



WHY ARE WE CREATING **ONE** **MORE** IOT PLATFORM?

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C . E . S . A . R



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Consultant

Researcher

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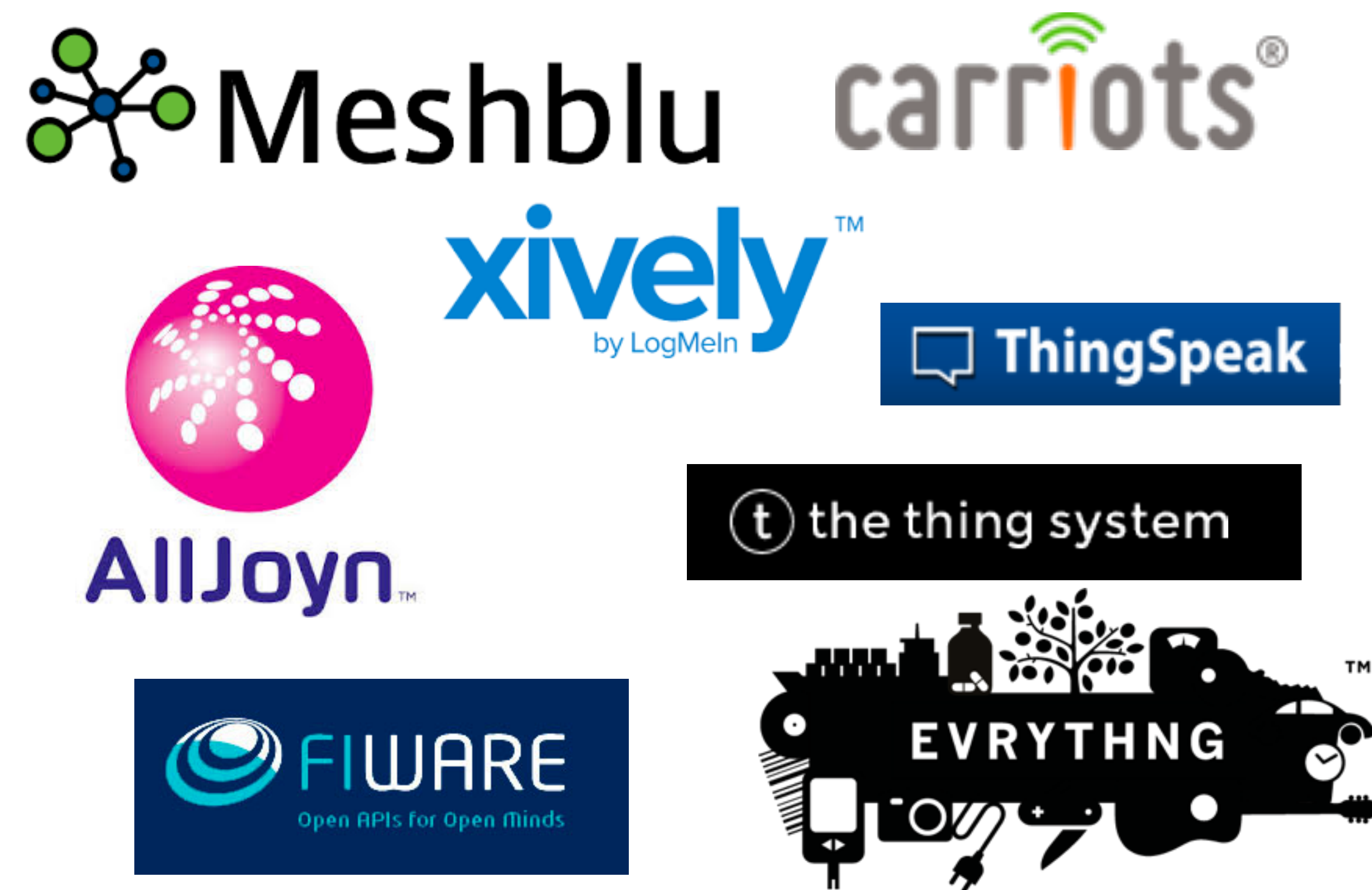
current platforms for the

