ICP DAS Smart Home Exihibition & Experimentation Center

By JE Wang

Global warming will directly impact human life in the future - and in the worst case it may affect the continuation of all life. Saving energy and reducing emissions are two common 21st-century global objectives. ICP DAS is one of the foremost specialists in automatic control and data acquisition; we experiment constantly with gathering environmental data and manipulating control equipment to achive energy savings, and hope that our products will give their users peace of mind from the thirst for energy.

Our Starting Point

A Method to Save Energy

Human life is often inseparable from the ubiquitous building, be it for work, entertainment, shopping, or the home. As the buildings differ, so do their demands for electricity; but as time goes by, the demand tends to increase. To face the rising want for energy, two approaches have arisen; the first is alternative energy solutions (like wind and solar power).

This is not always an easy approach because of the high start-up cost, which not every individual or entity can take. The second approach involves streamlining the use of energy: avoiding unnecessary waste of energy. Simply turning off unneeded devices can cut consumption drastically; yet the public is sometimes slow to pick this mindset up. And so we turn to automation as the fundamental solution, which is why we refer our customers to our smart home showroom in Wuhan.

Using low power-consumption LED lighting

Characteristics

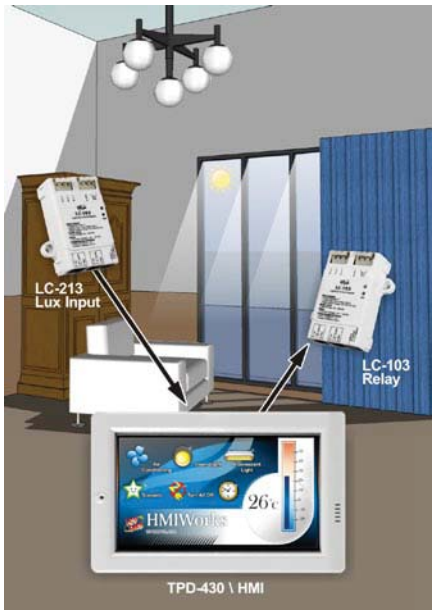
Sensors react quicker than humans do.

Electricity pervades all modern life - from steam power we went speedily to electricity, which now powers a huge majority of our lifestyles. It gives us light, keeps us warm (or cool), preserves our food, and entertains us by powering our many devices.

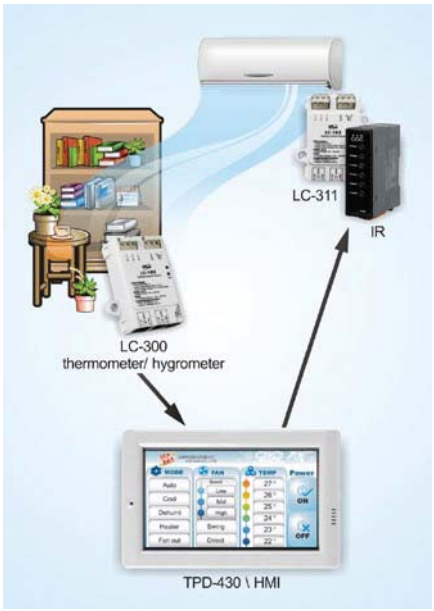
Statistics say that lighting and air conditioning make up 70% of a building's energy consumption, making the two prime for pruning in order to save energy. By trimming waste from unneeded air conditioning and lighting, the savings are immediately apparent in that 70% consumption.

Completely ceasing to use electricity is hardly an option. The only question,

Light perception



Temperature and humidity



then, is how should one optimize usage of electricity. The obvious solution is to get people to manually switch them on and off as needed - but in a busy work environment, who actually actively keeps score on when it's needlessly bright or warm? Automation comes to the rescue of the people who have better things to do than fret about every bulb in the building.

If the demand for electricity is traced to the environment inconveniencing efforts to save energy, then the integration of environmental factors is essential.

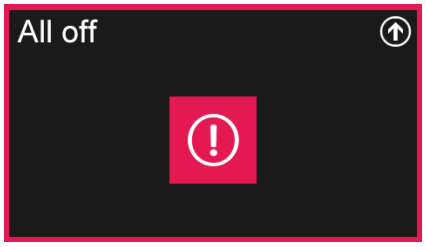
Using dimmers, for example, can go a long way to saving energy for those who need light but not 100% of it. By studying light usage in an environment and converting the data into procedures, an all-around lighting solution is in reach that intelligently adjusts lighting as needed. Data acquisition has long been a specialty of ICP DAS - by combining sensors with data, one will see a great improvement in energy savings and take a fair burden off the users.

