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DOI: 10.1109/GLOCOMW.2012.6477821

Study description	Study identifier	10.1109/GLOCOMW.2012.6477821
	Date of data extraction	29-11-2023
	Bibliographic reference	Multi-UAV network control through dynamic task allocation: Ensuring data-rate and bit-error-rate support
	Multi-drone mission context of the study	describes a unique framework that uses task assignment information to predict the network topology and plan support using relays
	Communication patterns of multi-drone missions tackled in the study	the communication models and task assignment formula.
	Data types sent and received within the multi-drone mission of the study	Sensor data, commands and control messages.
	Architectural layers involved within the multi-drone mission of the study	not explicitly mentioned
	Agents involved into the multi-drone mission of the study	hybrid

Study findings	Findings and conclusions, if relevant to RQs	The paper proposes a unique framework that uses task assignment information to predict the network topology and plan support using relays. Communication models, including factors like signal-to-noise ratio (SNR), path loss, and fading effects, are discussed in the document
Quality assessment	Is there a clear statement of the aims of the research?	YES, ELABORATION: The aim is to ensure effective task execution by allocating tasks to the right UAV, at the right place, and at the right time.
	Was the research design appropriate to address the aims of the research?	YES, ELABORATION: The research design involves developing a unique framework that utilizes task assignment information to predict the network topology and plan support using relays. It also takes into account realistic network communication dynamics and optimizes the use of agents to address the needs of dynamic missions
	Is there a clear statement of the findings?	YES, ELABORATION: The paper presents a framework for controlling communications in multi-UAV systems through dynamic task allocation. The experiments conducted in simulation and outdoor flight testing show the effectiveness of the framework in optimizing the use of agents,
	Are validity and limitations of the study discussed?	YES, ELABORATION: the document discusses the limitations of the study. In section IV.

▼ DOI: 10.1145/3075564.3077628

Study description	Study identifier	10.1145/3075564.3077628
	Date of data extraction	29-11-2023
	Bibliographic reference	Designing Swarms of Cyber-Physical Systems: the H2020 CPSwarm Project: Invited Paper
	Multi-drone mission context of the study	surveillance and intrusion detection

	Communication patterns of multi-drone missions tackled in the study	heterogeneous swarms of ground robots/rovers and UAVs.
	Data types sent and received within the multi-drone mission of the study	not explicitly mentioned
	Architectural layers involved within the multi-drone mission of the study	not explicitly mentioned
	Agents involved into the multi-drone mission of the study	UAVs (Unmanned Aerial Vehicles) and ground robots/rovers
Study findings	Findings and conclusions, if relevant to RQs	No, The document mainly focuses on the CPSwarm project and its goals, challenges, and use cases, but does not provide specific details on the communication patterns used in multi-drone missions.
Quality assessment	Is there a clear statement of the aims of the research?	YES, ELABORATION: The CPSwarm project aims to design and integrate complex herds of heterogeneous Cyber-Physical Systems (CPS) that collaborate and exhibit collective behavior.
	Was the research design appropriate to address the aims of the research?	NO
	Is there a clear statement of the findings?	YES, ELABORATION: Highlights the challenges faced in the interactions among different Cyber-Physical Systems (CPS) and the need for an integrated design approach to address these challenges.

	Are validity and limitations of the study discussed?	NO

▼ DOI: 10.1109/RED-UAS.2017.8101648

Study description	Study identifier	10.1109/RED-UAS.2017.8101648
	Date of data extraction	29-11-2023
	Bibliographic reference	Blockchain-based protocol of autonomous business activity for multi-agent systems consisting of UAVs
	Multi-drone mission context of the study	it does not specifically mention a multi-drone mission context.
	Communication patterns of multi-drone missions tackled in the study	does not specifically mention communication patterns of multi-drone missions. only focus on focuses on the communication protocol.
	Data types sent and received within the multi-drone mission of the study	not mention anything. only focus on focuses on the communication protocol.
	Architectural layers involved within the multi-drone mission of the study	Not mention anything related architectural layer. But provides some provide an architectural solution such as Blockchain technology and smart contracts as potential candidates for organizing a communication network for autonomous agents.
	Agents involved into the multi-drone mission of the study	robots and human.
Study findings	Findings and conclusions, if relevant to RQs	No

Quality assessment	Is there a clear statement of the aims of the research?	NO
	Was the research design appropriate to address the aims of the research?	NO
	Is there a clear statement of the findings?	NO
	Are validity and limitations of the study discussed?	YES

▼ DOI: 10.1109/ACCESS.2020.2964073

Study description	Study identifier	10.1109/ACCESS.2020.2964073
	Date of data extraction	29-11-2023
	Bibliographic reference	Distributed Fog Computing for Latency and Reliability Guaranteed Swarm of Drones
	Multi-drone mission context of the study	task assignment mechanism, dynamic task allocation model
	Communication patterns of multi-drone missions tackled in the study	includes a hierarchical communication model that consists of three layers: the drone layer, the fog layer, and the cloud layer
	Data types sent and received within the multi-drone mission of the study	does not provide specific information on the data types, but the drone layer is responsible for local data processing and communication between drones.