INTERNET

of things

current platforms for the internet of things

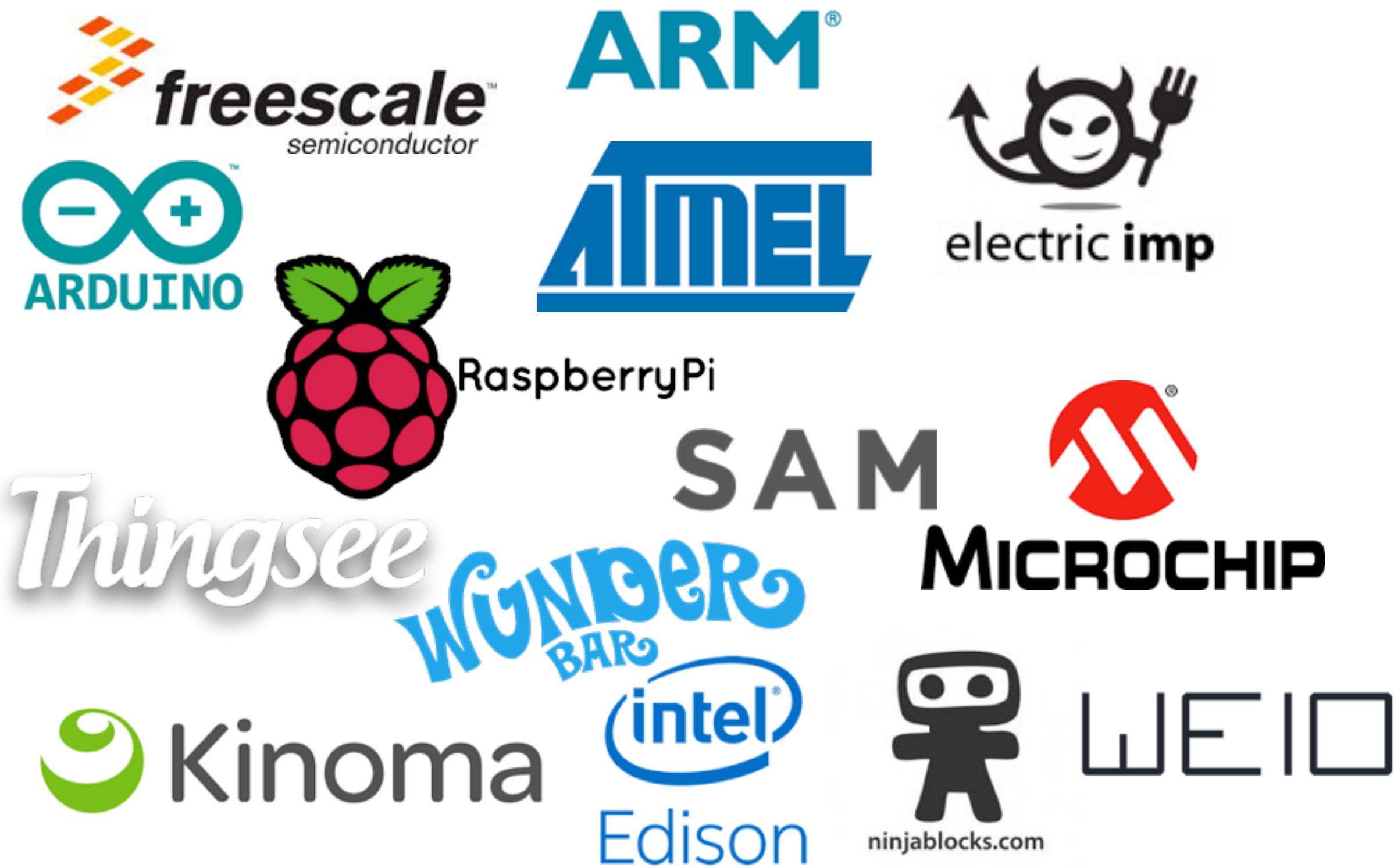
software



**cloud services for exchange device's
data**

current platforms for the internet of things

hardware



**wireless MCUs + sensors for
developing your application**

complexity



Applications (Verticals)

Personal Devices	Lifestyle	Connected Home	Industries	Industrial Internet
Wearable Computing pebble, cookoo, rucon, AUGMENT, i'm, IDEYE, GLASS, RINGLY, striiv, APX, MOTA, OpenSense, M, wearable intelligence, VUZIX	Sports SOLI, Brain Sentry, BIKESPIKE, biometrics, ZEPP, InfoMotion, swingbyte, HAMMERHEAD	Automation Quirky, Radiator Labs, netatmo, LEVITON, SmartThings, Ubi, nest, LIFX, gecko, WeMo, CRESTRON, smarthome, OLUTRON, HUE, ecobee, AdvancedLumenics, vivint, SAVANT, vera, INSTEON, CHAMBERLAIN, PRO, LIGHT, SENSORY, somfy	Retail bytelight, euclid, proximity, SWIRLO, mahana, GIMBAL, PERCH, BONI, PassKit, M	Robotics Double Robotics, ALDEBARAN, HARMONY, YENEX, ROBOTEX, EMPIRE, iRobot, KUKA, VEX, ABB, LIQUID ROBOTICS, jibo
Fitness GARMIN, JAWBONE, HISFIT, VALEN, BASIS, fitbit, TOMTOM, LifeBEAM, wahoo	Cooking Smart Die Scale, ANOVA, drop, blossom, iDevices, THE ORANGE CHEF CO., paritry, nomiku	Monitoring lapka, sense, birdi, BlueMaestro, SUPERMECHANICAL, knet, CUBESENSORS, tado°, leeo, ambient	Payment/Loyalty Square, shopify, PayPal, ACS, VeriFone, LevelUp, belly, DUKU, payleven, con	Drones/Aerospace 3DR, KML, cyphix, Airware, SKYCATCH, spire, Parrot Skybotix, DJI
Health LUMO, nanowear, VESSEY, kinsa, HAPIfork, soundhawk, SPIRE, Withings, QUANTTUS, Lively, SCARAB, mc10, Blueanatomy, hello, AliveCor, iHealth, remee, melon, corventis, TELCARE	Pets Whistle, PetPace, pintofeed, PetHub, Petcub, tractive, Petnet, gibi, PetChatz, BISTRO, haytag, FitBark	Security HomeMonitor, canary, ring, dropcam, butterflye, Lockitron, August, SCHLAGE, RAVEN, Kwikset, globesense, genie, UNIK, GOJI, scout, SmartAlarm, KeyFob, SimpliSafe	Healthcare VISI, Senseonics, STANLEY, AccuVx, VITALITY, MedMinder, TeleTracking, MedSignals, AdhereTech, VERSUS, CENTRAK, intelligent, Sotera, iKeyGen	Green tech BigBelly, enlightened, Smart, enevo, compology, AMPY
Family FILIP, Sproutling, ovuline, AmberAlert, greatcall, Good Night Lamp, menbaby, OWLET, Secur, BELLABEAT, mimo, Glow, pocketfinder	Toys KAROTZ, UBOOLY, MAKIES, aforms, seebo	Tracker Chipolo, Linquet, locca!, TrackR	Automotive Zobie, nix, INRIX, navdy, DELPHI, Airbiquity, dash, waze, OpenXC	3D Scan/Print MakerBot, dp, Stratasys, HUREL 3D, formlabs, M3D, printbot, FUEL3D, AIB, NEXTENGINE, RepRap, MATTER, FDM, VFAB, Ultimaker, occipital, DAVID, FSLD, Solidoodle
	Music/Art/Video ROLI, CATCH, GoPro, narrative	Hub Homey, Control, Lowe's, NEXIA, revolv, muzzley, NINJABLOCKS, zonoff, wink	Infra-structure wavelink, iBeam, KIST, Johnson Controls, Trimble, Robin, Schneider Electric	Smart Grid GRIDNET, SMART GRID CLUSTER, e-on, Silver Spring, Itron, Trilliant
	Garden plantlink, BITPONICS, rachio, EDYN, Greenbox, Koubachi		Agri-culture AIRBUS, adapt-N, Zed, Ag Leader	Asset Tracking asap, vloc, MESHSYSTEMS, Bosch, elohau, RACANT, Flextronics, Viasat, Impire, CUBIC, assetracks, Apply

