Same procedure as every year: Days become shorter and list of burglaries longer. These crimes happen quite often during dusk, when people are still working.

Here in Switzerland we believe, that housebreakers are intelligent and want to avoid problems. This is, why we think, they prefer unoccupied houses for their intrusions.

In this video, I will show you how to use technology for your advantage.

To simulate occupancy during dawn we have several possibilities like light or sound. Because burglars usually have to do their decisions from a certain distance, I will concentrate on light. Two possibilities are widely used for that matter: Random timers connected to lamps and fake TVs. I will combine both, enhance them, and show you how you can build such a device for a few dollars using an ESP8266 or a SONOFF and a Neopixel strip. And of course, it will use the internet to reduce your effort.

The solution has three components:

1. A fake TV
2. A device to switch a lamp or LED on and off
3. An algorithm which looks at current time, at actual sunset, and decides when to start and stop the show. It also decides, based on randomness, when to use light or fake TV, or both together

Let’s start with the fake TV. We can buy these devices in stores. But they are not very bright, at least not compared with our big screen TVs, and the randomness is not very sophisticated. So, these devices do not offer a big protection. Also, because everybody can buy the same thing and they are known by potential burglers. We need something stronger.

Fortunately, Phillip Burgess at Adafruit did a great job in building a fake TV. He used a database of 54 films to find and average color distribution of films playing in TV. With this knowledge in mind, he built a sketch to simulate such colors with Neopixels. Therefore, you can decide, how bright (or big) you want to have your TV screen by adding more Neopixels. He even simulates faded and abrupt changes in colors or intensity. Great stuff!

So, we have now our fake TV. Next, we have to find out the actual time to decide when to switch on or off. With our ESP8266 we can get the time from an NTP server in the internet. Frequent viewers know, that they can have a look at my video #67 or #71 for this matter. Now, we need also the time of today’s sunset, because our device has to run without any user intervention.

There are a few web services available to get the time of sunset. The most prominent service is sunrise-sunset.org. They offer a free api. But I did not like it, because you have to include the exact geographic position in numbers to get the right answer. Too complicated. So, I searched for a better solution. Darksky.net would also provide the data, but again, you need the enter the geographic location the same way. At the end, I found an API at openweathermap.org which offers a free access to our needed data. And it works with the postal code and your country. Which is usually better known to all of us.

So, we send a request to the API and wait for an answer. In this answer string, we search for the word “sunset”, and after this word, we find today’s sunset time in Unix time format.

So, we have now everything to build our sketch. As always, the sketch is based on my IOTappstore infrastructure.

After startup, the sketch checks, if it has the newest version and, if the “setup button” on GPOI0 is pressed. If it is pressed, it enters into a setup routine and you can connect your smartphone or browser to the WLAN called SONOFF. On 192.168.4.1, you get the normal configuration screens. If you press the programming button again, or your press “EXIT” in the browser, or you wait for 70 seconds, the sketch enters into normal operation and connects to the internet.

In normal operation, it reads the current time and the today’s time of the sunset a first time. Both numbers are in UNIX time format. The current time, of course is time zone adjusted. The sunset time comes already according your current time zone. So, we just compare the two times and decide if we have to switch the presence simulator on. In my sketch, I start the simulation one hour before official sunset. But you can change that time easily. I also do not want the simulator run the whole night. This is why I stop the simulation at 10 pm. The next day, it starts again automatically before sunset. If you are at home, you just switch the device completely off and it uses no electricity. Because everything runs automatically you can leave it off as long as you want, even though the whole summer.

The sketch synchronizes every 10 minutes the time with the internet, because the Neopixel library seems to interfere with the ESP internal time-keeping. A switch statement switches between fake TV on, light on, or both on. After each change, a random number of minutes is fixed and after that, a new decision is made. So, somebody from the outside sees a changing behavior, where the light and TV is switched on or off at random times. You can set the minimum and maximum time between these changes. And, if you call the device with its address and /STATUS from your browser, you get the different numbers back for debugging

I had a one meter strip with 60 Neopixels in my drawer. These provide a decent intensity, and if you need more light, you can add another meter or two, or buy Neopixels strips with higher density. The maximal current of my strip is less than one ampere. So, you can use a cheap 5-volt power supply to power it.

To fake the light, I use a normal Sonoff with a relay, like in the last episode, and switch a normal lamp. Of course, you can also just use a normal ESP module with a relay to switch mains.

Watch my episode #93 if you need to know how to hack the Sonoff.

With the Sonoff, you can use GPIO14 to drive your Neopixels, and if you use your own ESP or nodeMCU module, you can use whatever pins you want.

Of course, you can use this project purely as a fake TV without lamp or to replace such a mechanical timer if you only want to use a lamp. You just omit the device you do not want.

Now, we connect a lamp to the Sonoff and install everything at a proper place and now, I hope, we all will be untroubled by criminals for the whole winter time.

I hope, this video was useful or at least interesting for you. Bye

<https://learn.adafruit.com/fake-tv-light-for-engineers/arduino-sketch>

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<http://api.openweathermap.org/data/2.5/weather?zip=4415,ch&APPID=b5ab369679b6b59c718a8acfaf308d37>

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<https://api.darksky.net/forecast/2a4b0030da5bb5fa1c72bbb0b231076b/37.8267,-122.4233>