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Capstone project (CurrentMaster)

Summary: Many locations need to control and monitor the usage of electricity. This can be for multiple reasons:

* Collect and charge actual electrical usage to users (i.e. RV park)
* Track equipment run time for preventative maintenance (shared industrial space)
* Monitor usage of equipment for capital replacement forecasting (manufacturing facility)
* Control access to equipment so that only trained personnel have access

Proposal: Create a device that forces a user to log on (via fingerprint) to enable the flow of current. When the user is finished, he/she clicks on a log off button to end the session. The usage statistics such as session start time, session stop time, kilowatt-hours, machine id and user id are written to a cloud database service every 1 minute. This data enables reporting required for all the above uses.

Devices and sensors:

* DLCT03C20 Current monitor controller
* OLED display to display usage statistics
* Relay to control 110/120 current
* Optical fingerprint sensor for logging in
* Button for logging out
* Neopixel LED to display status to user

LED Status

* Red –Device is not connected to network
* Blue – Device is ready, but no session is active, electrical power is disabled
* Green – Device is in a session and electrical power is enabled

OLED display

* When LED status = RED, display actual error
* When LED status = Blue, displays “Ready for login”
* When LED status=Green, display session start and running electrical usage
* On logoff, displays total session statistics for 10 seconds

Future enhancements

* Web service responds to device request, indicating if user is authorized
* Since each fingerprint is stored on the reader, first use requires a PIN that associates that particular user fingerprint with a user account.
* Front-end application to manage who can use which devices.
* Front-end application has reporting for usage and billing.