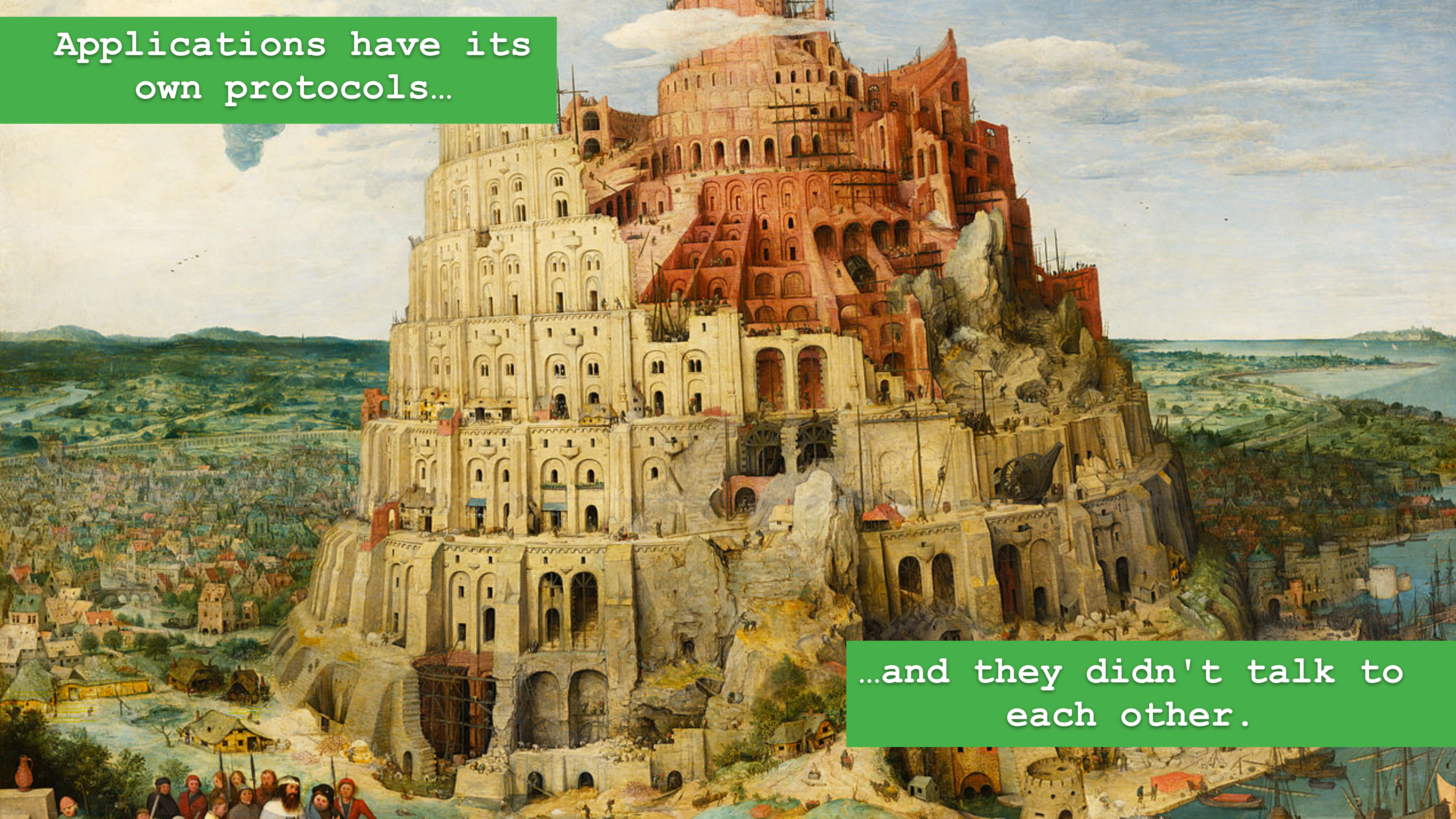
Platforms & Enablement (Horizontals)

Connectivity/Dev Platforms	Software/Data Platforms	Open Source Platforms	Sensor Networks	Personal Interfaces	Security	Corporates
spark, kynetx, pinoccio, ioBridge, electric imp, Ayla Networks, EUROTECH, resin.io, Symplic, TESSEL, bluecity	EXOSITE, icontrol, Lhings, ConnectHQ, NewAer, BERG, Axeda, Yaler.net, RacoWireless, SpaceCurve, IFTTT, greenWAVE, wot.io, ZATAR, Cyberlighting, allux, Yo, ThingWorx, DN2K, X, geopower, IOTO, thingful, CANDI, bugswarm, TempolQ, evercam.io, covisint, Jasper, Grovemade, ETHERIOS, PubNub, SensorCloud, xively	webinos, openHAB, ThingSpeak, SAFECAST, placemeter, Motionloft	NeuroSky, Layar, wit.ai, LEAP, gestigon, Speech, THALMICLABS, INTUIGINE, api.ai, EMOTIV, Makubla, Reemo, Oculus	inside, SafeNet, utimaco, escrypt, gemalto, BASTILLE NETWORKS, MQCANA	amazon, hp, LG, intel, htc, PHILIPS, IBM, SAMSUNG, Google, WIND RIVER, MOTOROLA, belkin, DELL, BOSCH, NATIONAL INSTRUMENTS, ARM, LogMeIn, Microsoft, Honeywell, SONY, Atmel, SIEMENS, QUALCOMM, CISCO, TOSHIBA, SHARP	

Building Blocks

Protocols	M2M Networks	Portable WiFi	Telecom	M2M	Cloud	Mobile	Processors/Sensors	Parts/Kits	Services	Incubators	Funding	Distribution
Bluetooth, Weaved, MQTT, ZigBee, oMA, 2G, 3G, 4G, LTE, CoAP, 6LoWPAN, LWM2M, BITXmI	Helium, SIGFOX, KORE, stream, aeris, HACKEEN, M2M	Open Garden, GOODSPEED, BRCK, Karma	at&t, boostmobile, Verizon, T-Mobile, Sprint, US Cellular, Vodafone, airtel	Pskick, QuSmart, Wireless, seed, arkessa, enocean, ecanais, Numalink, GainSpan, Wozyn, Telit	Google Cloud Platform, amazon, redhat, ORACLE, Microsoft Azure	iOS, Windows Phone, BlackBerry	ARDUINO, WEIO, Petajense, mCube, beagleboard.org, ESPRIMO, MEMS, freescale	Makey Makey, SAM, ready mate, littleBits, TinkerForge, WONDER	MY MINI FACTORY, dragon, makexyz, sculpteo, Adafruit, CIRCUIT	Highway1, LEMOS Labs, WEARABLE WORLD, R/GA Accelerator, TechShop	KICKSTARTER, indiegogo, MedStart	angelcam

Applications have its
own protocols...



