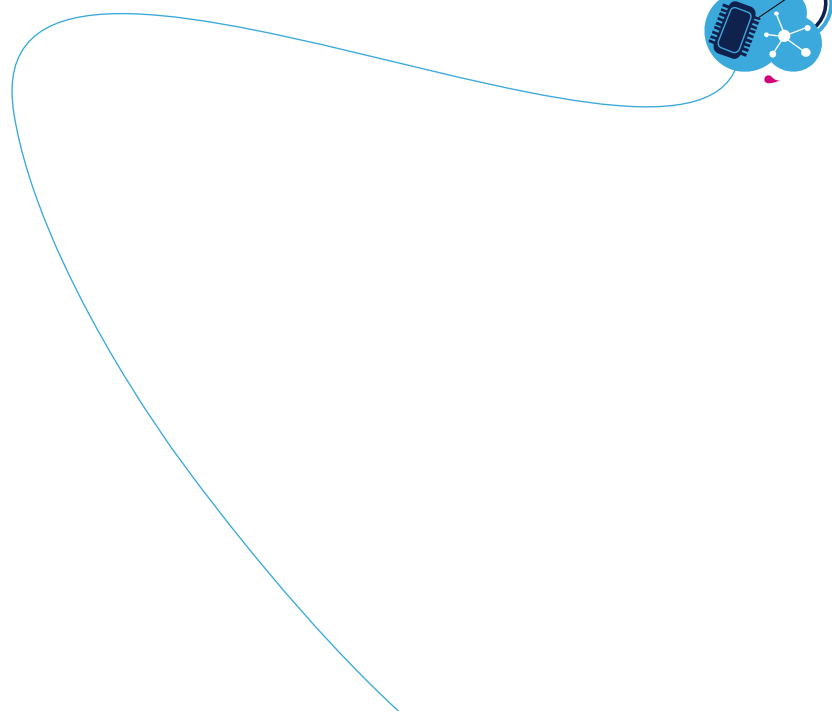


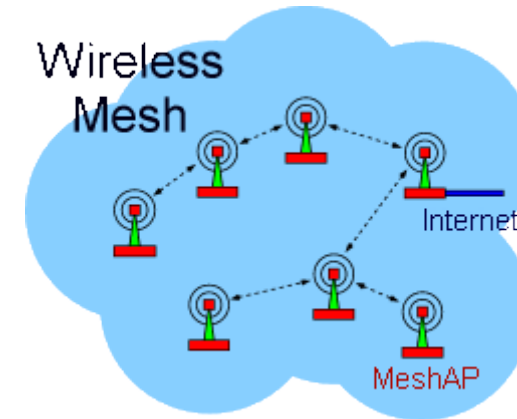
The collage features several elements:
 