	Architectural layers involved within the multi-drone mission of the study	three architectural layers: the drone layer, the fog layer, and the cloud layer
	Agents involved into the multi-drone mission of the study	does not mention any specific agents
Study findings	Findings and conclusions, if relevant to RQs	a distributed fog computing architecture for multi-drone missions that enables low-latency and reliable communication between drones and the ground station. also discusses the use of wireless communication technologies such as Wi-Fi, Bluetooth, and ZigBee for communication between drones and the fog layer.
Quality assessment	Is there a clear statement of the aims of the research?	YES
	Was the research design appropriate to address the aims of the research?	NO
	Is there a clear statement of the findings?	NO
	Are validity and limitations of the study discussed?	YES

▼ DOI: 10.1109/JIOT.2022.3165278

Study description	Study identifier	10.1109/JIOT.2022.3165278
	Date of data extraction	29-11-2023

	Bibliographic reference	Autonomous Cooperative Search Model for Multi-UAV With Limited Communication Network
	Multi-drone mission context of the study	develop a cooperative architecture, optimization function and an improved sparrow search algorithm.
	Communication patterns of multi-drone missions tackled in the study	Limited communication network, Local communication networks and Information interaction
	Data types sent and received within the multi-drone mission of the study	not mentioned
	Architectural layers involved within the multi-drone mission of the study	not mentioned
	Agents involved into the multi-drone mission of the study	UAVs (Unmanned Aerial Vehicles)
Study findings	Findings and conclusions, if relevant to RQs	limited communication in an unknown environment during cooperative search missions involving multiple UAVs. a new cooperative architecture that utilizes local communication networks among the UAVs to overcome the limitations of the global communication network. local communication networks are established based on the distances among UAVs and facilitate the sharing of UAV locations and target search information. multi-UAV cooperative search model (MCSM) that incorporates communication cost and formation benefit as an optimization function.
Quality assessment	Is there a clear statement of the	YES

	aims of the research?	
	Was the research design appropriate to address the aims of the research?	YES
	Is there a clear statement of the findings?	YES
	Are validity and limitations of the study discussed?	YES

▼ DOI: 10.1109/SYSTEMS.2009.4815797

Study description	Study identifier	10.1109/SYSTEMS.2009.4815797
	Date of data extraction	30-11-2023
	Bibliographic reference	AirShield: A system-of-systems MUAV remote sensing architecture for disaster response
	Multi-drone mission context of the study	the use of a swarm of Micro Unmanned Aerial Vehicles (MUAVs) in the AirShield project.
	Communication patterns of multi-drone missions tackled in the study	Not mention. primarily focuses on the communication system and challenges associated with establishing communication links between the MUAVs and the mission control center.
	Data types sent and received within the multi-drone mission of the study	sensor data such as measurement results of potentially hazardous substances, GPS localization etc.

	Architectural layers involved within the multi-drone mission of the study	Inter-Drone Links (IDL), Drone to Ground Station Links (DGSL), Backend Network Topology and Data Management
	Agents involved into the multi-drone mission of the study	Micro Unmanned Aerial Vehicles (MUAVs), Mission Control Center and Backend System Components
Study findings	Findings and conclusions, if relevant to RQs	not mention
Quality assessment	Is there a clear statement of the aims of the research?	YES
	Was the research design appropriate to address the aims of the research?	NO
	Is there a clear statement of the findings?	NO
	Are validity and limitations of the study discussed?	NO

▼ 10.1109/ACCESS.2020.3043672

Study description	Study identifier	10.1109/ACCESS.2020.3043672
	Date of data extraction	2023-11-30
	Bibliographic reference	Skeleton-Based Swarm Routing (SSR): Intelligent Smooth Routing for Dynamic UAV Networks

	Multi-drone mission context of the study	General. Article says it focuses on “mission-driven swarm networks”
	Communication patterns of multi-drone missions tackled in the study	SSR (Skeleton-based swarm routing, hybrid protocol with geometric forwarding & reactive search) Proactive routing Store-carry-forward LTA-OLSR traffic-load aware optimized link state routing protocol FANET Leader-follower (Hierarchical)
	Data types sent and received within the multi-drone mission of the study	Location data, Geometric data for routing, Command packets.
	Architectural layers involved within the multi-drone mission of the study	Swarm architectures: Swarm cooperation, Mission-driven formation
	Agents involved into the multi-drone mission of the study	Autonomous
Study findings	Findings and conclusions, if relevant to RQs	a novel UAV routing and morphing scheme based on the skeleton structure, called SSR, was proposed for swarm network. This routing scheme has low complexity, can avoid congested areas, and achieves traffic balancing in the pipe. SSR uses geometric forwarding and avoids the flooding of route search messages throughout the network. It

		only needs a local search in a specific region, whenever the destination moves away.
Quality assessment	Is there a clear statement of the aims of the research?	YES
	Was the research design appropriate to address the aims of the research?	YES
	Is there a clear statement of the findings?	YES
	Are validity and limitations of the study discussed?	NO: Not specifically. Research is based on simulations.
	NOTE: Focused basically primarily on routing algo, but included bits on the communication	

