WNMA - Progetto con survey

Argomenti usando corso e slide progetti (inglese)

Device-to-Device (D2D) Communication

* Survey recent approaches enabling D2D interaction and communication in mobile networks.
* Analyze the benefits, challenges, and potential applications of D2D communication.
* Compare different D2D architectures and protocols proposed in the literature.
* Especially important inside of LTE advanced networks

Personal considerations:

* Interesting in general and has implications in the immediate and far future

 Starting material:

* <https://ieeexplore.ieee.org/document/9737127>
* <https://www.sciencedirect.com/science/article/pii/S1570870522001524>
* <https://www.sciencedirect.com/science/article/pii/S1570870522001524>

Unmanned Aerial Vehicle (UAV) Route Planning

* Survey state-of-the-art approaches for UAV route planning and navigation.
* Analyze the unique requirements and constraints of UAV route planning, such as flight dynamics and obstacles.
* Discuss different optimization techniques and algorithms used for UAV routing.

Personal considerations:

* May be difficult due to complex algorithms being involved

Starting material:

* <https://www.mdpi.com/2504-446X/8/2/51>
* <https://www.globalscientificjournal.com/researchpaper/UAV_Route_Survey_Planning_and_Quality_Control_for_Height_Measurement.pdf>

Body Area Networks (BANs) and Predictive/Behavioral Algorithms

* Survey the use of predictive and behavioral algorithms in BANs for healthcare applications.
* Investigate how BANs can leverage user data and machine learning to improve monitoring and rehabilitation.
* Analyze the challenges and opportunities in deploying BAN systems for different medical conditions.

Personal considerations:

* Interesting from the point of view of wearable technology
* Also in the context of privacy/security concerns
* Significant in terms of potential for healthcare applications

Starting material:

* <https://www.sciencedirect.com/science/article/pii/S2772918424000134>
* <https://www.researchgate.net/publication/220133776_Body_Area_Networks_A_Survey>
* <https://core.ac.uk/download/pdf/55705205.pdf>

2D Vehicular Networks (VANETs)

* Survey routing protocols and data dissemination mechanisms for 2D VANET scenarios.
* Discuss the impact of road topology and vehicle mobility on VANET performance.
* Explore solutions for efficient message forwarding and coverage in urban 2D VANET environments.

Personal considerations:

* Very interesting, since it can be applied to autonomous vehicles driving and smart cities

Starting material:

* <https://www.researchgate.net/publication/373321373_Vehicular_Ad-hoc_networks_VANETs_A_survey_on_connectivity>
* <https://iopscience.iop.org/article/10.1088/1742-6596/1427/1/012015>
* <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9856630>

2D/3D Drone Networks (FANETs)

* Survey the unique challenges and requirements of drone networks compared to traditional MANETs.
* Analyze mobility models and their impact on routing protocols in 2D and 3D drone network scenarios.
* Explore applications and services that can benefit from the integration of drone networks.

Personal considerations:

* Might be useful here to focus on specific applications (e.g. disaster response/package delivery)
* May be hard since it involves analysis of 3D scenarios

Starting material:

* <https://www.sciencedirect.com/science/article/abs/pii/S1570870512002193>
* <https://www.math.unipd.it/~dronzani/docs/seminar-fanets-2017.pdf>
* <https://www.mdpi.com/2072-4292/14/18/4459>

Seamless Communication and Pairing

* Survey techniques for achieving seamless data transfer between wireless devices without explicit pairing.
* Investigate the use of advertisement frames and other mechanisms to enable user-transparent connectivity.
* Compare solutions for different wireless technologies, such as Bluetooth Low Energy and Wi-Fi.

Personal considerations:

* Closely related to the field of ubiquitous wireless computing
* Pretty general and also pretty applicable

Starting material:

* <https://ieeexplore.ieee.org/document/558184>
* <https://dl.acm.org/doi/abs/10.1145/3581791.3596833>

Wireless Charging and Energy Management for Mobile Devices

* State-of-the-art in wireless charging technologies
* Analyze the challenges and opportunities in integrating wireless charging into mobile ad-hoc networks
* Discuss novel energy management strategies that leverage wireless charging for prolonged device operation

Starting material:

* <https://www.researchgate.net/publication/309917872_Improving_wireless_charging_energy_efficiency_of_mobile_phones_Analysis_of_key_practices>
* <https://ieeexplore.ieee.org/document/7576854>
* <https://www.researchgate.net/publication/339581330_A_Survey_on_Energy_Management_for_Mobile_and_IoT_Devices>

Personal considerations:

* This may be interesting for extending the operational time of nodes in mobile ad-hoc networks

Location-Based Services and Augmented Reality in Wireless Networks

* Survey the use of wireless technologies (e.g., WiFi, Bluetooth, UWB) for indoor localization and positioning
* Explore the integration of localization capabilities with augmented reality applications for mobile devices
* Discuss the technical challenges and potential solutions for enabling seamless AR experiences in wireless networks

Starting material:

