

## How DJI Dominates the world of Drones (Aerial Robotics)

### Why and How DJI Dominates the world of Drones (Aerial Robotics)

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#### Introduction

Consumer drones are hitting their stride this holiday season, with forecasts of the 2016/2017 revenue running into the billions of dollars. Despite the large and rapidly growing market, a single company - DJI - dominates to a degree rarely seen in the consumer technology industry. You can buy great digital cameras from Sony, Nikon, Panasonic, Canon etc. or smartphones from Apple, Samsung, Huawei, Google and dozens more - but you can only buy an advanced, mature and reliable consumer camera drone from one company...**DJI**.

While the tech world is very familiar with DJI drones, the company itself remains somewhat of a mystery. The Founder and CEO, Frank Tao Wang, is an engineer and workaholic who rarely hobnobs with the Press or at industry confabs. The same is true of many of the core C-Suite office holders, who seem laser focused on R&D, design and production and therefore leave the PR and Marketing to legions of hired surrogates.

It's no accident that DJI dominates the Camera Drone Market. The company represents a

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“New Chinese Paradigm” that innovates at a speed that even writers find difficult to keep up with. This makes their story – or at least the parts of it which can be pieced together from the outside – an educational tale for those with interest in business, China, technology and leadership.

### The Basics of DJI – Founding and History

Started by a student of Hong Kong’s University of Science and Technology, DJI is now the world leader in consumer-level quadcopters. Often described as “The up and coming Apple of China”, DJI was started in an 80 sq. ft. office by Frank Wang Tao and has grown to over 5,000 employees. As to why Frank started the company – “I was a model enthusiast, but my aircraft often crashed,” he says. “So it was my dream to develop this technology.”

The company’s full name is “Dà-Jiāng Innovations Science and Technology Corporation”, shortened to DJI. The astute observer will notice that there is no mention of aircraft, drones, flight or similar in the name, suggesting that DJI may have more in mind than small flying machines..

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Frank Wang (L) and Li Zexiang (R)

DJI was built from the ground up and represents largely the vision of Mr. Wang along with his first advisor/mentor and investor Lu Di. Other friends helped with the startup of the company but many left in the first years due to conflicts largely related to the relentless pace and sky-high expectations of Frank Wang. In many ways, Wang is the “Steve Jobs” of both DJI and China with his abrasive manner and refusal to accept anything less than the best...or, in fact, better than the best. Wang may even possess talents over and above Steve Jobs since he is an degreed engineer and may have more of a handle on what is possible in advanced technology.

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A famous poultry producer in the USA - Frank Purdue - had an advertising slogan which stated *"It takes a tough man to make a tender Chicken"*. The same can be said for advanced camera drones which, in effect, ARE rocket science. While Wang may not have guessed that his firm would grow so quickly, his ability to see the opportunities, take on risk and hire top talent have combined to create an entire new industry and a single company that is gathering the lions share of the market.

### 2006-2011 - Laying the Foundations

DJI's first product was a flight controller - the "brain" or autopilot of a drone. Originally designed for unmanned model helicopters, the DJI flight controller was modified and updated to work on multirotors - drones with 3 or more propellers which are able to hover in place or move in any direction.



### DJI Naza Flight Controller with GPS Puck

Hobbyists, researchers and photographers formed the core of the early market, which often required that drones be assembled from dozens of parts sourced from various manufacturers. As a result of all the variables, the final product often had glitches and low reliability. In addition, the cost of putting together a serious platform with GPS and other sensors (required for stability) was high.

By 2010 a number of RTF (Ready to Fly) or ARF (Almost ready to fly - and Kit) Drones were being introduced - most of them so-called "toy grade", but some which were designed for the professional. Brand names included Walkera (toys and hobby grade), MikroCopter (commercial) and Parrot (high tech toy). DJI recognized the market was growing and made a fateful decision - to stay out of the toy market and instead concentrate on improving the technology and lowering the cost in order to enlarge the market. The years 2011 and 2012 saw DJI introduce a number of improvements in their components as well as higher end drone packages name the "S" series. With the addition of a stabilizing gimbal (DJI made their first in 2011), professionals now had a package which could, in many cases, substitute for the manned helicopters formerly used for filming aerial scenes. It was during this time that DJI first opened a small sales office in North America and hired a talented "pitchman", Colin Guinn, to promote the products here.