...and they didn't talk to
each other.

the internet of things

“It is very difficult to have a unique standard for IoT as we have for the WWW, with HTML and browsers. The THINGS in IoT are so different and the applications as diverse that many standards and protocols will coexist.”

current platforms for the internet of things

devices

apps

platform

CESAR efforts on

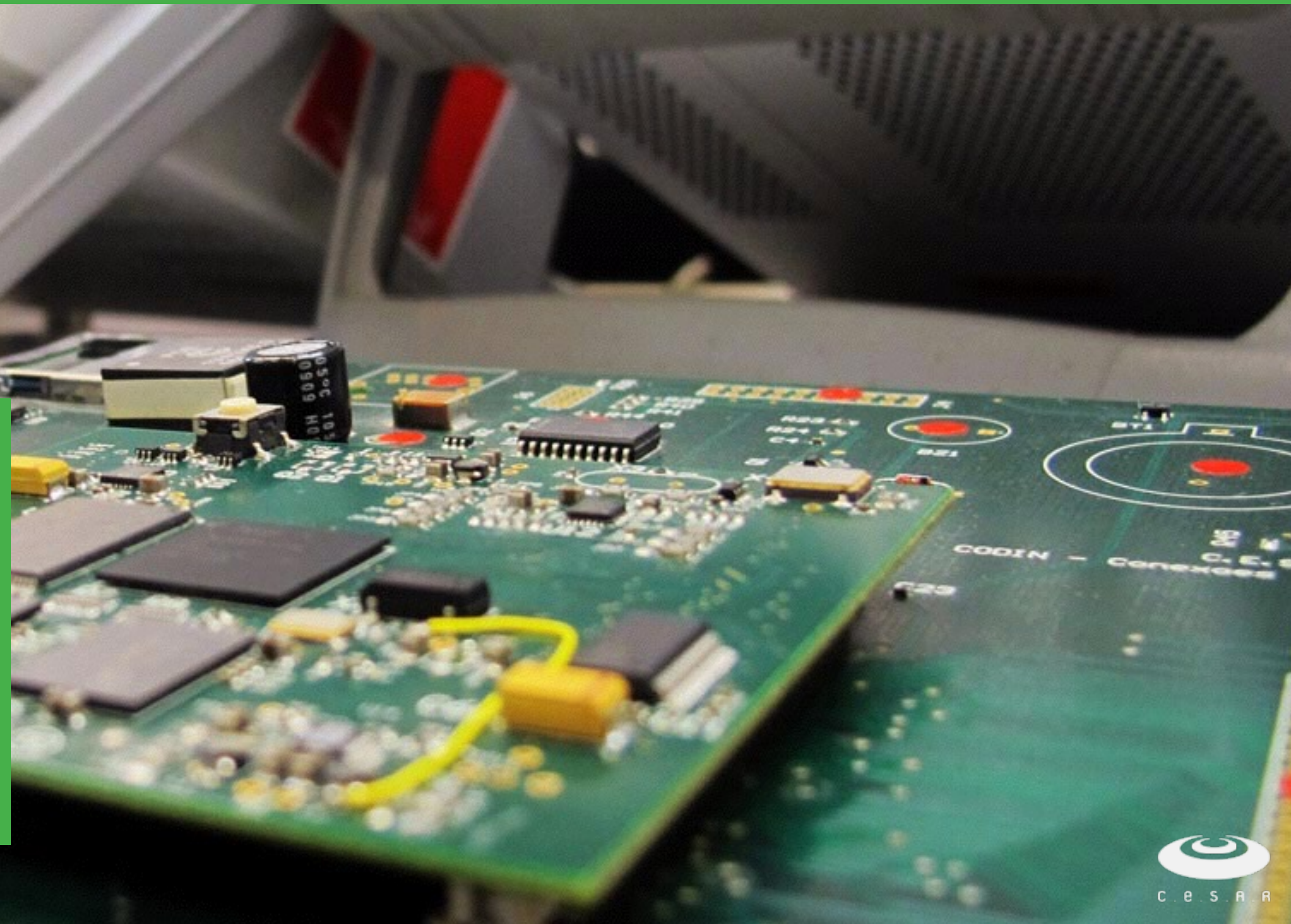
THE INTERNET **of things**

CESAR IoT Research Lab

Promote knowledge in IoT internally by creating prototypes for problems or opportunities identified by CESAR.

CESAR IoT Research Lab

- © power & energy
- © smart cities
- © connected cars
- © agribusiness
- © industrial IoT



CESAR IoT Research Lab





KNoT
KNoT Network of Things

but...





We are **not** creating **one
more** IoT platform!





KNoT

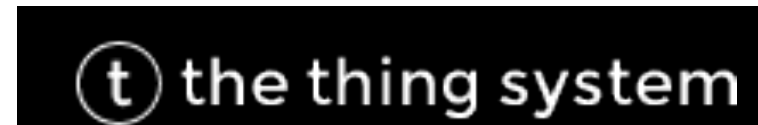
KNoT Network of Things

meta platform for IoT

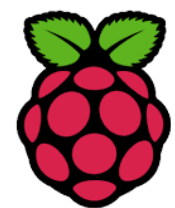
bridging the gap between existing platforms
made on top of them

