

Multi-drone entertainment

CollMot Robotics provides multi-drone services for entertainment. Our drone fleet is flexible, reliable, built with the demanding requirements of live events in mind. We create ready-made shows for your or integrate your ideas regarding motion, light, music and special effects. Besides the mesmerizing luminous patterns on the sky we offer drone launched fireworks, which brings novelty to the ancient amusement and adds power to your event.



Light show on the drones is made visible through a long exposure shot on the FINA World Championships Opening Ceremony, 2017, Budapest

Specification of drones

DRONE TYPE	quadrocopter (four rotor vehicle)
DRONE SIZE	under 100 cm in diameter and approx. 30 cm total height
DRONE WEIGHT	less than 2 kg total takeoff weight (including max payload)
BATTERY	LiPo 3-4S, 3000-6000mAh
FLIGHT TIME	5-8 minutes recommended, 10-12 minutes max show time per take-off. Multiple take-offs are possible.
FLIGHT ALTITUDE	typically 0-100m above ground, depends on application
COMMUNICATION	
WITH CONTROLLER	latest RC modeler equipment, 2.4 GHz (FHSS)
WITHIN THE FLOCK	two redundant digital wireless channels on 2.4 GHz
WITH GROUND STATION	two redundant digital wireless channels on 2.4 GHz
PREFERRED SPEED	0-6 m/s horizontal and 0-2 m/s vertical relative to ground. Can be slightly extended depending on the environment.
MINIMUM DISTANCE BETWEEN DRONES	7 m, can be decreased in some special cases. Minimum distance also depends on the velocity of the drones.

Control mechanisms and safety measures

MOTION PLANNING	Workflow compatible with most 3D animation software. Pre-visualizations are supported; rigorous error checks before actual flights are compulsory.
MOTION CONTROL	Any combination of these methods is possible: <ul style="list-style-type: none">• preprogrammed flight paths• real-time interactions with humans• self-organized motion
FLEET CONTROL	Multi-level / redundant communication through the following channels for added safety: <ul style="list-style-type: none">• collective control through standard remote controller• real-time monitoring and individual/group control through any number of ground control stations• interactive flock control through motion beacon
SAFETY MEASURES	<ul style="list-style-type: none">• top quality carbon and wooden frame and propellers, professional level motors and speed controllers• speed limitation• altitude and flying zone limitation, automatic avoidance of predefined objects• real-time communication and collision avoidance between drones, individual error handling within the flock context• continuous error checking and multi-level failsafe mechanisms• continuous real-time monitoring and individual control through ground station• well-tested routines for immediate landing, return-to-home or return to closest predefined emergency landing spots

Multi-drone light shows

DRONE LIGHTING	20 Watts of programmable colored LEDs and LED strips
LIGHT PROGRAMMING	Workflow compatible with 3DS Max, Blender and Sunlite Suite. Light program will appear in the final pre-visualization of the show in synchrony with motion and music.
DRONE LIGHT CONTROL	Any combination of these methods is possible: <ul style="list-style-type: none">• timeline based preprogrammed light show• automated light show reacting to drone state• interactive light shows reacting to ground based events• live show through full manual control
SYNCHRONIZATION	<ul style="list-style-type: none">• manual sync moments via remote controller• automated MIDI timecode sync through ground station• ms accuracy collective self-synchronization on all drones

Drone-launched fireworks

APPLICABLE PYRO TYPES	Stroboscope, roman candle, waterfall, rocket, or any other custom type can be used within weight, size and safety specifications.
MAXIMAL PAYLOAD	400 g
NUMBER OF CHANNELS	6 pyro channels per drone
CONTROL OPTIONS	Preprogrammed, automated triggering, synchronized to motion, light and music, or manual triggering through remote controller
SAFETY MEASURES	<ul style="list-style-type: none">• Safety switch on remote controller• Onboard triggering automatically disabled in case of any malfunction, unexpected behavior or low altitude• Dedicated and well-tested electronics for onboard triggering

General tech rider

TAKE-OFF AREA	Flat surface, min. 5 m between drones in all directions, no walls and high buildings nearby, min 8 m from buildings
FLIGHT AREA	No audience under drones, no high-power lines within 30 m, free airspace, min. distance in air between drones is 5 m, preferable is 8-10 m.
SAFETY ZONE	Empty corridor between audience and flight area, width depending on local aviation rules and height of flights. Minimum 10 m advisable in all cases.
GROUND CONTROL	3 chairs, 1 table and rainproof shelter for ground control station (laptop + peripherals) during show close to take-off area
BACKSTAGE	Rainproof shelter for storing equipment, recharging batteries, repairing equipment. Work light, heating, 1 table, 2 chairs, power (220V 20A min), power distributor with 10 sockets, extension cable.
SECURITY	Guard for equipment between rehearsals and show. If not available, secure storage facility for drones and technical equipment near to site.
FLIGHT PERMISSIONS	To be arranged by event organizer, with our intensive assistance. It is advisable to have permissions ready 1 month before the event. Please note that getting flight permissions can be a long procedure. Typical lead time is 1-3 months.
WEATHER CONDITIONS	Good weather conditions are needed for a safe flight: no hail, no strong rain, no intensive solar flares that might affect GPS reception, maximum permitted average wind speed: 8 m/s. Temperatures above 35 °C (especially with direct sunlight) are to be avoided. Temperatures below -5 °C are not tested.
PARKING	Parking facility on site for building in and break down. Parking of minivan for total duration of event.
CATERING, ACCOMODATION	Preferably to be provided by event organizer