▼ 10.1109/TWC.2020.2988363

Study description	Study identifier	10.1109/TWC.2020.2988363
	Date of data extraction	2023-11-30
	Bibliographic reference	A Novel Multimodal Collaborative Drone-Assisted VANET Networking Model
	Multi-drone mission context of the study	Support terrestial vehicles in VANET in urban scenarios.
	Communication patterns of multi-drone missions	VANET FANET Drone-to-Drone

	tackled in the study	Drone-to-Vehicle Drone-to-DataCenter
	Data types sent and received within the multi-drone mission of the study	Location data, timestamp
	Architectural layers involved within the multi-drone mission of the study	Data collection module & Communication module
	Agents involved into the multi-drone mission of the study	Autonomous
Study findings	Findings and conclusions, if relevant to RQs	
Quality assessment	Is there a clear statement of the aims of the research?	YES
	Was the research design appropriate to address the aims of the research?	YES
	Is there a clear statement of the findings?	YES
	Are validity and limitations of the study discussed?	YES: Study was compared with SoA methods and limitations was discussed. Validity wasn't explicitly mentioned though.
	Again, paper is mostly focused on	

	routing optimizations and has few interesting things to say on communication patterns & architecture layers	

▼ 10.1145/3241539.3241549

Study description	Study identifier	10.1145/3241539.3241549
	Date of data extraction	2023-11-30
	Bibliographic reference	SkyCore: Moving Core to the Edge for Untethered and Reliable UAV-based LTE Networks
	Multi-drone mission context of the study	low-altitude UAV networks, such as those considered by mobile operators for on-demand LTE network deployments
	Communication patterns of multi-drone missions tackled in the study	UAV-to-Base station (Wireless & Tethered) UAV-to-UAV UAV as Hotspot Broadcast update messages (secuirty update to notify other agents of security vector update, location update & policy update for QoS and charching profile)
	Data types sent and received within the multi-drone mission of the study	Wifi data (as hotspot for phones), Broadcasted messages
	Architectural layers involved within the multi-drone mission of the study	EPC Data plane, EPC control plane UAV Control engine, Inter-agent communication. Controller layer, Switch layer.

	Agents involved into the multi-drone mission of the study	Autonomous
Study findings	Findings and conclusions, if relevant to RQs	
Quality assessment	Is there a clear statement of the aims of the research?	YES
	Was the research design appropriate to address the aims of the research?	YES
	Is there a clear statement of the findings?	YES
	Are validity and limitations of the study discussed?	YES: Results have been tested in simulations and implemented in a small-scale and large-scale outdoor scenario. Validity wasn't mentioned specifically.
	Mostly focused on adding a part typically found on base stations to the UAVs	

▼ 10.1109/ICRA.2017.7989376

Study description	Study identifier	10.1109/ICRA.2017.7989376
	Date of data extraction	2023-11-30

	Bibliographic reference	Crazyswarm: A large nano-quadcopter swarm
	Multi-drone mission context of the study	Coordinated formation flight (basically light show) Swarm interaction (unified collision avoidance)
	Communication patterns of multi-drone missions tackled in the study	UAV-to-Base station Request-response (mainly used for configuration) Broadcasting (minimizes latency)
	Data types sent and received within the multi-drone mission of the study	Broadcast commands, group ID number, position from motion sensor.
	Architectural layers involved within the multi-drone mission of the study	Anything that is represented in layers that seems relevant to the communication between drones or the mission context.
	Agents involved into the multi-drone mission of the study	Autonomous
Study findings	Findings and conclusions, if relevant to RQs	
Quality assessment	Is there a clear statement of the aims of the research?	YES
	Was the research design appropriate to address the aims of the research?	YES

	Is there a clear statement of the findings?	YES
	Are validity and limitations of the study discussed?	NO

▼ 10.5555/2499592.2499599

Study description	Study identifier	10.5555/2499592.2499599
	Date of data extraction	2023-11-30
	Bibliographic reference	Design and Evaluation of UAV Swarm Command and Control Strategies
	Multi-drone mission context of the study	The first involves the detection and tracking of a contaminant plume, which could be the result of a chemical spill, a dirty bomb, or a chemical or biological weapon. The second focuses on the patrolling of a defined body of water for detection and tracking of vessels of interest which could be, for example, smugglers or enemy vessels
	Communication patterns of multi-drone missions tackled in the study	Command-and-Control (C2) UAV-to-Base station UAV-to-UAV (with long-range low power radios) Searcher UAV & Pursuer UAV
	Data types sent and received within the multi-drone mission of the study	Commands, Sensor readings