IoT platforms

software



SAM



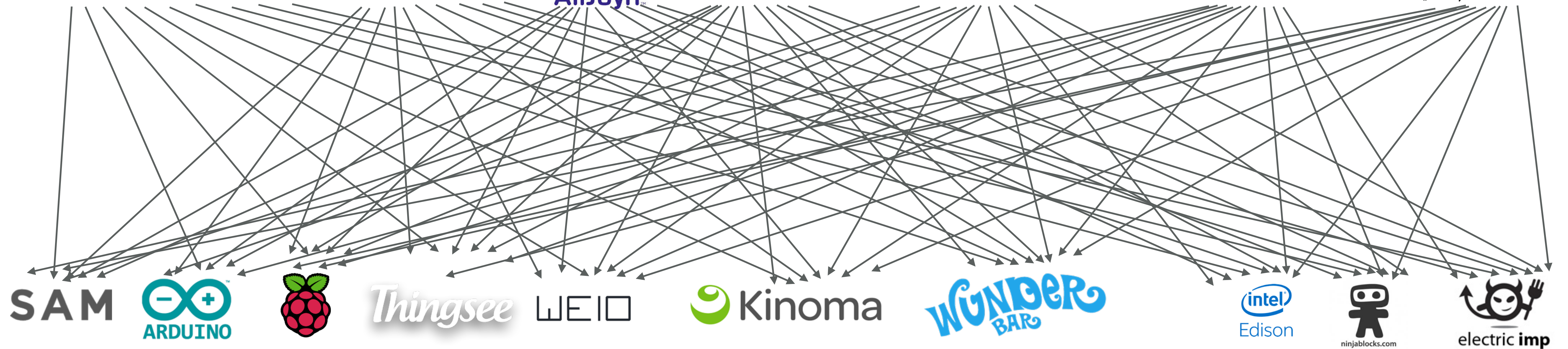
Thingsee



hardware

IoT platforms

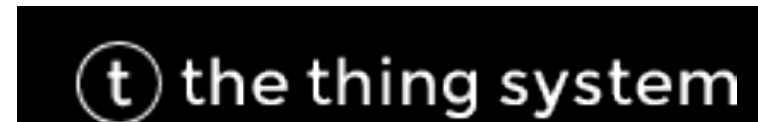
software



hardware

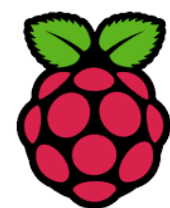
IoT platforms

software



KNoT
KNoT Network of Things

SAM



Thingsee



hardware

IoT platforms

software



KNoT
KNoT Network of Things



hardware



KNoT
KNoT Network of Things

**open source, hardware &
software**



KNoT
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multi protocol

for the physical (multi radios), data link, transport
and network layers



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end to end

from the device to the app, crossing radios and
gateways



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data sharing by space and time

"to share the data only on monday, 2pm to 3pm"