- Top Left:** A terminal window showing assembly code for the 'Penguin' exploit, including instructions like 'RCC\_APSBPeriphClockControl', 'P\_Enable ADC1', 'ADC2', 'ADC3', 'RCC\_APB3PeriphClockControl', and 'RCC\_APB3PeriphClockControl'.
- Top Center:** A terminal window displaying a green penguin character, which is the visual representation of the exploit's success.
- Top Right:** A terminal window showing assembly code for the 'Penguin' exploit, including instructions like 'LDRD r0, [r0, #4]', 'LDRD r1, [r0, #8]', 'LDRD r2, [r0, #12]', 'LDRD r3, [r0, #16]', 'LDRD r4, [r0, #20]', 'LDRD r5, [r0, #24]', 'LDRD r6, [r0, #28]', 'LDRD r7, [r0, #32]', 'LDRD r8, [r0, #36]', 'LDRD r9, [r0, #40]', 'LDRD r10, [r0, #44]', 'LDRD r11, [r0, #48]', 'LDRD r12, [r0, #52]', 'LDRD r13, [r0, #56]', 'LDRD r14, [r0, #60]', 'LDRD r15, [r0, #64]', 'LDRD r16, [r0, #68]', 'LDRD r17, [r0, #72]', 'LDRD r18, [r0, #76]', 'LDRD r19, [r0, #80]', 'LDRD r20, [r0, #84]', 'LDRD r21, [r0, #88]', 'LDRD r22, [r0, #92]', 'LDRD r23, [r0, #96]', 'LDRD r24, [r0, #100]', 'LDRD r25, [r0, #104]', 'LDRD r26, [r0, #108]', 'LDRD r27, [r0, #112]', 'LDRD r28, [r0, #116]', 'LDRD r29, [r0, #120]', 'LDRD r30, [r0, #124]', 'LDRD r31, [r0, #128]', 'LDRD r32, [r0, #132]', 'LDRD r33, [r0, #136]', 'LDRD r34, [r0, #140]', 'LDRD r35, [r0, #144]', 'LDRD r36, [r0, #148]', 'LDRD r37, [r0, #152]', 'LDRD r38, [r0, #156]', 'LDRD r39, [r0, #160]', 'LDRD r40, [r0, #164]', 'LDRD r41, [r0, #168]', 'LDRD r42, [r0, #172]', 'LDRD r43, [r0, #176]', 'LDRD r44, [r0, #180]', 'LDRD r45, [r0, #184]', 'LDRD r46, [r0, #188]', 'LDRD r47, [r0, #192]', 'LDRD r48, [r0, #196]', 'LDRD r49, [r0, #200]', 'LDRD r50, [r0, #204]', 'LDRD r51, [r0, #208]', 'LDRD r52, [r0, #212]', 'LDRD r53, [r0, #216]', 'LDRD r54, [r0, #220]', 'LDRD r55, [r0, #224]', 'LDRD r56, [r0, #228]', 'LDRD r57, [r0, #232]', 'LDRD r58, [r0, #236]', 'LDRD r59, [r0, #240]', 'LDRD r60, [r0, #244]', 'LDRD r61, [r0, #248]', 'LDRD r62, [r0, #252]', 'LDRD r63, [r0, #256]', 'LDRD r64, [r0, #260]', 'LDRD r65, [r0, #264]', 'LDRD r66, [r0, #268]', 'LDRD r67, [r0, #272]', 'LDRD r68, [r0, #276]', 'LDRD r69, [r0, #280]', 'LDRD r70, [r0, #284]', 'LDRD r71, [r0, #288]', 'LDRD r72, [r0, #292]', 'LDRD r73, [r0, #296]', 'LDRD r74, [r0, #300]', 'LDRD r75, [r0, #304]', 'LDRD r76, [r0, #308]', 'LDRD r77, [r0, #312]', 'LDRD r78, [r0, #316]', 'LDRD r79, [r0, #320]', 'LDRD r80, [r0, #324]', 'LDRD r81, [r0, #328]', 'LDRD r82, [r0, #332]', 'LDRD r83, [r0, #336]', 'LDRD r84, [r0, #340]', 'LDRD r85, [r0, #344]', 'LDRD r86, [r0, #348]', 'LDRD r87, [r0, #352]', 'LDRD r88, [r0, #356]', 'LDRD r89, [r0, #360]', 'LDRD r90, [r0, #364]', 'LDRD r91, [r0, #368]', 'LDRD r92, [r0, #372]', 'LDRD r93, [r0, #376]', 'LDRD r94, [r0, #380]', 'LDRD r95, [r0, #384]', 'LDRD r96, [r0, #388]', 'LDRD r97, [r0, #392]', 'LDRD r98, [r0, #396]', 'LDRD r99, [r0, #400]', 'LDRD r100, [r0, #404]', 'LDRD r101, [r0, #408]', 'LDRD r102, [r0, #412]', 'LDRD r103, [r0, #416]', 