	Architectural layers involved within the multi-drone mission of the study	
	Agents involved into the multi-drone mission of the study	Autonomous, Hybrid
Study findings	Findings and conclusions, if relevant to RQs	
Quality assessment	Is there a clear statement of the aims of the research?	YES
	Was the research design appropriate to address the aims of the research?	YES
	Is there a clear statement of the findings?	YES
	Are validity and limitations of the study discussed?	NO:Talked about limitations extensively, didn’t mention validity though.

▼ 10.2514/6.2009-5653

Study description	Study identifier	10.2514/6.2009-5653
	Date of data extraction	2023-11-30
	Bibliographic reference	Collaborative Mission Planning & Autonomous Control Technologies (COMPACT) for complex UAV missions

	Multi-drone mission context of the study	Intelligence, Surveillance, and Reconnaissance (ISR) Suppression of Enemy Aerial Defenses (SEAD), Destruction of Enemy Aerial Defenses (DEAD)
	Communication patterns of multi-drone missions tackled in the study	Two-way communication. Semi-covert communication Covert communication
	Data types sent and received within the multi-drone mission of the study	Leader: Leader position, velocity and heading, commands for followers. Follower: Current sensors, weapons available, available fuel, distance from target, new threats discovered, vehicle health, etc.
	Architectural layers involved within the multi-drone mission of the study	Command, Control, and Communications (C3) architecture Command center → function leader → team leader → platoon leader → autonomous agent
	Agents involved into the multi-drone mission of the study	Autonomous, human, hybrid
Study findings	Findings and conclusions, if relevant to RQs	
Quality assessment	Is there a clear statement of the aims of the research?	YES
	Was the research design appropriate to address the aims of the research?	YES

	Is there a clear statement of the findings?	YES,
	Are validity and limitations of the study discussed?	NO: Limitations were well-covered. Validity wasn't explicitly discussed.
	Mostly focused on task allocation, not really much about communication.	

▼ DOI: 10.1007/s10846-008-9303-9

Study description	Study identifier	DOI: 10.1007/s10846-008-9303-9
	Date of data extraction	22/11/2023
	Bibliographic reference	Architectures for cooperative airborne simultaneous localisation and mapping
	Multi-drone mission context of the study	Abstract (UAVs in unknown terrain without GPS signal)
	Communication patterns of multi-drone missions tackled in the study	- Centralized: All drones of the swarm communicate with a central computer (centralized architecture). The central computer creates a plan for the swarm based on all available information. - Decentralized: Each drone calculates its own actions, taking information of other drones into consideration (coordinated architecture).
	Data types sent and received within the multi-drone mission of the study	- Sensor data - Location data - Digital map
	Architectural layers involved within the multi-	Coordination layer

	drone mission of the study	
	Agents involved into the multi-drone mission of the study	Autonomous
Study findings	Findings and conclusions	- Centralized architecture achieves planning vehicle actions more optimally. - Coordinated Architecture achieves reducing the computation and communication requirements of the swam system. - Information gain of coordinated architecture is slower than with the centralized architecture.
	Validity	Simulation
	Relevance	None mentioned

▼ DOI: 10.1007/978-3-319-59394-4_12

Study description	Study identifier	DOI: 10.1007/978-3-319-59394-4_12
	Date of data extraction	22/11/2023
	Bibliographic reference	Communication and autonomous control of multi-UAV system in disaster response tasks
	Multi-drone mission context of the study	Disaster Response
	Communication patterns of multi-drone missions tackled in the study	- Ground station to drone swarm - Broadcasting (TCP vs UDP)
	Data types sent and received within the multi-drone mission of the study	- Commands - Waypoints - Images

	Architectural layers involved within the multi-drone mission of the study	Anything that is represented in layers that seems relevant to the communication between drones or the mission context.
	Agents involved into the multi-drone mission of the study	Human operator, base station, drone swarm
Study findings	Findings and conclusions	- Employing drone swarms not only decreased the mission time, but also improved the quality of the taken images within the same time.
	Validity	- Tested protocol MAClink cannot establish a TCP connection without UDP. - It is not clear how the ‘disaster’ scenario was simulated in the experiment, if at all.
	Relevance	- None mentioned

▼ DOI: 10.1109/ICC.2017.7996481

Study description	Study identifier	DOI: 10.1109/ICC.2017.7996481
	Date of data extraction	22/11/2023
	Bibliographic reference	Coordinated maritime missions of unmanned vehicles — Network architecture and performance analysis
	Multi-drone mission context of the study	Abstract (maritime mission)
	Communication patterns of multi-drone missions tackled in the study	- Relay: The the UAV and the Areostat acted as a mobile relay station forwarding messages from the supporting vessel to the USV (Unmanned surface vehicle) and vice versa.

