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Creating a Cat Tracker Using the TinyDuino Platform

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IoT – Internet of Things (MTE7117)

Agenda

- ▶ Project Goals
- ▶ Implementation Steps
- ▶ Results
 - ▶ GPS / SD
 - ▶ WiFi / MQTT
- ▶ Discussion

Project Goals

- ▶ Use the TinyDuino platform to create a miniature GPS tracker for cats.
- ▶ The GPS board continuously transmits NMEA messages.
- ▶ These messages are parsed and GPS co-ordinates are stored using the SD board.
- ▶ When the cat returns, the WiFi board connects to the home network.
- ▶ The co-ordinates are read from the SD card and published to an MQTT broker.
- ▶ While connected to the network, a status is published as well
- ▶ A SIOT dashboard visualises the co-ordinates.
- ▶ The Raspberry Pi LED matrix displays an icon when the cat is in WiFi range.

Implementation Steps

- ▶ Outlined in report
- ▶ Order & assemble TinyDuino
- ▶ Implement first sketch
- ▶ Read & parse NMEA messages
- ▶ Store data to SD card
- ▶ Connect to WiFi network
- ▶ Publish sample MQTT message
- ▶ GPS & WiFi libraries cannot be loaded simultaneously
- ▶ Occasional problems with SD storage

Results – GPS / SD

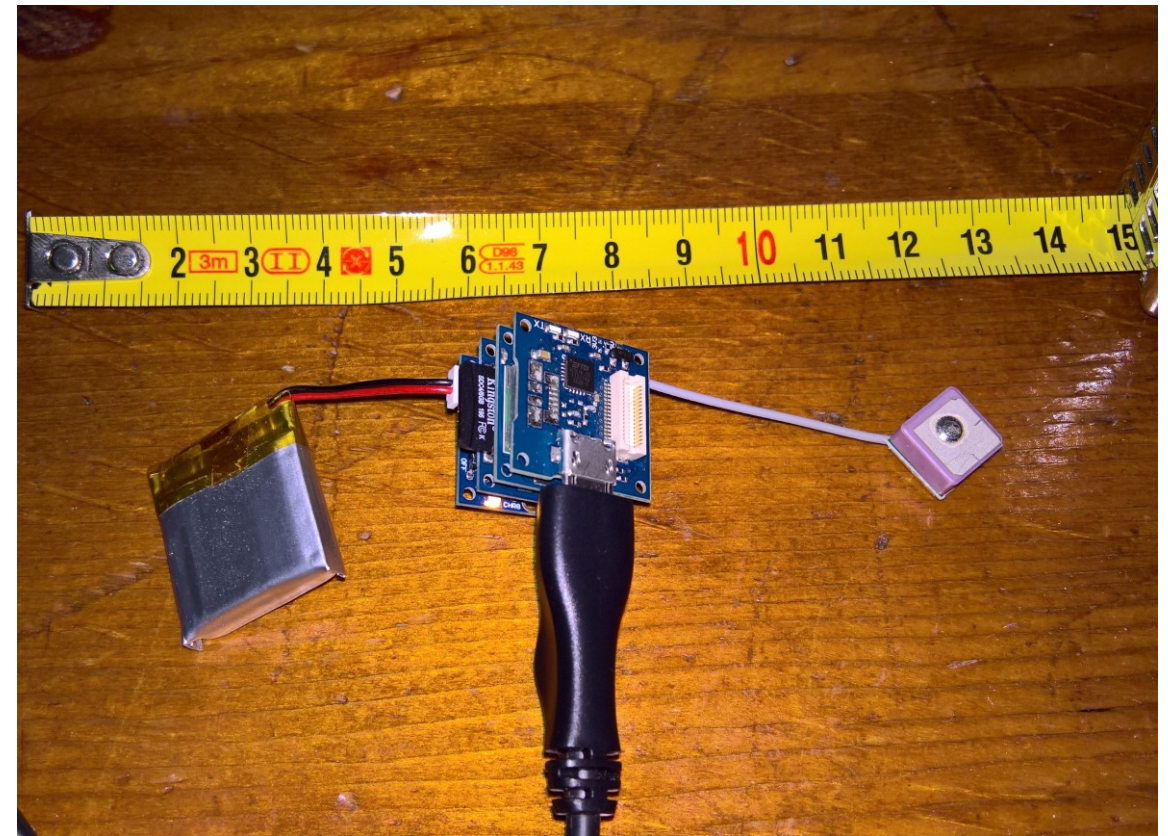
- ▶ Partial success
- ▶ <https://github.com/StrubT/IoTCatTracker>
- ▶ Continuously read GPS NMEA messages
 - ▶ Read for 10 seconds at a time
 - ▶ Optionally switch of GPS board to save energy
- ▶ Parsing of messages included in library
- ▶ Print co-ordinates to serial port
 - ▶ Print statistics to detect problems
- ▶ Write co-ordinates to SD card
 - ▶ Occasional problems with SD storage
 - ▶ Program may freeze – no possibility to recover