* <https://www.researchgate.net/publication/324748144_Location-Based_Services>
* <https://ieeexplore.ieee.org/document/10007642>
* <https://core.ac.uk/download/pdf/36733557.pdf>
* <https://www.mdpi.com/1424-8220/23/3/1370>
* <https://www.inase.org/library/2014/santorini/bypaper/COMPUTERS/COMPUTERS2-37.pdf>

Personal considerations:

* This combines networking with computer vision and human-computer interaction
* Consider focusing on the networking challenges of real-time AR applications

Wireless Sensor Networks for Environmental Monitoring and Smart Cities

* Survey the applications of wireless sensor networks in urban environments for monitoring air quality, noise levels, traffic, etc
* Analyze the data collection, aggregation, and dissemination mechanisms employed in wireless sensor-based smart city deployments
* Discuss the role of edge/fog computing and the Internet of Things (IoT) in enhancing the capabilities of wireless sensor networks for smart city applications

Starting material:

* <https://www.mdpi.com/1424-8220/21/4/1172>
* <https://ieeexplore.ieee.org/document/8586819>
* <https://www.semanticscholar.org/paper/Wireless-Sensor-Networks-for-Smart-Cities%3A-Network-Khalifeh-Darabkh/437633deb0d4b66e257cb1e37780295db72b42af>

Personal considerations:

* Really interesting since Palazzi particularly cares about anything about energy consume and management

Blockchain and Distributed Ledger Technologies in Wireless Networks

* Investigate the potential integration of blockchain or distributed ledger technologies with mobile ad-hoc networks and wireless mesh networks
* Explore the use cases and benefits of blockchain-based solutions for secure data sharing, resource management, and trustless transactions in wireless environments
* Discuss the technical challenges and design considerations in adapting blockchain principles to the constraints of wireless networks.

Starting material:

* <https://www.sciencedirect.com/science/article/pii/S1110016824001704>
* <https://link.springer.com/article/10.1007/s43154-023-00101-3>
* <https://www.researchgate.net/publication/327431492_Potential_Applicability_of_Distributed_Ledger_to_Wireless_Networking_Technologies>
* <https://www.mdpi.com/1424-8220/22/11/4182>
* <https://ieeexplore.ieee.org/document/9908598>

Personal considerations:

* I studied blockchain in my bachelor, so I’m fresh on this, but it might be difficult, possibly the hardest
* This is a cutting-edge topic that combines networking with cryptography and distributed systems
* Consider focusing on specific use cases in mobile or ad-hoc networks.

Delay tolerant networking for challenged environments

* Examine DTN protocols and applications for intermittently connected networks.

Personal considerations:

* Particularly interesting in the context of distant communications, such as satellites and stuff. Interesting enough to tackle, according to my point of view

Starting material:

* <https://www.mdpi.com/1999-5903/16/4/129>
* <https://www.researchgate.net/publication/228383498_Delay-Disruption-Tolerant_Networking_State_of_the_Art_and_Future_Challenges>

Comparison of TCP variants for satellite communications

* One can compare TCP Reno, TCP New Reno, TCP Westwood, TCP Hybla and analyze their performance in satellite network scenarios.

Personal considerations:

* This topic allows for practical performance comparisons
* Consider including newer TCP variants and discussing how they address specific challenges in satellite communications, such as long propagation delays and high bit error rates

Starting material:

* <https://stem.elearning.unipd.it/pluginfile.php/651094/mod_folder/content/0/QUIC-WirelessProject.pdf?forcedownload=1>
* <https://dl.acm.org/doi/10.5555/1817770.1818232>
* <https://www.researchgate.net/publication/269253433_Performance_Evaluation_of_TCP_Variants_Over_High_Speed_Satellite_Links>
* <https://www.researchgate.net/publication/224224321_Comparative_performance_evaluation_of_TCP_Hybla_and_TCP_Cubic_for_satellite_communication_under_low_error_conditions>

Vehicular ad-hoc networks (VANETs) and applications

* Survey recent developments in VANET protocols, architectures and applications like smart traffic management, safety systems, etc.

Personal considerations:

* VANETs are a key component of intelligent transportation systems
* Consider focusing on how VANETs can enable new applications like platooning, real-time traffic optimization, or vehicle-to-pedestrian safety systems.

Starting material:

* <https://ieeexplore.ieee.org/document/9626779>
* <https://www.researchgate.net/publication/315512136_Vehicular_Ad_Hoc_Network_VANET_A_Survey_Challenges_and_Applications>
* <https://arxiv.org/pdf/2101.04539>

Indoor localization techniques for mobile devices

* Compare different approaches like Wi-Fi fingerprinting, Bluetooth beacons, sensor fusion etc.

Personal considerations:

* Crucial for many location-based services and applications
* Personal considerations: Indoor localization is a complex problem with no one-size-fits-all solution
* Consider discussing the trade-offs between different approaches in terms of accuracy, cost, and scalability.

Starting material:

* <https://www.mdpi.com/2079-9292/12/8/1814>
* <https://www.sciencedirect.com/science/article/abs/pii/S0263224121003444>
* <https://www.researchgate.net/publication/326982013_Review_of_indoor_localization_techniques>
* <https://link.springer.com/article/10.1007/s11277-021-08209-5>