	Data types sent and received within the multi-drone mission of the study	- The telemetry data from the involved vehicles is used to create visualization of the mission progress and the last position of the different vehicles. - Commands are send to different UVs.
	Architectural layers involved within the multi-drone mission of the study	Network layer: Relay of information.
	Agents involved into the multi-drone mission of the study	- 4 UVs (1 AUV, 1 UAV, 1 USV, 1 Aerostat) - 1 support vessel - 1 on-shore team
Study findings	Findings and conclusions	- The proposed communication architecture allows for communication distances of 20km and more, both with direct communication and relayed communication. - When used as a mobile relay, the UAV altitude is critical for the signal margin level.
	Validity	Tested under real-world conditions in the ocean
	Relevance	Allows for research in hard-to-reach maritime environments because the distance between USV and manned vessel can be over 20km.

▼ DOI: 10.1109/PERCOMW.2015.7134011

Study description	Study identifier	DOI: 10.1109/PERCOMW.2015.7134011
	Date of data extraction	22/11/2023
	Bibliographic reference	Coordinating movement within swarms of UAVs through mobile networks
	Multi-drone mission context of the study	Abstract

	Communication patterns of multi-drone missions tackled in the study	- Enable swarm communication by using on-board smartphones and conventional mobile networks, e.g. 3G and 4G. - Leader-Follower communication: Only the leader is controlled over the internet. The followers only communicate within the swarm.
	Data types sent and received within the multi-drone mission of the study	- The ground control sends commands to the UAVs (patrol mode, swarm mode). - The UAVs send images to the ground control. - The UAVs send their position to the ground control if requested.
	Architectural layers involved within the multi-drone mission of the study	- Control layer: Leader-Follower - Network layer: Use of conventional mobile networks.
	Agents involved into the multi-drone mission of the study	- Ground control (manned) - UAVs
Study findings	Findings and conclusions	- Imprecision of the swarm formation (position of follower drones relative to the leader drone) increases almost proportionally with the speed of the leader drone. - Swarm formation can be better maintained if the follower drones are about 20% faster than the leader drone.
	Validity	- Experiment is digitally simulated. - Experiment does not take environmental conditions (e.g. wind) into consideration. - Experiment does not take synthetic network latency into consideration. - Experiment does not take collision detection into consideration.
	Relevance	- None mentioned.

▼ DOI: 10.1109/ACCESS.2020.2987983

Study description	Study identifier	10.1109/ACCESS.2020.2987983
	Date of data extraction	22/11/2023
	Bibliographic reference	MUSCOP: Mission-Based UAV Swarm Coordination Protocol
	Multi-drone mission context of the study	Abstract
	Communication patterns of multi-drone missions tackled in the study	- Leader-Follower communication: Every time the follower drones reach a waypoint of the mission, they are synchronized by the swarm leader. - Leader sends continuously messages to the followers indicating the target location to increase reliability by redundancy
	Data types sent and received within the multi-drone mission of the study	- Leader drones send personalized missions and commands to the follower drones. - Follower drones send acknowledge messages indicating that they have reached a waypoint
	Architectural layers involved within the multi-drone mission of the study	- Control layer: leader-follower model, swarm-formation control
	Agents involved into the multi-drone mission of the study	- Ground station(s) - Drone swarm
Study findings	Findings and conclusions	- Proposed protocol MUSCOP “achieve[s] a high degree of swarm cohesion independently of the swarm formation adopted, and even in the presence of very lossy channels, achieving minimal synchronization delays and very low position offsets with regard to the ideal case.” - Using this protocol, mission complexity (instead of number of involved UAVs) is the main driver of

		mission completion time. - Proposed protocol is not that much affected by channel loss that can arise in real-world applications (tested by a simulation)
	Validity	- Proposed protocol is validated by conducting a simulated experiment. Also, the chosen simulator can be effortlessly deployed on real-drones if required. - Swarm takeoff is not optimized (can lead to collisions)
	Relevance	None mentioned

▼ DOI: 10.1145/2750675.2750683

Study description	Study identifier	DOI: 10.1145/2750675.2750683
	Date of data extraction	22/11/2023
	Bibliographic reference	An autonomous multi-UAV system for search and rescue
	Multi-drone mission context of the study	Search and rescue missions
	Communication patterns of multi-drone missions tackled in the study	- Use of TCP-driven ROS (Robot Operating System) middleware to communicate between ground stations and drones. - Single ground control station calculates plans and sends out commands to the UAVs. - UAVs exchange video streaming data to calculate an appropriate swarm formation (decentralized decision making). - Relaying: If one UAV detects a rescue target, the other UAVs fly to relaying positions to bridge the communication between the base stations and the UAV that detected the rescue target. This helps realizing the live-stream video transmission. - Distinction between centralized, autonomous and distributed tasks is made.