Results – GPS / SD

Results I

- ▶ Processor, SD, GPS & USB boards
 - ▶ 2x2cm
 - ▶ Plus battery & GPS aerial
- ▶ Fits in a small plastic container
 - ▶ Tic Tac / Smint
- ▶ GPS co-ordinates stored in CSV file
- ▶ Can be removed easily and read on PC

TinyDuino Setup



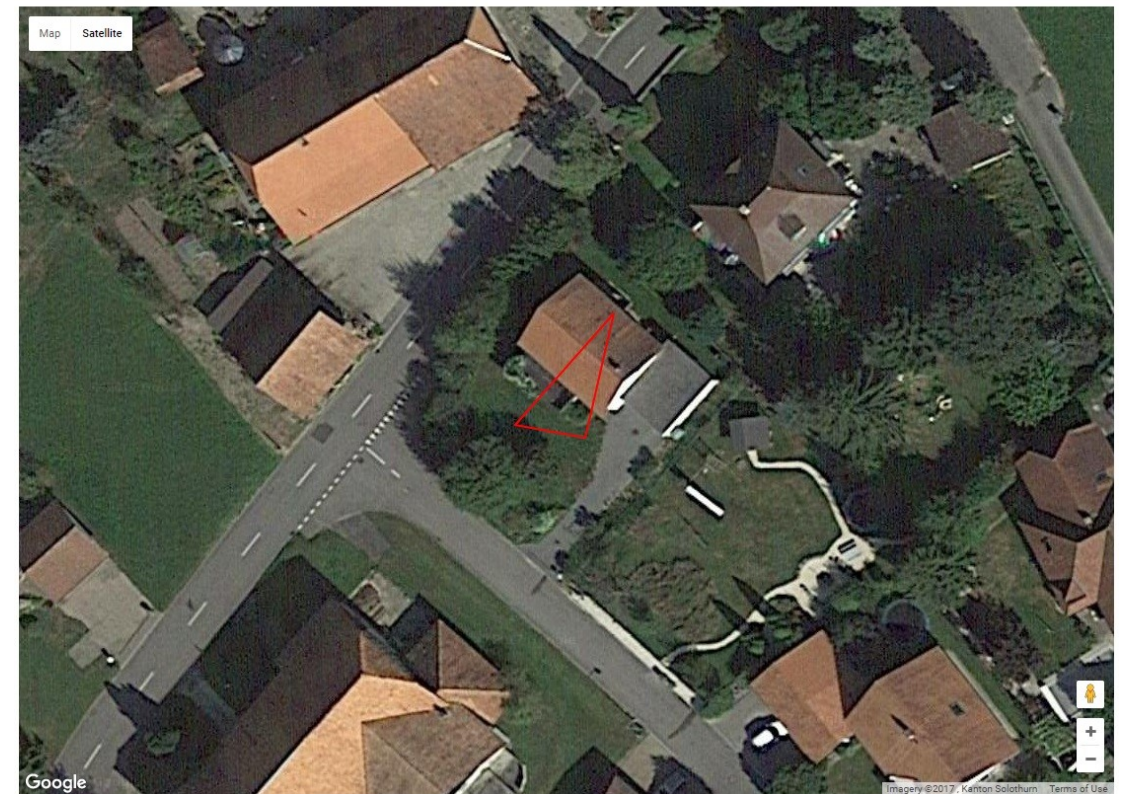
Results – GPS / SD

Results II

- ▶ Backup option
- ▶ Web page to visualise CSV file
- ▶ Co-ordinates printed on Google map

Visualiser Output

Visualise GPS Positions

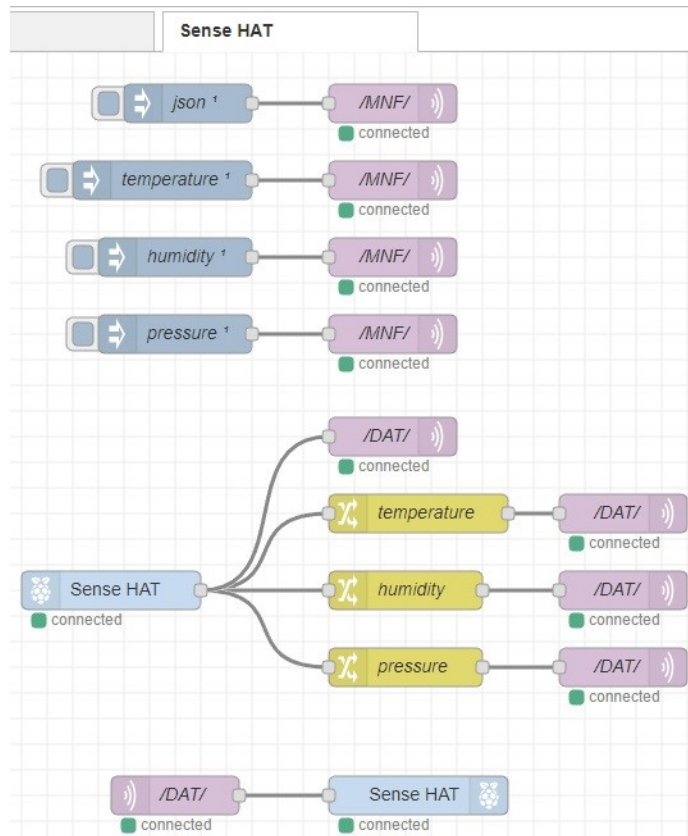


Results – WiFi / MQTT

- ▶ Partial success
- ▶ <https://github.com/StrubT/IoTCatTracker/tree/feature/wifi>
- ▶ Connect to WiFi network
- ▶ Connect to MQTT broker
- ▶ Publish MQTT message
 - ▶ JSON message proven earlier
- ▶ SIOT centre down

Results – WiFi / MQTT

Node-RED Flows



Sensor Manifest

```
{
  "name":          "environment",
  "type":          "sensor",
  "zone": {
    "name":        "raspberrynodered",
    "guid":        "...",
  },
  "description":   "Node-RED",
  "valueType":     "json",
  "jsonMapping": {
    "temperature": "float",
    "humidity":    "float",
    "pressure":    "float"
  }
}
```

Discussion

- ▶ Did not fully achieve goal
- ▶ Did not properly test solution
- ▶ Did complete two PoC
- ▶ Limited code memory
 - ▶ TinyCircuits recently introduced better components
 - ▶ Larger libraries required
- ▶ Limited data memory
 - ▶ Only three global variables
 - ▶ Additional flash board available
- ▶ Unstable SD storage