Predictive Control

"Predictive control" is my term for having HCA learn what you do, and over time start predicting and carrying out a sequence of actions that it "predicts" you are going to do. This sounds interesting, huh? Here is how it works.

Learning by watching and recording

Each time HCA sees a manual action in your home - you tap a switch paddle or tell a voice assistant to control a device – it starts a recorder watching for subsequent actions. That recording lasts for a short time period and then stops. At that point it knows these things:

- What time the recording started.

- What device initiated the action and what that action was – tapping the switch paddle top to turn on a light or the switch paddle bottom to turn it off.

- What other devices were controlled during the recording time and the time between each action.

As an example, here is a display of a recording:

```
Media – Lights
   [hit 4] 18:27:51 – 18:57:51 receive 0% [10-Oct-22]
     (+delay 1) Down Hallway – Hallway 100%
     (+delay 6) Stairway – Lights 80%
     (+delay 8) Kitchen – Lights 100%
```

The initiating device is "Media-Lights" being turned off (0%). One second later the "Down Hallway-Hallway" lights were turned on. Six seconds after that the "Stairway-Lights" went to 80%. Finally, eight seconds after that the "Kitchen-Lights" were turned on.

This action happened sometime between 6:27:51PM and 6:57:51PM. The last time this action was recorded was on the 10th of October this year.

The explanation of "Hit 4" is this: Each time a recording is made this system tries to find a previously recorded sequence that is the "same", which means:

- It was started by the same initiating device and the same action. In this example, it must be started by "Media – Lights" going off.

TechSup@HCATech.com

www.homecontrolassistant.com

- It also must have recorded the same subsequent devices and their actions – but perhaps not with the exact same inter-action delays. In this example, it means that only the "Down – Hallway", "Stairway – Lights" and "Kitchen – Lights" must all be controlled and to those same levels.

- Finally, the time that the action is started must be close in time to a previous recording. In this example, that means that the initiating action must have happened sometime between 6:27:51pm and 6:57:51 pm.

If all these conditions are met, then the system overwrites that recording with the current recording and increments the recording "hit count".

Why all these conditions? You may do different things at different times of the day. What you do in the morning may be different than later in the day. Sometimes you may do one thing and other times something else. In this example someone was probably finishing up in the media room – the lights were turned off – and headed down the hallway, to the stairway, and then to the kitchen. But another time they may have left the media room and gone to the office.

This system can keep several recordings for any device you want to have participate in this system. Since the data is saved in device tags you can have up to 31, but you can limit it to fewer so you can reserve space for other device tags for your own purposes.

The idea is that over time the system accumulates several recordings for each of your devices. Some happened only once and so probably get replaced over time, but others are more common and so get an increased hit count.

Anticipating by playing back a recording

Once the system has learned your usage pattens then the system can be told, in addition to continue making recordings, to use them. Let's return to the recording shown above and see what happens.

The initiating action is that the media room lights are turned off. As soon as it sees that, the system looks for a recording that has that same initiating action recorded at a time near the current time. It also looks to see if it has a high enough hit count. If that recording is found, then automatically the hallway lights come on, the stairway lights come on, and then the kitchen lights come on all without you touching a switch after the media light switch. Each element in the recording happens slightly faster than in the recording – to keep a bit ahead of you. Nice, huh?

TechSup@HCATech.com

www.homecontrolassistant.com

Configuring the system

After importing the predictive control package from the online library there is some configuration to do. Any device you want to participate in this system – both as an initiator of a recording and a participant in the recording – must have a tag added whose value is "predict" with no value. Like this:

<u>After</u> you import the predictive control package, there are several <u>global</u> variables you can adjust. These are:

RecordingOnly	If set to 1 then no playback attempted. This puts the system into learning mode only.
RecordingSeconds	The number of seconds to record for. Once the initiating action happens any subsequent receptions from devices are recorded for this length of time.
RecordingMax	Max number of recordings that can be saved for a device. As I said above, you are limited to 31 but can use less.
RecordingTimeMatchDeltaMinutes	For a recording to match, and so increase its hit count, the time it was recorded must be the same as the current time plus or minus this number of minutes.
PLaybackMinHits	The number of times a sequence must have been recorded before considered for playback. Any recording with a hit count less than this is never used

	for a playback.
PlaybackSpeed	When a recording playback happens, decrease inter-action delays by this percentage. Must be a value between 0 (all delays zero) and 1 (no speedup). For example, .75 reduces each delay time by 25%

While all these variables have default values, they can be adjusted to "tune" the installation for your needs. For example, you may want the recording time to be longer or shorter.

There are several other global variables used by the system and they should not be modified.

Getting Started

A good way to get started is to import the Predictive Control package and mark those devices you want to participate in this system. Then leave it in learning only mode. After a while you can use the "Report Recordings" program, also in the package, to create a file you can look at that shows all your recordings.

After a while, you can enable playback mode – set the RecordingOnly global variable value to 0 - and experience what HCA predicts you are about to do.

##end##