	Data types sent and received within the multi-drone mission of the study	- Planning commands are sent from the base control station to the UAVs. - Operation commands are calculated by communication within the UAV swarm (Centralized vs Decentralized version; either the detecting UAV calculates the relay positions of the other drones OR the other drones claim relay positions and broadcast their claim). - Real-time video data can be streamed from an UAV to one or multiple ground stations.
	Architectural layers involved within the multi-drone mission of the study	- Control layer: The control of the UAV swarm is distributed - Distribution layer: Proposed architecture can be adapted to give more autonomy to the single drones or to centralize the coordination. - Interoperability layer: Architecture can integrate new types of drones or robots. - Autonomy layer: Human operators can adjust the current mission through a GUI at any time.
	Agents involved into the multi-drone mission of the study	- Ground control stations - Multiple UAVs - Optional: human operators
Study findings	Findings and conclusions, if relevant to RQs	
Quality assessment	Is there a clear statement of the aims of the research?	YES: Propose a modular architecture of autonomous UAVs for search and rescue missions.
	Was the research design appropriate to address the aims of the research?	YES: The proposed architecture was validated by a real-world experiment.
	Is there a clear statement of the findings?	YES: In the ‘Conclusions’ chapter.

	Are validity and limitations of the study discussed?	NO: None mentioned

▼ DOI: 10.1109/PERCOM.2009.4912764

Study description	Study identifier	DOI: 10.1109/PERCOM.2009.4912764
	Date of data extraction	22/11/2023
	Bibliographic reference	A novel communications protocol using geographic routing for swarming UAVs performing a Search Mission
	Multi-drone mission context of the study	Search missions
	Communication patterns of multi-drone missions tackled in the study	- Traditionally: Drones share a global search state (digital map) including all other drones, the progress of the search mission, all robots waypoint selections). - Proposed protocol: Global state is replaced with a communication mechanism (location update) and resolves waypoint selection conflicts (waypoint conflict resolution).
	Data types sent and received within the multi-drone mission of the study	- Location Update: Neighbor UAV location information to determine whether a search cell has already been searched. - Waypoint Conflict Resolution: Basically waypoint reservations that broadcasted to the network (however, conflicts between close drones are more likely because closer waypoints are selected first)
	Architectural layers involved within the multi-drone mission of the study	- Control layer: How do drones cooperatively perform a search mission?

	Agents involved into the multi-drone mission of the study	Autonomous, human, hybrid, etc.
Study findings	Findings and conclusions, if relevant to RQs	- Geographic routing does not improve the performance of an inter-UAV communication protocol.
Quality assessment	Is there a clear statement of the aims of the research?	YES: Propose a communication protocol for UAV swarms that improves search efficiency.
	Was the research design appropriate to address the aims of the research?	YES: Simulation of a factorial experiment covering all features of the protocol.
	Is there a clear statement of the findings?	YES: Proposed USMP protocol improves performance by 188% compared to non-inter-UAV communication. Also, the hypothesis that utilizing geographic routing improves search performance is rejected.
	Are validity and limitations of the study discussed?	YES: Tested under realistic communication conditions. And NO: Search area is assumed to be free of obstacles.

▼ DOI: 10.3390/app12062865

Study description	Study identifier	10.3390/app12062865
	Date of data extraction	22/11/2023
	Bibliographic reference	Distributed Grouping Cooperative Dynamic Task Assignment Method of UAV Swarm
	Multi-drone mission context of the study	Cooperative reconnaissance-and-attack (military)

	Communication patterns of multi-drone missions tackled in the study	- Leader-Follower communication (hierarchical topology: top leader, group leaders, followers) - Communication happens within or between subsets of the swarm
	Data types sent and received within the multi-drone mission of the study	- Target information is relayed to other UAVs once detected. - Tasks are distributed within the UAV swarm
	Architectural layers involved within the multi-drone mission of the study	Anything that is represented in layers that seems relevant to the communication between drones or the mission context.
	Agents involved into the multi-drone mission of the study	Autonomous
Study findings	Findings and conclusions, if relevant to RQs	None
Quality assessment	Is there a clear statement of the aims of the research?	YES: “Aiming at the problem of UAV swarms with distributed subsets performing cooperative reconnaissance-and-attack tasks on multi-targets in complex and uncertain combat scenarios, a distributed grouping cooperative dynamic task assignment method is proposed based on extended contract network protocol.”
	Was the research design appropriate to address the aims of the research?	YES: The proposed method is tested in a simulated experiment.
	Is there a clear statement of the findings?	YES: “The simulated results show that the proposed method can achieve the cooperative dynamic assignment of the UAV swarm to perform reconnaissance-and-attack tasks to multi-targets in

		complex and uncertain combat scenarios, improve the adaptiveness of the swarm under the sudden circumstance, and realize the optimization for task execution efficiency of the UAV swarm.”
	Are validity and limitations of the study discussed?	NO