'LDRD r104, [r0, #420]', 'LDRD r105, [r0, #424]', 'LDRD r106, [r0, #428]', 'LDRD r107, [r0, #432]', 'LDRD r108, [r0, #436]', 'LDRD r109, [r0, #440]', 'LDRD r110, [r0, #444]', 'LDRD r111, [r0, #448]', 'LDRD r112, [r0, #452]', 'LDRD r113, [r0, #456]', 'LDRD r114, [r0, #460]', 'LDRD r115, [r0, #464]', 'LDRD r116, [r0, #468]', 'LDRD r117, [r0, #472]', 'LDRD r118, [r0, #476]', 'LDRD r119, [r0, #480]', 'LDRD r120, [r0, #484]', 'LDRD r121, [r0, #488]', 'LDRD r122, [r0, #492]', 'LDRD r123, [r0, #496]', 'LDRD r124, [r0, #500]', 'LDRD r125, [r0, #504]', 'LDRD r126, [r0, #508]', 'LDRD r127, [r0, #512]', 'LDRD r128, [r0, #516]', 'LDRD r129, [r0, #520]', 'LDRD r130, [r0, #524]', 'LDRD r131, [r0, #528]', 'LDRD r132, [r0, #532]', 'LDRD r133, [r0, #536]', 'LDRD r134, [r0, #540]', 'LDRD r135, [r0, #544]', 'LDRD r136, [r0, #548]', 'LDRD r137, [r0, #552]', 'LDRD r138, [r0, #556]', 'LDRD r139, [r0, #560]', 'LDRD r140, [r0, #564]', 'LDRD r141, [r0, #568]', 'LDRD r142, [r0, #572]', 'LDRD r143, [r0, #576]', 'LDRD r144, [r0, #580]', 'LDRD r145, [r0, #584]', 'LDRD r146, [r0, #588]', 'LDRD r147, [r0, #592]', 'LDRD r148, [r0, #596]', 'LDRD r149, [r0, #600]', 'LDRD r150, [r0, #604]', 'LDRD r151, [r0, #608]', 'LDRD r152, [r0, #612]', 'LDRD r153, [r0, #616]', 'LDRD r154, [r0, #620]', 'LDRD r155, [r0, #624]', 'LDRD r156, [r0, #628]', 'LDRD r157, [r0, #632]', 'LDRD r158, [r0, #636]', 'LDRD r159, [r0, #640]', 'LDRD r160, [r0, #644]', 'LDRD r161, [r0, #648]', 'LDRD r162, [r0, #652]', 'LDRD r163, [r0, #656]', 'LDRD r164, [r0, #660]', 'LDRD r165, [r0, #664]', 'LDRD r166, [r0, #668]', 'LDRD r167, [r0, #672]', 'LDRD r168, [r0, #676]', 'LDRD r169, [r0, #680]', 'LDRD r170, [r0, #684]', 'LDRD r171, [r0, #688]', 'LDRD r172, [r0, #692]', 'LDRD r173, [r0, #696]', 'LDRD r174, [r0, #700]', 'LDRD r175, [r0, #704]', 'LDRD r176, [r0, #708]', 'LDRD r177, [r0, #712]', 'LDRD r178, [r0, #716]', 'LDRD r179, [r0, #720]', 'LDRD r180, [r0, #724]', 'LDRD r181, [r0, #728]', 'LDRD r182, [r0, #732]', 'LDRD r183, [r0, #736]', 'LDRD r184, [r0, #740]', 'LDRD r185, [r0, #744]', 'LDRD r186, [r0, #748]', 'LDRD r187, [r0, #752]', 'LDRD r188, [r0, #756]', 'LDRD r189, [r0, #760]', 'LDRD r190, [r0, #764]', 'LDRD r191, [r0, #768]', 'LDRD r192, [r0, #772]', 'LDRD r193, [r0, #776]', 'LDRD r194, [r0, #780]', 'LDRD r195, [r0, #784]', 'LDRD r196, [r0, #788]', 'LDRD r197, [r0, #792]', 'LDRD r198, [r0, #796]', 'LDRD r199, [r0, #800]', 'LDRD r200, [r0, #804]', 'LDRD r201, [r0, #808]', 'LDRD r202, [r0, #812]', 'LDRD r203, [r0, #816]', 'LDRD r204, [r0, #820]', 'LDRD r205, [r0, #824]', 'LDRD r206, [r0, #828]', 'LDRD r207, [r0, #832]', 'LDRD r208, [r0, #836]', 'LDRD r209, [r0, #840]', 'LDRD r210, [r0, #844]', 'LDRD r211, [r0, #848]', 'LDRD r212, [r0, #852]', 'LDRD r213, [r0, #856]', 'LDRD r214, [r0, #860]', 'LDRD r215, [r0, #864]', 'LDRD r216, [r0, #868]', 'LDRD r217, [r0, #872]', 'LDRD r218, [r0, #876]', 'LDRD r219, [r0, #880]', 'LDRD r220, [r0, #884]', 'LDRD r221, [r



