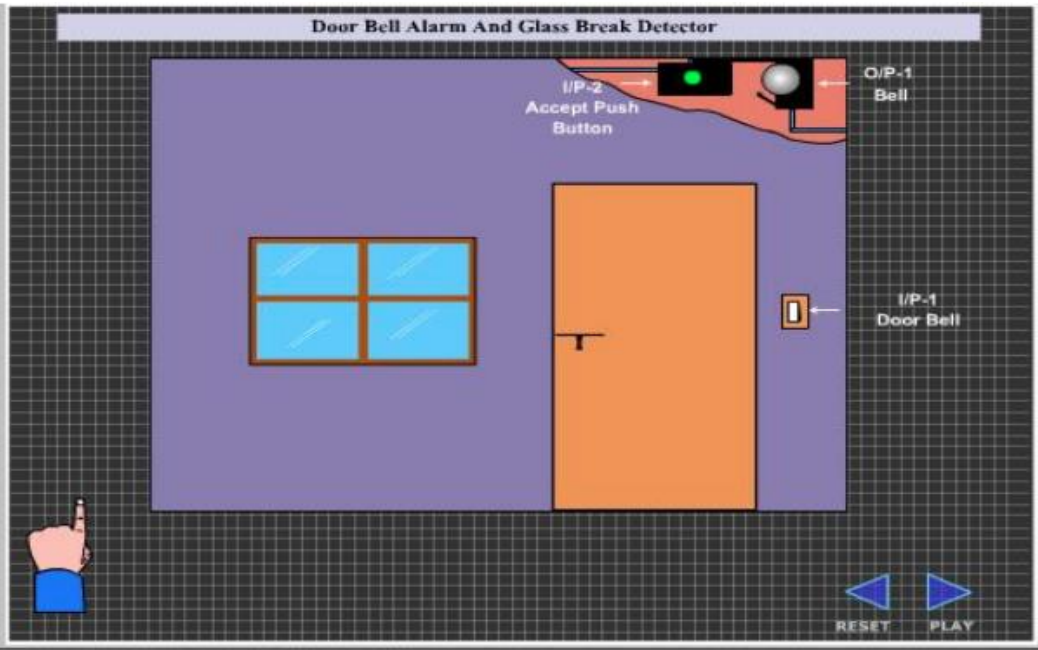
Sequence of operation

When Input 1 is pressed, Pump 1 is switched on Red Lamp (Output 2 switched on)
When Input 3 is pressed, Pump 2 is switched on and Green Lamp (Output 1) switched on
When Input 2 is pressed, Pump 1 switches off, Red Lamp glows
And when Input 4 is pressed, Pump 2 switches off and both Lamps remains off.

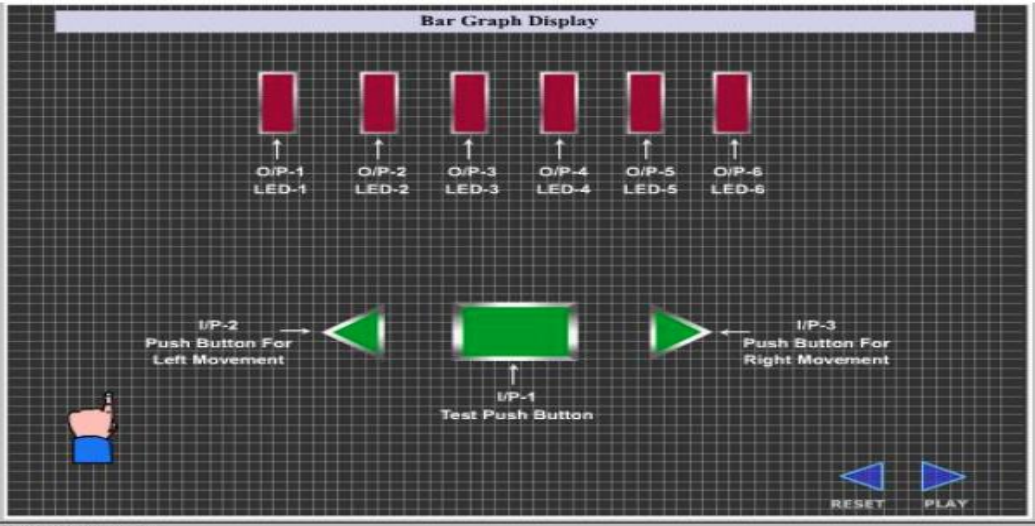


Sequence of operation

As soon as the power is on, initially Red Lamp should be on for a delay of 10 seconds, then Red Lamp switches off and Green Lamp is switched on for a delay of 10 seconds.Then the green lamp is switched off
And Orange Lamp switches on for a delay of 2 seconds and then Red Lamp switches on and the cycle continues.



The alarm bell is switches on for 2 conditions
1. If a person press input 1 (door bell)
2. If a person breaks a glass
The alarm bell is switched off
1. If input 1 is pressed output 1 is switched off after a delay of 10 seconds
2. If input 3 (or there is a breaking of glass) output 1 is switched off manually by pressing input 2 accept push button.



Sequence of operation

When the test Push Button is pressed, all the LED's are switched on for 2 seconds time delay and then it switches off. Now number of times we press right Push Button (Input 3) that many LED's from Left are switches on. The number of times we press Left Push Button (Input 2), that many LED's are switches off from right provided they are on.