▼ DOI: 10.1145/3213526.3213527

Study description	Study identifier	DOI: 10.1145/3213526.3213527
	Date of data extraction	22/11/2023
	Bibliographic reference	ASTRO: Autonomous, Sensing, and Tetherless netwoRked drOnes
	Multi-drone mission context of the study	
	Communication patterns of multi-drone missions tackled in the study	- Tetherless operation: Drones do not need to communicate to any ground station, but instead communicate with each other.
	Data types sent and received within the multi-drone mission of the study	- Sensor data (GPS, Obstacles) of other drones - Commands when the target object is spotted by one drone
	Architectural layers involved within the multi-drone mission of the study	- Control/Mission layer: Calculating the next steps of the mission with help of machine learning. Also, calling other drones after detecting the search target. - Network layer: Discovering and maintaining air-to-air links (MAVLink) - Routing layer: Ad hoc networking (BATMAN)
	Agents involved into the multi-	- Multiple Drones - Mobile spectrum cheater (a device sending messages on a forbidden radio frequency)

	drone mission of the study	
Study findings	Findings and conclusions, if relevant to RQs	None
Quality assessment	Is there a clear statement of the aims of the research?	YES: “[P]ropose ASTRO, a drone network that realizes three key features: (i) networked drones that coordinate in autonomous flight via software defined radios, (ii) off-grid tetherless flight without requiring a ground control station or air-to-ground network, and (iii) on-board machine learning missions based on on-drone sensor data shared among drones.”
	Was the research design appropriate to address the aims of the research?	YES: The proposed network is validated by a real-world experiment.
	Is there a clear statement of the findings?	NO: Results of the experiment are presented, but not really discussed or interpreted.
	Are validity and limitations of the study discussed?	NO: None

▼ DOI: 10.23919/ELINFOCOM.2019.8706417

Study description	Study identifier	DOI: 10.23919/ELINFOCOM.2019.8706417
	Date of data extraction	22/11/2023
	Bibliographic reference	Towards Real-Time Data Delivery in oneM2M Platform for UAV Management System
	Multi-drone mission context of the study	- Patrol mission
	Communication patterns of multi-drone missions	- Real-time data delivery

	tackled in the study	
	Data types sent and received within the multi-drone mission of the study	- Location, status, event data are sent from the UAVs to the UAV management system - Control messages are sent from the UAV management system to the UAVs
	Architectural layers involved within the multi-drone mission of the study	- Service layer
	Agents involved into the multi-drone mission of the study	- Drone swarm - (Human) Administrator
Study findings	Findings and conclusions, if relevant to RQs	None
Quality assessment	Is there a clear statement of the aims of the research?	YES: ”In this paper, we study the problem of real-time data delivery in oneM2M platform for UAV management system. In addition, we design a real-time data delivery feature for oneM2M standard and implement our design using Mobius, an open-source server platform based on oneM2M which is a global standard targeted for internet of things (IoT) and machine-to-machine (M2M) services.”
	Was the research design appropriate to address the aims of the research?	YES/NO: The experiment validating design and implementation of an architecture seems to be simulated, but it is not clearly stated.
	Is there a clear statement of the findings?	YES: “[W]e developed an oneM2M platform which supports real-time data delivery and verified its real-time data delivery performance under various network configurations including wired and wireless LAN environments.”

	Are validity and limitations of the study discussed?	NO: None

▼ DOI: 10.1109/AVSS.2017.8078465 (not that useful)

Study description	Study identifier	DOI: 10.1109/AVSS.2017.8078465
	Date of data extraction	29.11.2023
	Bibliographic reference	Preventive maintenance of critical infrastructures using 5G networks & drones
	Multi-drone mission context of the study	Critical infrastructure maintenance and surveillance
	Communication patterns of multi-drone missions tackled in the study	Not mentioned
	Data types sent and received within the multi-drone mission of the study	Video data, flight control (not mentioned more in detailed)
	Architectural layers involved within the multi-drone mission of the study	Not mentioned
	Agents involved into the multi-drone mission of the study	Not mentioned
Study findings	Findings and conclusions, if relevant to RQs	Not very helpful

Quality assessment	Is there a clear statement of the aims of the research?	No
	Was the research design appropriate to address the aims of the research?	No
	Is there a clear statement of the findings?	Yes
	Are validity and limitations of the study discussed?	No