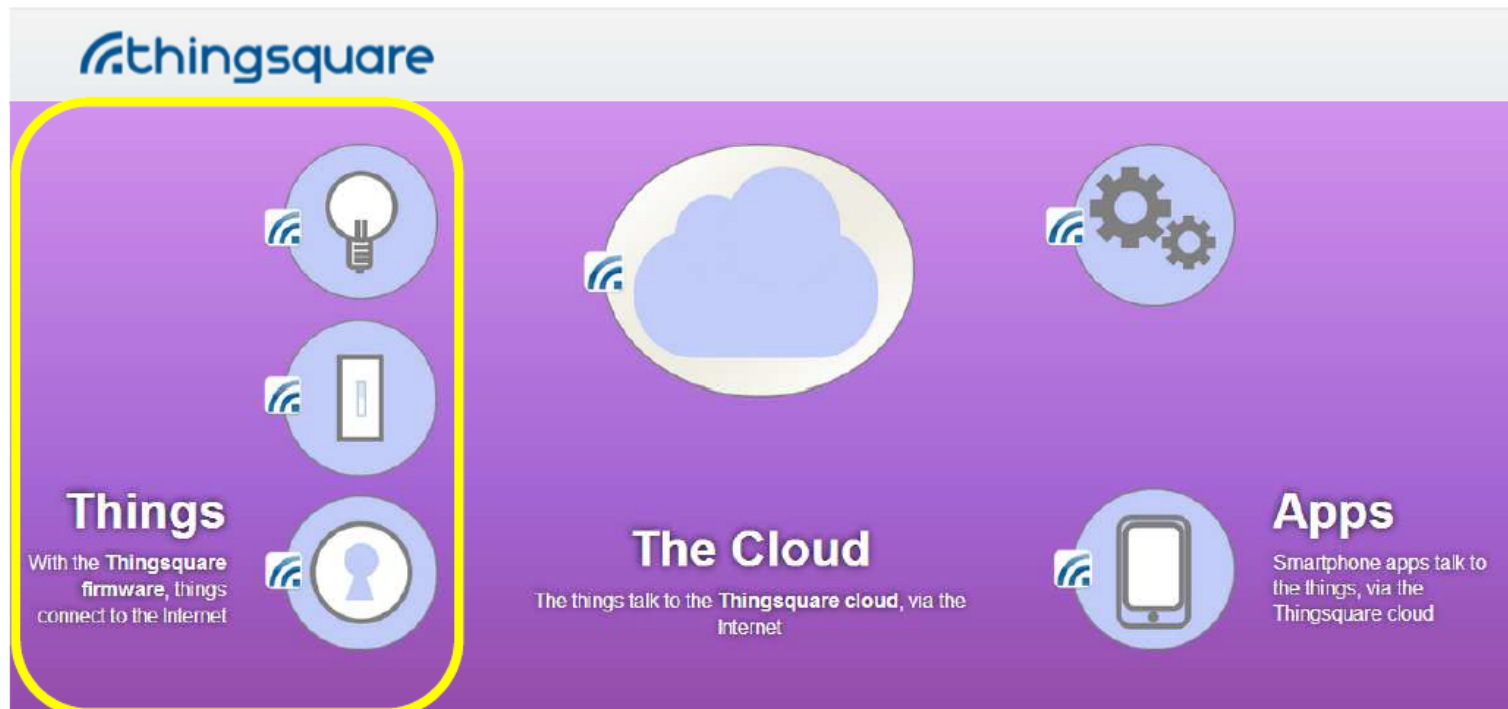
# 6LoWPAN and Internet of Things

- Spirit1 + STM32L based platform
  - Availability: March 2013
- Developed and provided by Thingsquare
  - A pioneering provider of open-source software
- To connect SPIRIT1 to Internet or any other IP network
  - Adapting the packet size of the two networks
  - Adaptation layer for interoperability and packet form
  - Mesh Routing in the personal area network
  - ...
- Open source based on Contiki OS
  - Modest resources requirements
  - Over-the-air secure software updates

