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Functions of the Smart Home Project

Short intro

The Smart Home system is a System that records temperatures over a week and remembers certain data, it also has a function which ensures that a photosensor has the least light possible. It functions through the built-in display.
The menu has 4 options, these include option 1 which takes the user to time and date and allows them to set it to whatever they like. Option 2 is where the user can check the information for the 7 days. Option 3 toggles fast mode which is there for debugging purposes. Option 4 enables the Light Check mode which makes sure that the setting where the light sensor gets the least light is selected.

Time and date

The Smart home system has an implemented calendar system which is represented by different values, days is represented by a char value, month is also a char value, Year is represented by a short.
Hours and minutes are represented by different chars, seconds is represented by a short. For the temperature timestamp they are all one int. In order to record time, each tick on the system it adds to the time variables, when enough time for a day has passed it adds to the day integer, if the month has an appropriate amount of days to be passed it also passes the month, and same for year if the month it was on was December.
In the systems menu you can enter the time and what the date is, you are unable to enter incorrect dates, if a month is over what it can be it will be clamped down to the maximum value of that month.

Data handling

There is a temperature sensor that measures the temperature each minute, the recorded temperature has a timestamp int for minutes and hours, day and month are both chars, year is an int. If the memory is full it will remove all old temps and they will have limited data be recorded so the day data can continue to be recorded. The data recorded once this happens include variance, amount of temperatures that was in it, and the average.
In order to make the system more efficient the type of variables used to save the data have been optimized, for anything that requires less than 127 char has been used, for all temperature values saved (not necessarily the ones that are only used 1 time in the calculation) are floats. The biggest data user is DLinkedLists which is used to save all the information needed about the temperature taken, to optimise

these they use the lowest possible memory shorts, chars and floats are used where possible.

Temperature records

In the Systems menu there is data about 7 day's worth of temperatures, minimum, maximum, variance and average values of the day are displayed. The minimum and maximum values also contain timestamps in order to know when it was the warmest and coldest. These days don't end up using too much data due to them being limited to 7. When the days go over, the oldest day is removed. Even though there are only 7 chars, shorts and floats are still used where possible.

Photosensor

In the menu, button 4 will enable a photosensor which will give information to the system which then controls the servo motor. It checks how bright it is at each rotation of the rotor, when it is done checking it goes to the location with the least light. This check is done each half an hour at HH:15 and HH:45.

Alarm

If a recorded temperature goes above 22 or below 15, the System's alarm boolean is set to 1, in the System all it does is it starts blinking because of a function inside of the systick handler which is only enabled when the Alarm boolean is set.

Troubleshooting

For troubleshooting convenience there is a mode called Fast Mode which makes each minute pass in one second, this makes troubleshooting issues a lot easier in order to see if everything is working properly.