DJI S-1000 with large camera and gimbal

At the same time the cost of the various components used in the drones (GPS modules, Accelerometers, Barometers, etc.) were dropping in price and becoming more capable...largely due the explosion of smartphones and tablets. DJI, located in the midst of the largest concentration of smartphone manufacturing in the world (Shenzhen- near Hong Kong) was uniquely positioned to take advantage of the potential offered by the expanding market and the lowered costs. They did so by designing and releasing the first true Consumer Camera Drone, **the Phantom (now referred to as Phantom 1)**.

2013 - The Rise of DJI

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The Phantom press release was only two paragraphs including “You can fly your Phantom the moment you receive it,” With those words, DJI announced release of the product that revolutionized the drone industry.

That year, DJI revenue soared to \$130 million, up from \$4 million two years prior. The market spoke, and the Phantom 1 propelled the company into its place as industry groundbreaker. The original Phantom was bare-bones compared with newer models. But the genius of the first Phantom was to remove much of the guesswork for pilots. This drone provided stability and reliability due to the advanced nature of the sensors onboard and the careful programming. DJI had squeezed what previously might have cost 10’s of thousands of dollars into a \$679 model.



**Phantom**

Phantom Base Model

The first version didn’t have a camera – a GoPro or similar lightweight camera could be hung below the Phantom and used to take video (very shaky due to lack of stabilization) or still pictures. The second Phantom, the FC40, had an included camera without a gimbal, meaning the video was still shaky – however DJI released an app with this model so that the pilot could actually see what the drone was taking a picture or video of.

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By the end of that same year, DJI released the Phantom 2, which offered an optional stabilizing gimbal for GoPro cameras. The smooth video produced by this combination stunned hobbyists, photographers and others. For a price of about \$2200 total (GoPro, Gimbal, Phantom 2 and FPV monitor), it was now possible to have high quality smooth “cinematic” video from a drone. But DJI didn’t stop there – they plowed all their profits back into R&D and made another important decision – to create their own cameras instead of relying on GoPro and others.

Sensing the importance of the N. American market, DJI terminated their relationship with Mr. Guinn and established their own offices, warehouses and repair depots in the USA.

2014 – Mass Market Camera Drones become Affordable





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In 2014 DJI introduced the Phantom 2 Vision+. This model featured an integrated gimbal and camera as well as an advanced App which allowed for monitoring of the camera view as well as basic telemetry (battery health, altitude and other such information). The app also allowed for mapping - now your drone knew where it was and could plot flight paths as well as other such information. Introduced at the price of \$1369 complete, this model was truly a “flying camera” that could be used by wide variety of consumers - even those with little or no technical abilities. As a result sales boomed into the 100’s of million of dollars - and, again, DJI plowed all profits back into R&D and sped up development to a dizzying pace. November 2014 saw the release of the DJI Inspire, a truly advanced Quadcopter (drone with 4 propellers) marketed to professionals. This setup cost approx. \$3,000, but provided advanced features and a 4K camera that previously would have cost much more.

### 2015 - Competition and Clones

Eyeing the success of DJI, a number of companies attempted to enter the field and grab a slice of the consumer camera drone market. Dozens of startup sprung up within a few miles of DJI in Shenzhen, many trying to copy or “clone” the Phantom. Various models were produced at prices as low as \$250, but most were copies of the earlier Phantom 1 - a drone whose time had passed. The clones also lacked worldwide support and often were unreliable. None of these companies gained any measurable market share.

An American company called 3D Robotics raised over 100 million in venture capital and claimed they were going to be the first true competitors to DJI. Their new model, dubbed Solo, was originally slated to be released at the end of 2014 but was delayed until July, 2015 at which time it was released unfinished - with no camera gimbal and many bugs in programming. Alas, it proved to be too little and too late ([see this article](#)) due to both its shortcomings and DJI’s April Release of the Phantom 3.

The Phantom 3 may have looked similar to previous Phantom models but once the machine

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was flown by hobbyists, experts and the press it became evident that this was a revolution in both capabilities and price. Most all of the features of the (\$3,000) Inspire model were crammed into the Phantom 3 - at a price starting at \$999. Improvements in the camera, the app, wind resistance, range, speed and most every other aspect of the drone were evident. In fact, as this article is written - 18 months later - no other company has released a model which betters the price/performance of the Phantom 3 line.