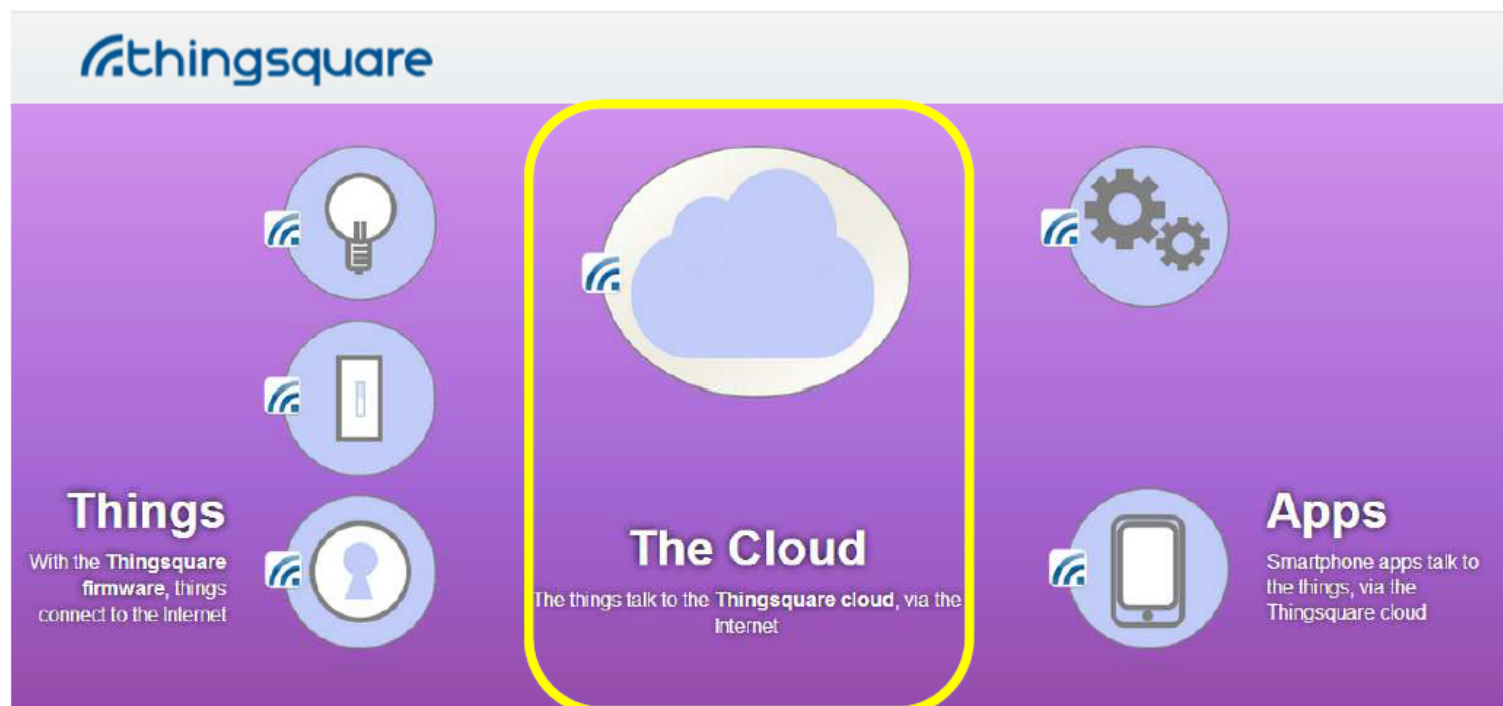


# Enter Thingsquare





- Thingsquare Mist: the open source firmware that connects things to the Internet
  - Runs on SoCs, microcontrollers
  - Leverages the Contiki OS
  - IPv6 mesh + seamless IPv4 connectivity



- Thingsquare Cloud backend:
  - Rendezvous, pairing, monitoring, data collection



- Smartphone / web apps
  - Reaches the things via the Thingsquare cloud API

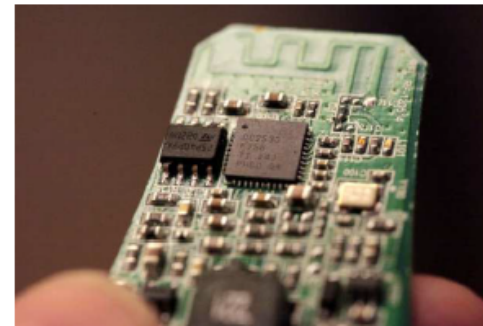
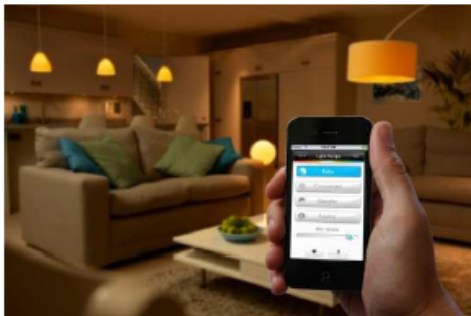
# Building an IoT product

- The Idea
  - "Everyone wants to have a smartphone-controlled lightbulb! I can sell millions of them!"
- What do you need?
  - An app
  - A chip





