

Remote Monitoring and Control of Engine Block Heaters in Northern Winters

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President / Co-founder



Company Overview

- Inico Technologies Ltd.
- Founded 2007, Calgary AB
- Core business:
 - Embedded industrial devices
 - Development and sales of industrial controllers / RTUs
 - Remote monitoring and control
 - Contract R&D

Engine Block Heaters

- Warm up engine for better start in cold climates



Typical Parking in Scandinavia



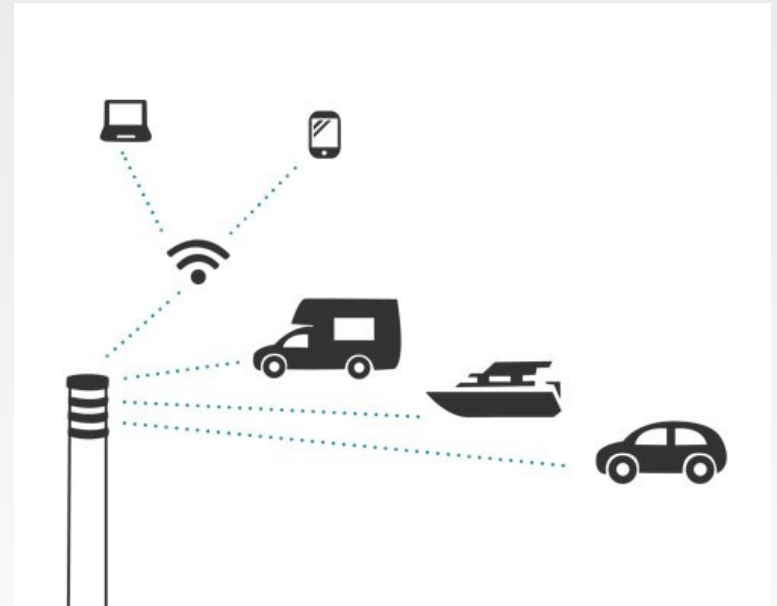
Parking lot concerns

- Wasteful use of energy
 - e.g. car plugged in whole night
- Unauthorized use of sockets
- Monitoring/feedback of heating
- Ability to pay per use
- Electric car charging

- Current target market is Northern Europe / Scandinavia
 - Car heating culture provides market advantage

Product concept

- Networked controller in each socket post
- Cell phone App
- Administrator PC interface
- Other uses
 - Camping / trailer
 - Marina / boat
- Currently being installed in Finland



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Socket Post

- Aluminum extrusion
- LED illumination
 - Localized lighting for cord handling
 - Blink for car location
- Push button for manual operation
 - Light ring for indication
- 2- or 4-socket setup



Parking Lot Topology

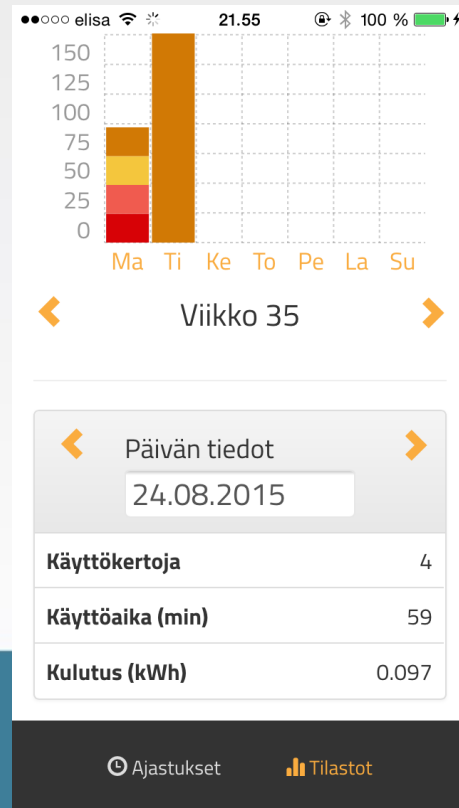
- Gateway device
 - Wi-Fi
 - 3G / LTE
- Surrounding posts connect to gateway
 - Wireless IEEE 802.15.4
 - IPv6 / 6LowPAN
 - Mesh networking
 - Extended range
 - Connect around obstacles
- Parking lot may have several gateways: **Zoning**

User Features

- Select “ready time”
 - Automatic calculation of start time
 - Duty-cycling according to outside temperature
 - Detection of heater wattage
 - Current curve analysis to estimate block temperature
- Hold warm until unplugged
 - Energy-efficient power delivery
- Multiple schedules supported
- Energy use monitoring
- Local timer through push button

Smartphone App

- Program schedules
- One-shot activation
- Energy use monitoring



Embedded controller features

- ARM Cortex-M4 CPU
- Wi-Fi: IEEE 802.11 b/g n
- WPAN: IEEE 802.15.4 + 6LowPAN
- Chip antennas
- RTC: Super-Cap backup
- LED power: 2 Amp, 2 channels
- Relays: 240VAC, 16A
- RS232 Modem / debug port



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Technical challenges

- IEEE 802.15.4 / 6LowPAN
 - Range / obstacles → Mesh networking
 - Throughput → UDP messaging, binary encoding
- Firmware update
 - Local or remote upgrade of Gateway
 - Automatic propagation to other posts
- Failsafe behaviour
 - Normally-closed contacts
- Standalone use
 - Embedded Web Server / HTML interface
- Maintenance access
 - RS232 cable access to HTML interface

Questions?

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