Coupling Microscopic Mobility and Mobile Network Emulation for Pedestrian Communication Applications

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Outline

CrowNet

Emulation Extension

Architecture

Performance Measurement

Demo

Conclusion
CrowNet (Crowd Network)\(^1\)

- Combines pedestrian locomotion simulation with wireless communication simulation.
- Pedestrians (nodes) exchange position beacons.

\(^1\)[https://crownet.org/](https://crownet.org/)
CrowNet Emulation Extension

▶ Developing a network emulation extension of the CrowNet Framework.
▶ Exchange of beacons and mobility data between simulation and real devices.
▶ Coupling of mobile Android applications.
▶ Motivations:
  ▶ Test mobile applications in pedestrian communication scenarios.
  ▶ Demonstrate the application.
  ▶ Enable user-studies.
Extension Architecture (1/3)

**OutboundEmulation**  Receives position beacons from other nodes and forwards them to the coupled device.

**NodeLocationExporter**  Sends the position of one node to one coupled device to spoof its location.

**InboundEmulation**  Receives position beacons from coupled devices and forwards them to emulated nodes.

Communication with the coupled device: IP/UDP + ProtocolBuffers
Figure: Structure of a generic node and node[0], serving as emulation bridge.
Figure: Flow of mobility data between Vadere, the simulated nodes, and the coupled app.
Performance Measurement

(a) Overview

(b) Detailed view of 80-115s for 4-6 nodes

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Demo

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Conclusion

- Extension of the CrowNet framework allows network emulation for mobile apps using pedestrian communication.
- Number of nodes is limited by performance requirements.

Future work:
- Find performance bottlenecks.
- Integrate more data formats.

Thank you for your attention!
Source code available at
https://github.com/roVer-HM/crownet/tree/emulation_omnetsummit21