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KNoT Network of Things

semantic data model

applications will know the data type of each other



KNoT
KNoT Network of Things

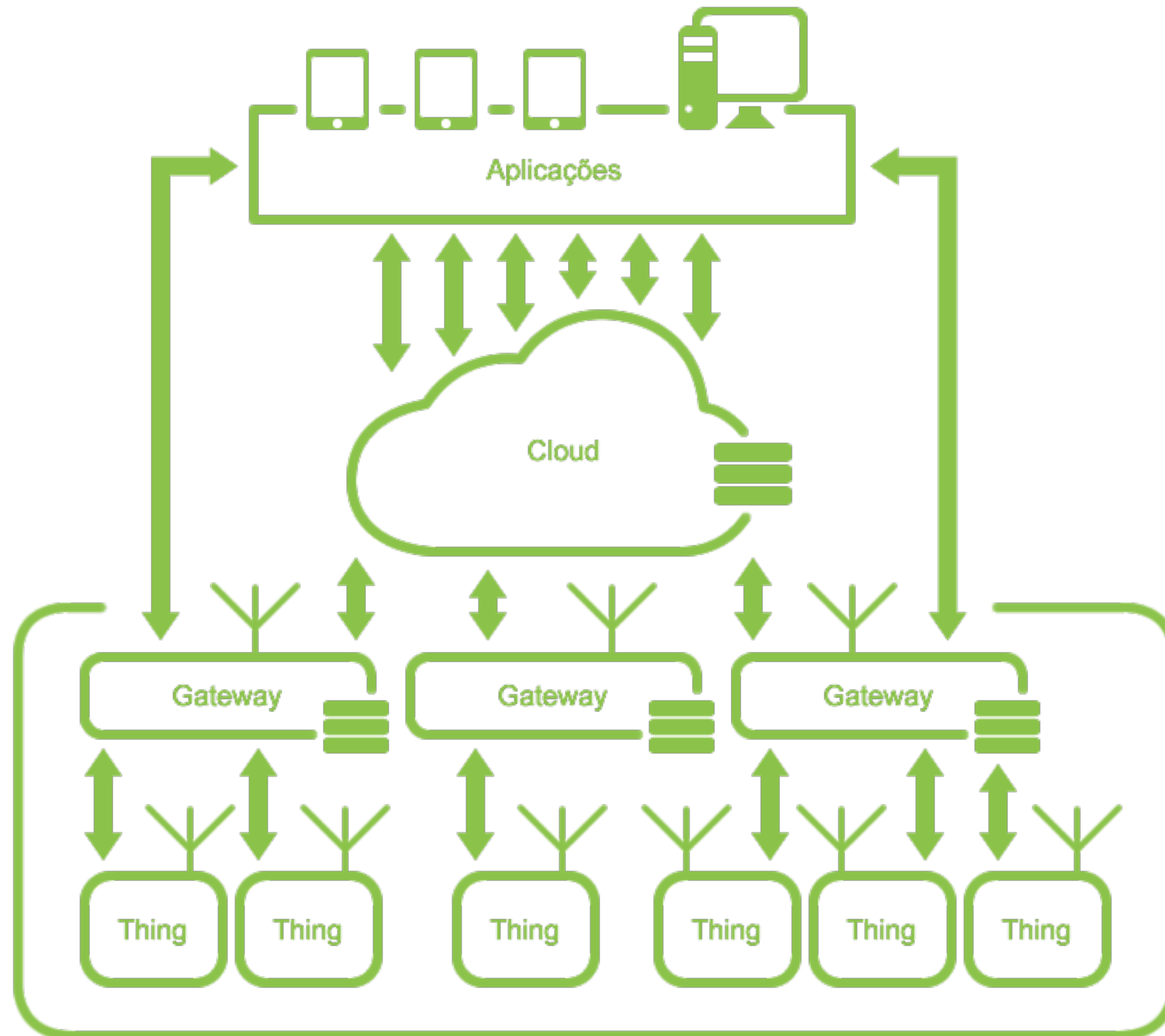
distributed cloud

a distributed system can handle billions of devices

Architecture 1.0



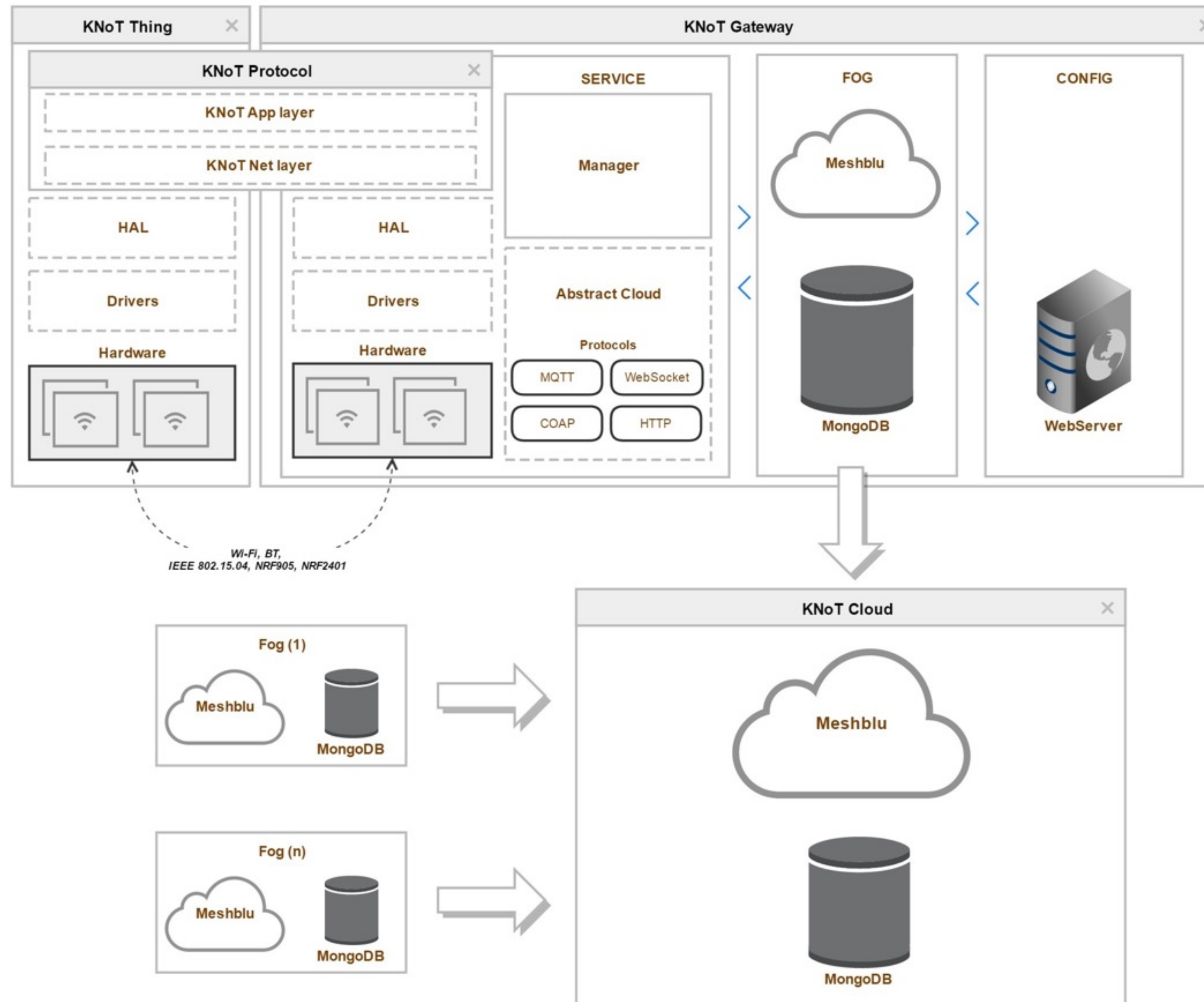
