SMART HOUSE TRAINER

Overview

Laboratory facility is designed for hands-on study of Lighting Control, Air Ventilation and Security System for household areas. It's a model of real home with air ventilation, motion and occupancy detection systems, security system (day and night video surveillance, door monitoring) and lighting control. The power analysis is also included to monitor the energy efficiency.

The whole system is connected to the specialized control software that is implemented in LabVIEW graphical programming language. The software visualizes a virtual operating diagram of the facility. It allows interactive monitoring and control over any modeled processes and simulated in hardware emergencies

List of Experiments

Study of components

- Motion Detection Sensor
- Occupancy Detection Sensor
- Gate Status Sensor
- Temperature Sensor
- Photodiode Sensor
- Loudspeaker and Microphone Sensor
- Proximity Reader
- Lighting
- HVAC Control
- Day and Night Video Camera
- Video Camera Based Motion and Occupancy Detection Sensor
- Email Notification
- Power Analysis
  - Voltage and Current Waveforms, RMS
  - Active, Reactive, Apparent Powers
  - Power Factor
  - Harmonic Analysis, THD
  - Flicker
- WSN Technology
- CompactRIO Technology

Benefits

- Student will have chance to learn how to work with real Home Automation system
- Student can control and monitor lighting system, air ventilation system based on people presence
- Investigate the work of motion and occupancy detection systems
- Student can investigate security systems which includes the surveillance system
- Student will have chance to get deeper into Home Automation Systems and ability to understand the working mechanism of every fields in the system using LabVIEW graphical programming language
- Student can add/modify different parts of the system, create new laboratory works

Study of Sub-Systems

- Outside Lighting Control System
- Room Lighting Control System
- Room HVAC Control System
- Roof Authentication Control System
- Main Entrance Authentication Control System
- Surveillance Control System
- Absence Control System
- Smart House Complex Control System

Specifications

Parameter	Value
Number of RTUs	1
Number of Programmable WSN nodes	3
Number of WSN Gateways	1
Programmable WSN nodes	4 channel, 24-Bit, Programmable node, Thermocouple
Voltage Inputs	3-Channel, 300 Vrms, 24-bit, 50kS/s, simultaneous
Current Inputs	4-Channel, 5Arms, 24-bit, 50kS/s, simultaneous
Digital Input/Output	24 V, 16 Ch Digital Input, 16 Ch Digital Output
4-20mA Input	8-channel, ±20 mA, 200 kS/s, 16-Bit
Digital Input	4-channel, 24V,Universal sinking/sourcing
Analog Output	Channel-to-Channel Isolated 10 V Analog Output
Cameras	3, Basler IP Camera
Motion Sensors	3, IR motion sensors, 24VDC
RFID Reader	1, RFID Reader, 3 cards, RS-232 port
Car	1, Remotely controlled car
Helicopter	1, Remotely controlled helicopter
Host PC	Regular desktop PC, FULL HD display
Stand Dimensions (H x W x D)	900x1500x1500mm
Weight	80kg

Hardware Pictures

Software Screenshots