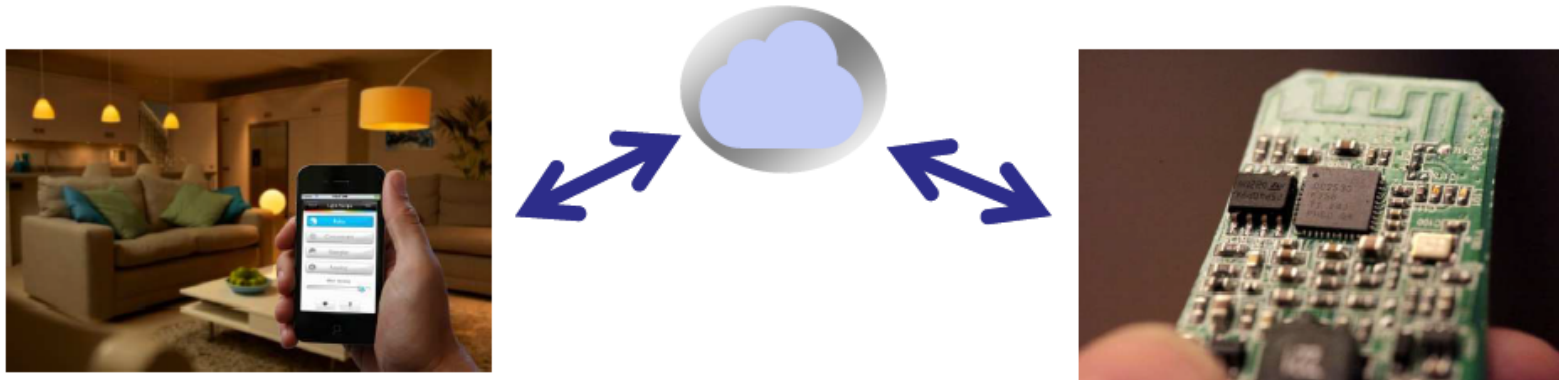
# One possible solution



- Phone talks directly to chip
  - E.g. Bluetooth, BTLE, Ant+, ...
- The problem
  - Every user must configure their phone
  - Everyone must be in range
  - Chip must be compatible with x types of phones
    - Most of which don't have BTLE/Ant+/...



# The IoT solution



- Phone and chip talks to cloud backend
  - Works with every phone, easy to extend, remote connectivity, new innovations, etc
- The problem
  - Connect the chip to the Internet

# Thingsquare Mist features

- World's smallest IPv6 stack
- The world's smallest IPv4/IPv6 router
  - NAT64 and DNS64
- AES encryption
  - Software, may use hardware acceleration
- Network sniffer
- Frequency hopping protocol
  - Needed for sub-GHz legal requirements
- Portable duty cycling (ContikiMAC, Drowsie)
- WebSocket protocol
- Nicer UDP and TCP socket APIs



# Thingsquare Code

The screenshot shows the Thingsquare Code website. At the top is the Thingsquare logo and navigation links for Technology, News, and Company. The main heading is "Thingsquare Code" in large, bold black letters. Below it is the tagline "Program the Internet of Things" and a subtext "Write code in your browser, compile in the cloud, upload instantly to your devices". A large, tilted image of a computer monitor displays a C code snippet for a blink process. The code includes comments in Italian and functions like `PROCESS_THREAD`, `PROCESS_BEGIN`, `while` loop with `static struct etimer`, `etimer_set`, `PROCESS_WAIT_EVENT_UNTIL`, `leds_on`, `leds_off`, and `PROCESS_END`. A "Take the tour" button is positioned below the code. At the bottom of the browser window, a status bar shows the URL `http://thingsquare.com/` and a message: "Discussions not available on http://thingsquare.com/".

thingsquare Technology News Company

# Thingsquare Code

Program the Internet of Things

Write code in your browser, compile in the cloud, upload instantly to your devices

```
PROCESS_THREAD(blink_process, ev, data)
{
    PROCESS_BEGIN();
    PROCESS_THREAD(blink_process, ev, data)
    {
        while(1) {
            static struct etimer et;
            etimer_set(&et, CLOCK_SECOND);
            PROCESS_WAIT_EVENT_UNTIL(etimer_expired(&et));
            leds_on(LEDS_ALL);

            etimer_set(&et, CLOCK_SECOND);
            PROCESS_WAIT_EVENT_UNTIL(etimer_expired(&et));
            leds_off(LEDS_ALL);
        }
    }
    PROCESS_END();
}
```

[Take the tour](#)

Or scroll down to read more

Discussions not available on <http://thingsquare.com/>