KNoT
KNoT Network of Things



Architecture 1.0



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KNoT Network of Things





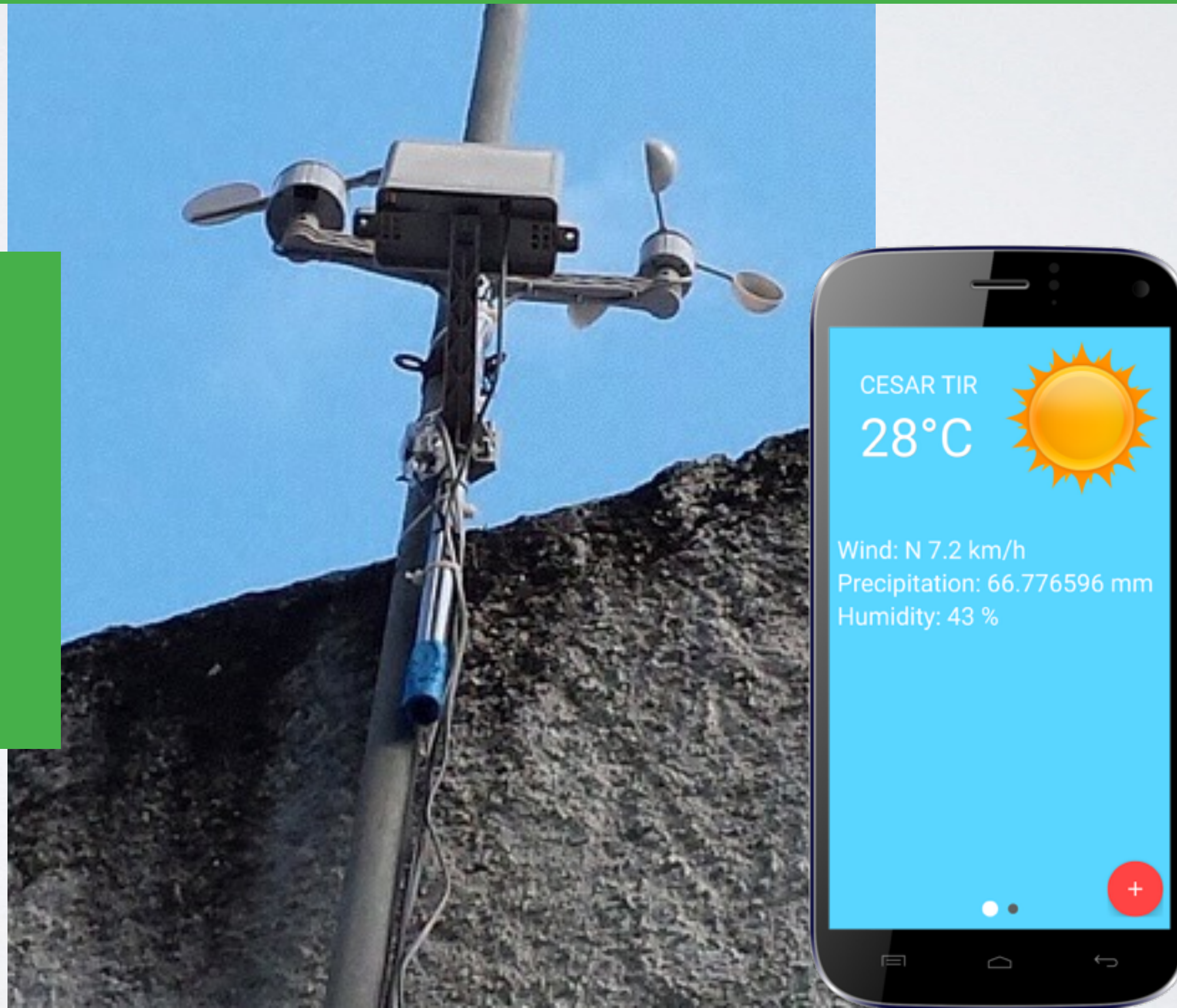
internet of things

experiments

experiments

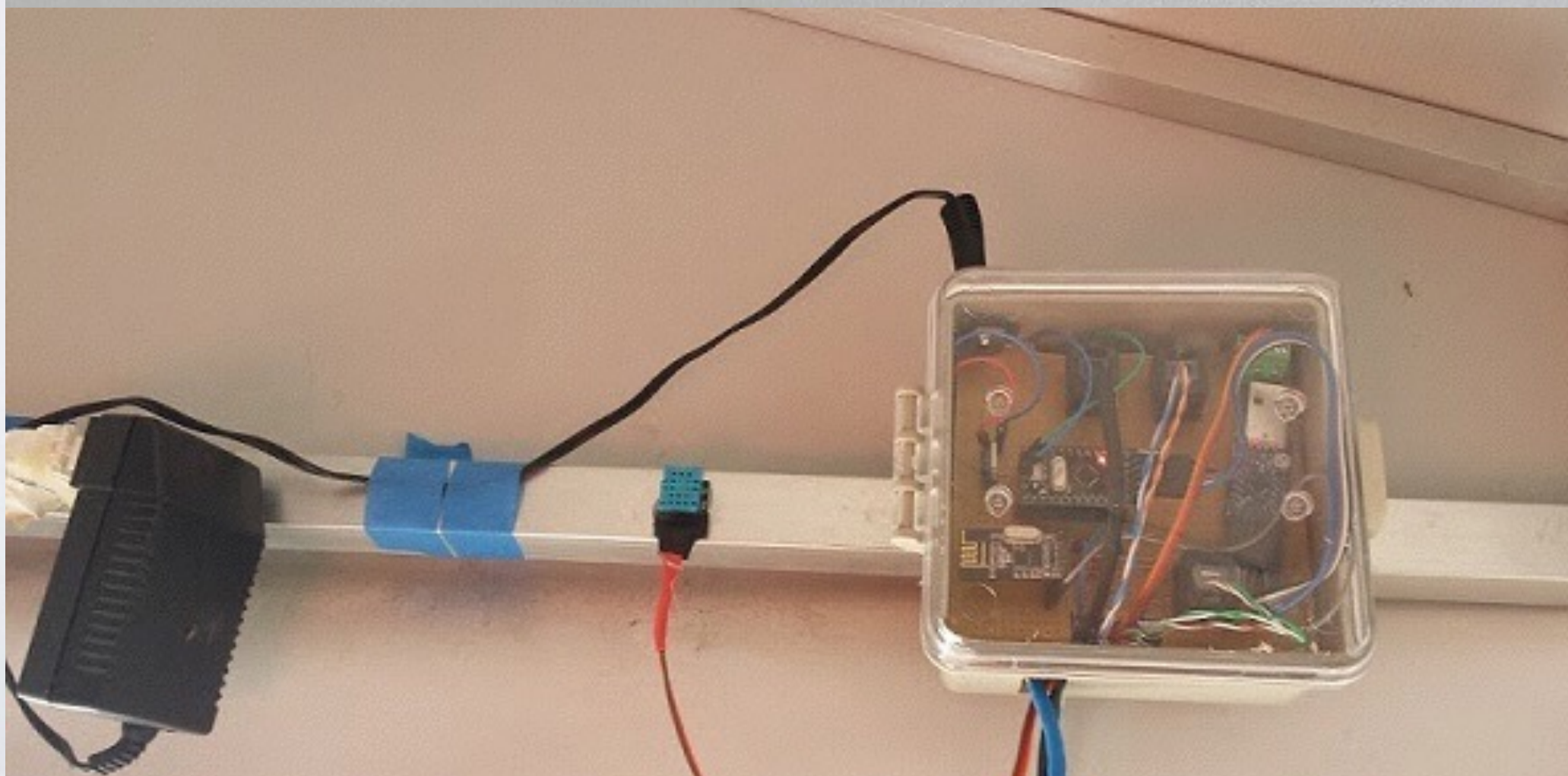
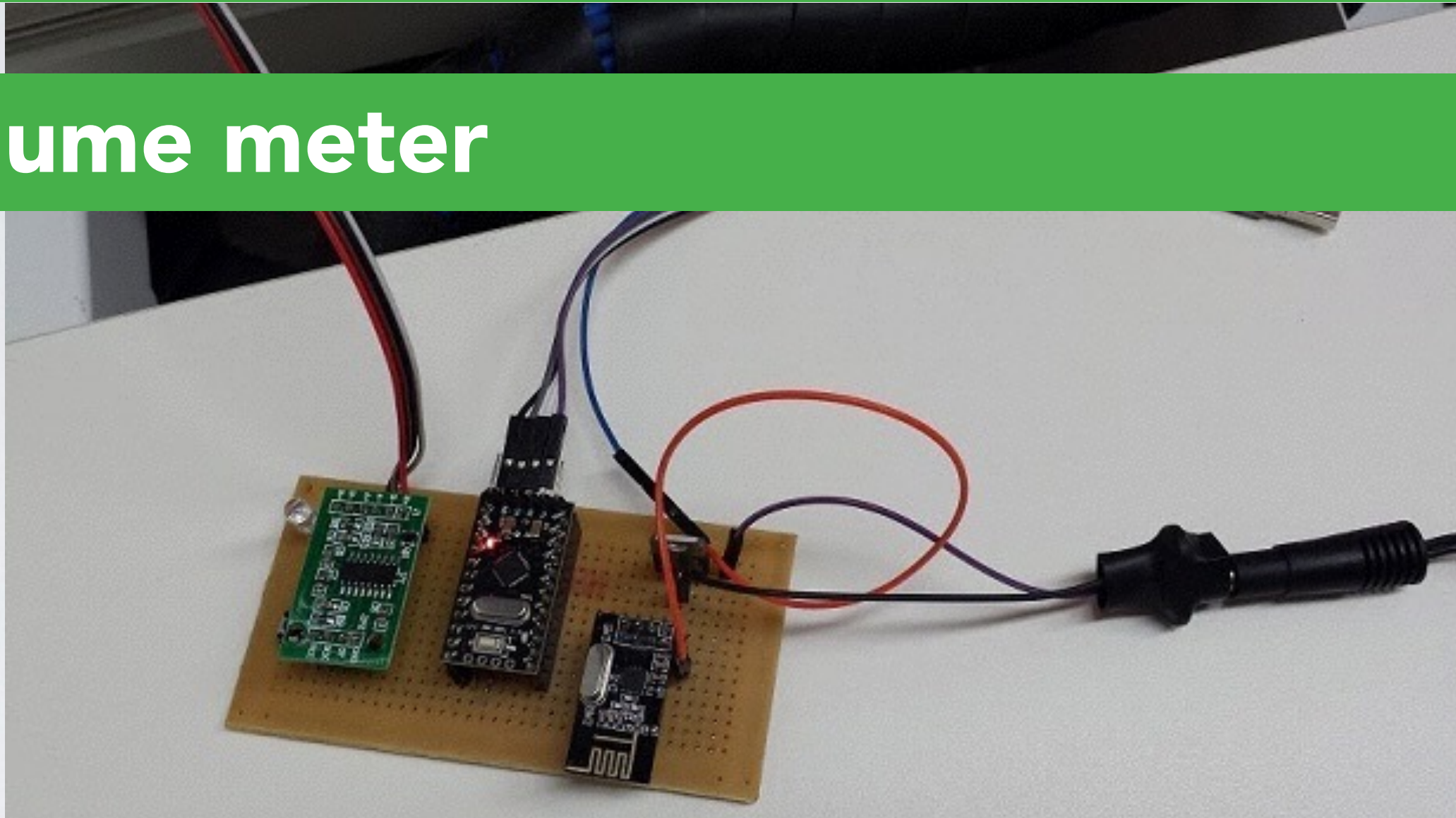
weather station