▼ DOI: 10.1016/j.cja.2020.02.026

Study description	Study identifier	DOI: 10.1016/j.cja.2020.02.026
	Date of data extraction	29.11.2023
	Bibliographic reference	Unmanned aerial vehicle swarm mission reliability modeling and evaluation method oriented to systematic and networked mission
	Multi-drone mission context of the study	Not mentioned
	Communication patterns of multi-drone missions tackled in the study	3 control patterns: behavior, leader-follower, autonomous.
	Data types sent and received within the multi-drone mission of the study	Not mentioned

	Architectural layers involved within the multi-drone mission of the study	3-layer architecture: communication, structure, mission.
	Agents involved into the multi-drone mission of the study	Hybrid
Study findings	Findings and conclusions, if relevant to RQs	They want the layers to as independent as possible, we can use 3 different types of communication, also using mission chain to help with planning and have created a case study
Quality assessment	Is there a clear statement of the aims of the research?	Yes
	Was the research design appropriate to address the aims of the research?	Yes
	Is there a clear statement of the findings?	Yes
	Are validity and limitations of the study discussed?	No

▼ DOI: 10.1109/IWCMC.2019.8766641

Study description	Study identifier	DOI: 10.1109/IWCMC.2019.8766641
	Date of data extraction	29.11.2023
	Bibliographic reference	UAV-GCS Centralized Data-Oriented Communication Architecture for Crowd Surveillance Applications

	Multi-drone mission context of the study	Crowd surveillance
	Communication patterns of multi-drone missions tackled in the study	GCS (ground central station) is used to manage centrally al drones, FANET,
	Data types sent and received within the multi-drone mission of the study	id, battery level, the urgent message class (0 or 1), the id and the position of the detected anomaly and the detection rate
	Architectural layers involved within the multi-drone mission of the study	Centralized communication from GSC
	Agents involved into the multi-drone mission of the study	Autonomous
Study findings	Findings and conclusions, if relevant to RQs	The whole paper seems more about how to send different levels of urgency events. They have centralized architecture because drones have limited battery so it is better to compute data in GCS
Quality assessment	Is there a clear statement of the aims of the research?	Yes
	Was the research design appropriate to address the aims of the research?	Yes
	Is there a clear statement of the	Yes

	findings?	
	Are validity and limitations of the study discussed?	No (I dont take future work as validity/limitation discussion)

▼ DOI: 10.1109/DS-RT50469.2020.9213700

Study description	Study identifier	DOI: 10.1109/DS-RT50469.2020.9213700
	Date of data extraction	29.11.2023
	Bibliographic reference	Article title
	Multi-drone mission context of the study	SEMRP: an Energy-efficient Multicast Routing Protocol for UAV Swarms
	Communication patterns of multi-drone missions tackled in the study	multicast-based routing protocols (they also mention bioinspired and geographical, but say that they will focus on multicast), using red-black tree to construct multicast communication tree
	Data types sent and received within the multi-drone mission of the study	They assume that UAVs are equipped with cameras, sensors and other necessary equipment according to the application. The study doesnt mention what data types are sent.
	Architectural layers involved within the multi-drone mission of the study	Not mentioned
	Agents involved into the multi-drone mission of the study	Hybrid (drones are controlled by multicast signal from central position, but they should be aware of other drones in swarm)
Study findings	Findings and conclusions, if	Authors proved that using multicast and drones resending messages from one to another help witg

	relevant to RQs	power efficiency of communication
Quality assessment	Is there a clear statement of the aims of the research?	Yes
	Was the research design appropriate to address the aims of the research?	Yes
	Is there a clear statement of the findings?	Yes
	Are validity and limitations of the study discussed?	No

▼ DOI: 10.1109/TSMC.2020.3033935

Study description	Study identifier	DOI: 10.1109/TSMC.2020.3033935
	Date of data extraction	29.11.2023
	Bibliographic reference	Mission-Oriented Miniature Fixed-Wing UAV Swarms: A Multilayered and Distributed Architecture
	Multi-drone mission context of the study	Not mentioned (they described it for general use)
	Communication patterns of multi-drone missions tackled in the study	air-ground, air-air, radio (for longer distances)
	Data types sent and received within the multi-	position, image, and video

	drone mission of the study	
	Architectural layers involved within the multi-drone mission of the study	5-layer architecture: 1) low-level control layer; 2) high-level control layer; 3) coordination layer; 4) communication layer; and 5) human interaction layer, tries to create multiple modules
	Agents involved into the multi-drone mission of the study	Drones fly autonomously but human can also interact with the system
Study findings	Findings and conclusions, if relevant to RQs	Using multiple layers and modules can reduce difficulty when developing system, distributed architecture ⇒ decision-making is done autonomously, thereby achieving better scalability, easy extensibility, experiments show that it outperforms state-of-the-art work
Quality assessment	Is there a clear statement of the aims of the research?	YES
	Was the research design appropriate to address the aims of the research?	YES
	Is there a clear statement of the findings?	YES
	Are validity and limitations of the study discussed?	No