MOD

Multipurpose Omnidirectional Drone platform

Introduction

We have different types of drones, just like we have different types of cars.

We have drones like sports cars.

Introduction

We have drones like trucks.

Introduction

We have small drones and big drones, fast and slow.

All these types of drones have common problems:

- drones are very specialized
- drones are very sensitive to conditions or operator skills

That's why we need something easy to operate and not specialized.

Something like...

Tractor

Existing Flying Tractors

Plane-tractor

Helicopter-tractor

Drone-tractor?

But we still don't have a tractor drone.

That's because a tractor is not just a single machine, but...

The capabilities of a tractor are determined by its attachments and implements

Where is drone-tractor?

But why can't other drones be used as tractors?

First, let me explain what an omnicopter is and what the difference is between omnicopters and regular drones...

Definition of omnicopter

An omnicopter is a type of aircraft capable of full six-degree-of-freedom (6DoF) movement,

meaning it can independently control its position and orientation in all directions:

- Translation: Forward/backward, left/right, up/down
- Rotation: Pitch, yaw, roll

- An omnicopter can change direction without tilting, unlike drones that tilt to move.
- An omnicopter can move without changing its orientation.
- An omnicopter can change orientation without changing its position.

Omnicopter vs. regular drone

Problem	Ordinary drone	Omnicopter
Operating in windy conditions	May be unstable	Still maintains position and orientation
Work in strong airflow gradients near obstacles	May be unstable or fall	May change orientation but still fly
Counteracts the forces caused by implements	May be unstable or fall	May change orientation but still fly
Hit an obstacle	Falls in most cases	Changes orientation and still flies
Damage one of the rotors	Falls in most cases	Changes orientation and still flies
Get caught on an obstacle	Falls	Changes orientation and still flies
Carries a long additional load and loses balance	Falls	Changes orientation and still flies

As you can see, only omnicopters allow you to work between obstacles and carry large implements.

It's like a tractor that can work on rough terrain in all weather conditions, carrying large implements.

Omnicopters are safer by design. Without cameras and collision detectors.

With cameras and collision detectors, omnicopters can become much safer.

MOD platform description

The MOD platform consists of two main parts:

- thrust-vectoring node (TVN)
- common base frame

Common Base Frame

The family of base frames may vary in size, but have common properties:

- very simple and lightweight
- foldable without losing in weight or strength at the joints
- allow connection to other frames
- allow mounting of implements on either side of the frame and through the frame

About the latter: mounting implements through the frame is a key feature for balancing large implements.

Thrust-vectoring node (TVN)

Each TVN type is a combination of a different number of motors and different types of rotors or other propulsion systems. Some types of TVN are interchangeable, just like a tractor, you can change the types of wheels or even replace them with tracks. Look how many different TVN there can be (what is not marked as "ref" is developed by me).

Type	Reorientation speed	Complexity	Thrust / weight	Dimensions	Usage proposal
Hex	Medium	**Low**	Low-medium	XS-L	Multipurpose
Square	**Fast**	Medium	Low-medium	XS-XL	Multipurpose, auxillary
DoubleJoint	Slow	Medium+	Low	XS-XL	Multipurpose
FullTilt	Slow	High	High	XS-XXL	Multipurpose, toys, auxillary
Ref: Cyclorotor	**Fast**	High+	Medium	XXS-L	Multipurpose, auxillary
TrueOmni	Slow	Ultra+	Low	XXS-S	Camera, toys, auxillary
OmniFlapper	Fast	Ultra	Low	XXS	Camera, indoor, toys
Ref: ETH Avero	Prototype is very slow but can be medium	Medium	Very low	XS	Multipurpose, indoor, toys

Benefits for markets

- Agriculture and services: safe, predictable and precise operation in difficult conditions with various types of implements.
- Pro camera operator: safe, predictable and precise operation in difficult conditions at high speeds, allows large cameras to be aimed at any angle.
- Non-pro camera operator, toys, entertainment, education: safe, predictable and precise operation with speed limiters opens up endless possibilities for enjoyment.
- Drone shows: safe, fastest and most precise drones and drone chains. Large versions allow visibility in daylight.

All of these capabilities are based on just the basic frame type with add-ons.

Many of these features do not require much study.

More info and my contacts

All public MOD files, links to omnicopter projects and my contacts are available on my github:

https://github.com/bpodchezertsev/MOD

Also, you can look short article "How AI understands omnicopters".