

around the HOUSE

From the Floor Up

The symmetry of inclusive Universal Design (UD) combined with sustainable building practices and products is what defines the Universal Designed “Smart” Home. In this context, “Smart” does not pertain to home automation as much as it does intelligent “Green” building design and construction. However, home automation features are often included and can enhance independent living and safety.

So, may I pose the questions: Why build an inclusive UD home if you can't afford to keep up with the utility bills? Conversely, why build a Green home if you can't make your way into the home or use the bathroom, kitchen, or any other areas? The UD Smart home unites the two into a home designed for ease of use and genuine independent living.

About 18 years ago I was an in-home caregiver for my grandfather. I learned that for most people, and especially those who are elderly, as goes the comfort of the feet so goes sensation of the body heat.

Grandpa lived in a split-level house with forced-air heating and cooling. A



Geothermal ground heat provides hot water for in-floor radiant heat. Photo shows water-holding tanks and manifolds to disperse water to separate zones.

Be Smart

Now, many years later, I am designing an addition for my parents. They are in their golden

years, and the two-story house with the laundry and utilities in the basement and bedrooms upstairs

is not suitable for independent living. They will be adding a 1,000-square-foot master suite, kitchen addition, four-season room, and mud room with a single unit washer/dryer. It will be fully UD and Smart with Green, energy-efficient construction.

The existing home employs forced-air heating and cooling. For the addition, enter the radiant floor heat system and ductless (Mini-Split) heat pump for cooling. Both systems will be quiet and provide clean operation and low maintenance. This is also a benefit for those who have issues with airborne allergens—and mom, who doesn't like additional dust and constantly vacuuming the floors.

In 2002, according to U.S. census figures, 1.7 million Americans used wheelchairs or scooters. As many as 20 million people had asthma, not to mention all the other airborne or lung diseases that cause problems. The point is that clean air is a genuine UD feature and will be a real benefit to everyone. I believe clean indoor air is the common

may be especially true for those who don't have good circulation or get a lot of physical exercise, and people who use wheelchairs.

Sunroom with in-floor heat for year-round enjoyment. No forced air means less dust on hard-surfaced floors and cleaner breathing air.



denominator that ties together UD and Green building to make a house a Universal Designed “Smart” Home.

Heating Options

A radiant-heated floor depends largely on heat transferred directly from the hot surface to the people or objects in the room. It is more efficient than base-board heating and as much as 40% more efficient than forced-air heating because no energy is lost through ducts. The ducts would also have to be insulated for maximum efficiency if located in a nonairconditioned space. This would add additional cost.

For radiant in-floor heating, “wet installations” make use of the large thermal masses of a concrete slab floor or lightweight concrete poured over a wooden sub-floor. There are also “dry installations,” where the installer “sandwiches” the radiant floor water tubing or electric mat between two layers of plywood or attaches the tubing or matting under the finished floor or sub-floor.

According to www.energysavers.gov, “Electric radiant floor systems are usually only cost-effective if they include a significant thermal mass (large mass of concrete) and the utility company offers time-of-use rates.” Time-of-use rates would provide cost benefits by allowing the heated slab to heat at night when electricity demand is low and then radiate the heat back into the heated area during the day. Hydroid systems are the most cost-effective and popular for heating-dominated climates.

What all in-floor radiant systems have in common is the fact that because a radiant system heats the space directly above the floor, a room may feel warmer than a forced-air system because heated air rises and makes the lower area seem cooler.

I am recommending a hydroid tubing system for my parents’ addition. So even though Grandpa could not enjoy

the benefits of in-floor heating, my parents will. The tubing will be sandwiched between two plywood sub-floor panels, one of which will have the curvilinear grooves pre-cut into the plywood for easy installation. This system will also allow the different rooms to be zoned and on separate thermostats.

A high-efficiency boiler will send water to a manifold that separates water and sends it to each room through polyethylene tubing (PEX). PEX is leak-free,

in the new addition. The new rooms will be zoned and on separate thermostats so the differences in temperatures between old and new can be controlled.

Be Efficient

When considering a UD Smart Home or addition, think about the use of these ever-evolving energy-efficient systems. Nurture the temperature of your feet to comfortably manage your body heat.



Warm floor interior with radiant heat. Notice lack of return and supply ducts.

nontoxic, flexible, and capable of handling high temperatures. The water then recirculates back to the boiler for another trip through the “loop.”

The cooling system will also be “ductless,” as it is to be a mini-split heat pump system that sends refrigerant liquid to four separate wall units and delivers the cool air to each room. Cool air drops to the floor, which will bring much comfort to seated users. The forced-air system will still be used in the existing house, but most activity will take place

The home plan book *Universal Design “Smart” Homes for the 21st Century* combines UD with energy-efficient features in every home as we have discussed here. In future months we will continue to look at UD and Green features. The plan book is still available to readers with a \$5 discount by using the coupon code: Vethomes. Order it at www.UniversalDesignOnline.com.

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