One touch turns everything off

An all-in-one key is convenient, not only for simple building management but also for the last-out patrolmen who have to sweep the building to make sure that everything has been turned off. Instead of manually passing through the whole building, toggling all the power from one place is the way to go. The exhibition center places a TouchPAD at the entrance to each room with a one-touch "all off" option to smoothly turn everything off on your way out. Turning out the lights has never been so easy.

Bedroom HMI home page

"One-touch, all-off" button for the Bedroom

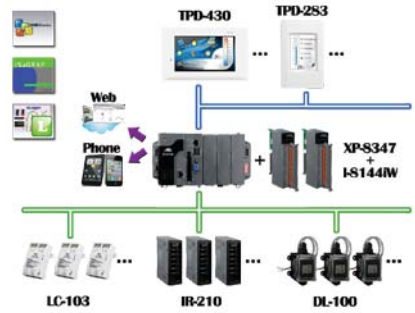


Structure and Function

Building Automation Framework

The quality of a complete system architecture is determined by the combined performances of both hardware and software. Most systems are built from the ground up with a specific structure in mind; many are unfortunately rigid and difficult to adapt for special cases. Is not the best case one where the system is both well-structure AND flexible? ICP DAS answers the call again.

Old architecture deployment is lacking of flexibility



Building model vs. System model

The Wuhan Exhibition Center is complete with a bedroom, living room, conference room, and reception hall - the five areas most likely to need an intelligent system. The Exhibition aims to be as all-encompassing as possible to cover most of the likely demands that a customer could have.

Built to operate within building engineering standards, the TouchPAD from ICP DAS can correspond with a variety of control groups; for example, the LC-103 comes with 3 relays to control lighting, the LC-221 controls 0 - 10V LED dimming, and the IR-210 infrared controls air conditioning, television, and music. Finally, we worked out a solution based on an idea called "subsystem", one subsystem maps to a room or an area that contains all of the most basic control, when we utilize subsystem concept, it will no longer be a single switch controlling a single device as in the past, subsystem will simplify our works and provides an interface for us to control all things.

Floor Plan

Subsystems

The latest TouchPADs have multi-channel communications that show off the highest performance of distributed systems. Control can be extended sequentially, one room at a time, from bedroom to living room to conference room to office to reception hall - and in the end, the whole setup can be threaded through the web and controlled remotely with mobile integration of SCADA to manage everything at once. Not only do we see an increased flexibility at work, but also a superior form of communication.

Subsystems are like building blocks for maximum flexibility

Optional Functions

Web and mobile control co-exist harmoniously in WinPAC; both can benefit from ugmenting the system with additional sensors. For example, a light sensors could detect low levels and brighten up the room to compensate; a temperature sensor could distinguish uncomfortable temperatures and make the appropriate adjustments. These automatic adjustments do not override the usual controls, merely serving to increase the utility of the overall system.

They can be safely tacked on as per customers' needs without introducing complications in control.

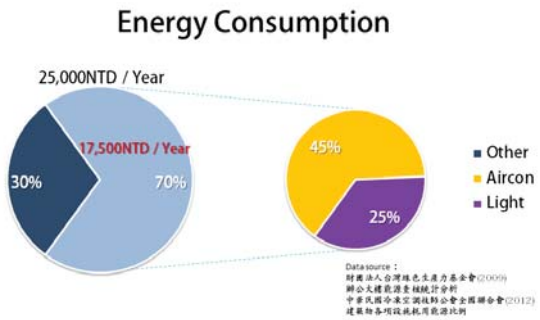
Implementation Cost and

Energy Efficiency

In terms of the general-use control kit plus housing, implementation costs about 90,000 New Taiwan Dollars ($3,000). For an annual electric bill of 25,000 NTD, ICP DAS estimates as much as 40% savings on energy - typically in the area of 7,000 NTD. This means that one breaks even in about a decade - whereupon the benefits REALLY begin to kick in from the energy savings.

Implementation costs	
Subsystems	35,000NTD / Set
(Web & Sensor)	20,000NTD~ / Set

More than 70% of the energy used in buildings is used for lighting and air conditioning



Using subsystem could save up to 20% energy, with Sensor Automation would even double energy saving