we are developing a weather station that will be integrated to the Irrigation Monitor.



experiments

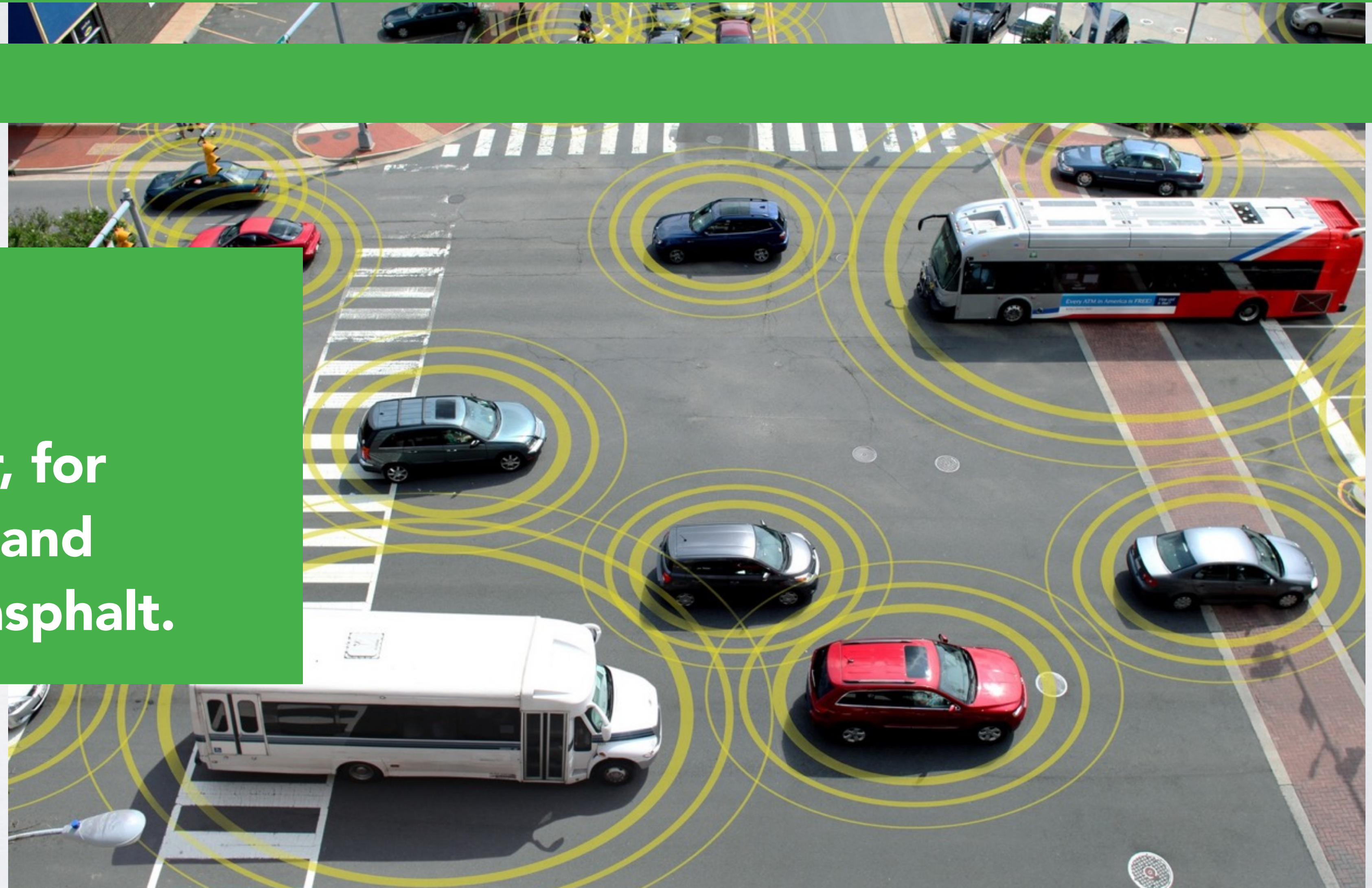
water volume meter



An experiment for measuring water volume of a drinking fountain. It will be used to measure volume of gas on pressurized cylinders.

experiments

connected cars



S.A.M.B.A

A prototype, that is embedded in the car, for monitoring flooding and irregularities in the asphalt.

internet of things

cases

CASE

Irrigation Monitor

How to improve performance on agriculture, having control and tracking on the central pivot for irrigation?

A service for monitoring central pivots based on the needs and restrictions of infrastructure and connectivity that exist inside the country.

<http://www.monitordeirrigacao.com>

CASE

Smart Metering

Technical specification of a Brazilian protocol for automatic and remote data collection of residential and industrial electricity consumption.

It promotes waste reduction and increased operational efficiency.

[illegible]

Thanks!

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