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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

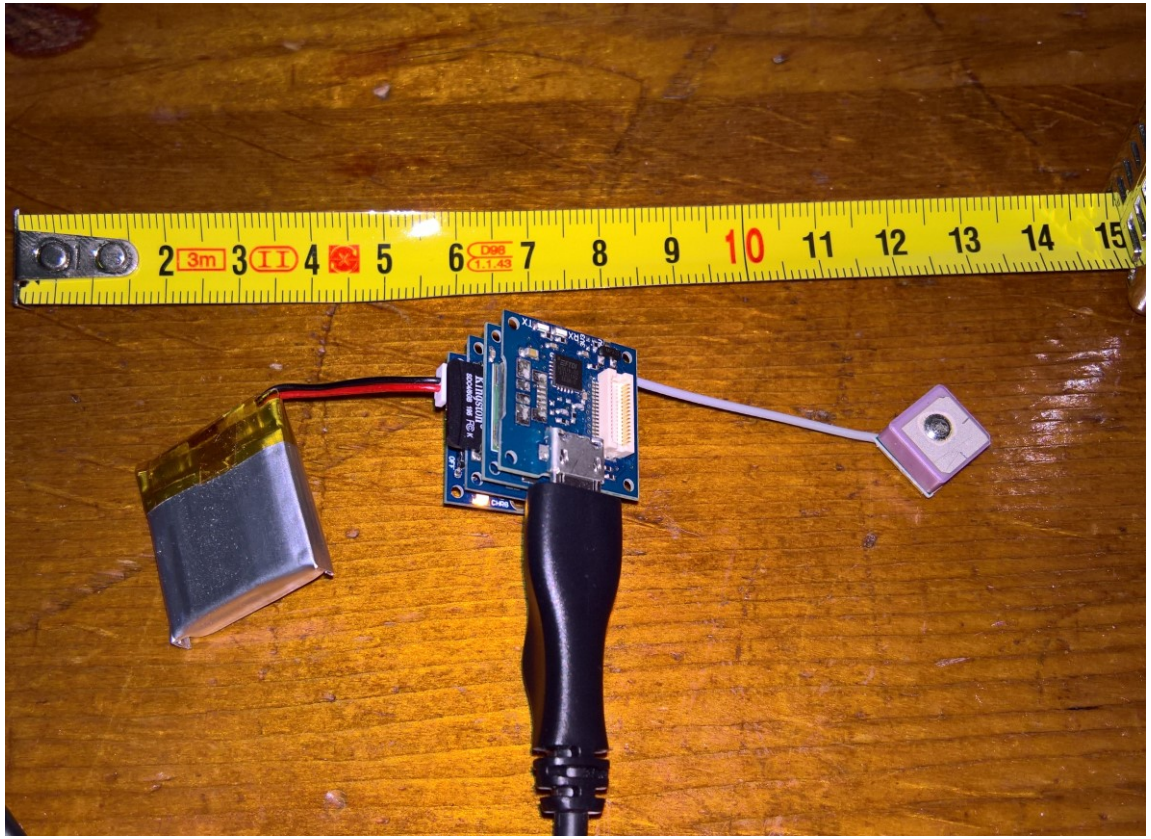
- Continuously read GPS NMEA messages
  - Read for 10 seconds at a time
  - Optionally switch of GPS board to save energy
- Parsing of messages included in library
- Print co-ordinates to serial port
  - Print statistics to detect problems
- Write co-ordinates to SD card
  - Occasional problems with 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

Results – WiFi / MQTT

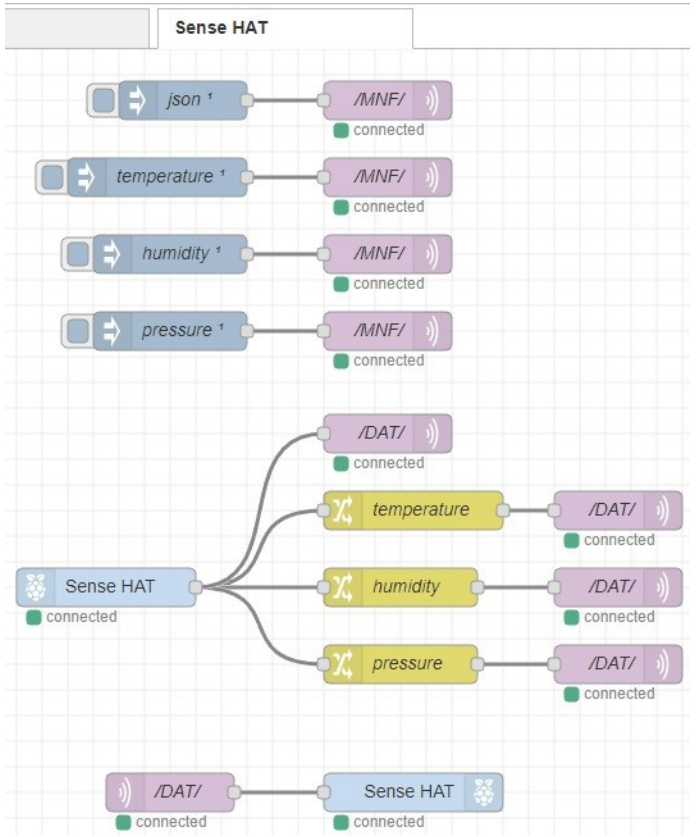
- Partial success
- https://github.com/StrubT/IoTCatTracker/tree/feature/wifi

- 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 PoCs

- 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