Phantom 3

Those of us in the industry watched 2015 go with numerous announcements of the next "DJI Killer" which was coming soon. Many of those models failed to ever hit the market and those that did came up short. By the end of 2015 it was clear that DJI was winning the "Drone Wars" due largely to their refusal to rest on their laurels. With thousands of employees working 70 hour weeks and almost unlimited access to capital, talent and components, they seem to have left the startups in the dust. Two established drone makers, Yuneec and Parrot, have had difficulty garnering even 5% of the market.

## 2016 - The Dust Settles and DJI Competes against themselves

Whatever hopes the clone manufacturers had (low price/beginners) were dashed when DJI announced their lowest cost model ever - the Phantom 3 Standard. This model currently sells for less than \$500 and includes a gimbal and camera. However, once again, DJI didn't sit back and rely on their substantial leads in the market - instead they introduced the **Phantom 4** (April, 2016), the most advanced consumer drone yet. The Phantom 4 is essentially a perfected Phantom 3 with the addition of "computer vision" that can avoid obstacles and perform other functions such as following a runner or other moving object.



## **DJI Phantom 4**

As part of the launch of the Phantom 4, DJI partnered with Apple Stores - a marketing coup

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that assured a much deeper market penetration as well as the perception of high quality. The Phantom 4 has sold extremely well – proving that Camera Drone enthusiasts will pay more if the money buys additional features and a higher quality item.

Two other new models of note entered the market in 2016 – the X-Star from Autel Robotics and the Typhoon H from Yuneec. The Autel is very similar in looks to a DJI Phantom – so much so that DJI is suing Autel for trade violations. In terms of features the X-Star is similar to the Phantom 3 Pro – a machine released 15 months before. Pricing is also similar to the Phantom.

The Yuneec model was released with great fanfare...as yet another “DJI Killer”. Alas, the price (\$1899 for the model with computer vision) as well as initial quality control problems have already hurt sales. At this point, neither Autel nor Yuneec pose a threat to DJI’s dominance in the consumer market.

Another 2016 would-be competitor to DJI was GoPro. GoPro has been working on a drone for over two years and announced the release for June. The release was cancelled (no reason given) and scheduled for “before the Holiday Season”. The GoPro Karma was finally shown at the end of September and slated for shipment by end of October – however, as of this date (Oct. 10, 2016), GoPro is not accepting orders from consumers...resulting in the loss of sales to DJI and others. It remains to be seen whether GoPro will be able to ship on time and in the quantity needed to be a contender for the 2016 Holiday season.

In Late September, 2016, DJI introduced the **Mavic Pro** – their most advanced and capable consumer drone ever. This compact and foldable drone has every feature of earlier DJI drones with the addition of more advanced Computer Vision. Early indications are that the **Mavic Pro** will outsell every other model in the 2016/2017 Holiday Season – quite a feat for a relatively expensive (\$1,000+) consumer drone package. In fact, it’s likely that 80% plus of the \$300-\$1500 drone market will go DJI during the coming months (Oct 2016 on). At this point DJI is competing mostly against themselves as well as attempting to bring new consumers into the

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fold so they can enlarge the market.



DJI **Mavic Pro**

Moving Forward – Much More than just Consumer Drones

DJI has seen the future and it is about much more than Camera drones. The technologies they have advanced are useful in other products and DJI has recognized this and taken full advantage of the opportunities. For example, their gimbal R&D has now resulted in a full line of hand-held gimbals which range from \$299 for the Osmo Mobile to many thousands of

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dollars for Hollywood Caliber rigs. This is just the beginning – DJI considers themselves to be in the robotics business – an industry that is likely to dominate the next 50 years or more. Technologies such as computer vision, artificial intelligence, machine learning, component miniaturization as well as the solving of complex “sensor fusion” (decision making) problems create a treasure trove of Intellectual Property that DJI will attempt to take full advantage of.

Whether DJI can keep up with such grand visions is an open question – they would not be the first or last company which attempted to “do it all” and ended up biting off more than they could chew. At the same time, firms such as Apple and Google are trying to enter the transportation business for many of the same reasons (they have the basis and engineering to do so) – so it certainly is possible.

At present, DJI is probably worth in excess of 20 Billion dollars – which is substantial, yet leaves a lot of room for growth. One gets the sense that Mr. Wang sees a future where DJI and Apple and Google and Toyota are all talked about in the same breath. Such an accomplishment could see a DJI with value 10X or more than the current speculation (DJI is private, so the true market cap remains unknown).

Note – as with all ventures, there are a number of stumbling blocks to get from here to there. The current issue with Samsung (phones catching fire) shows how even the largest companies can make mistakes which heavily damage their brand.

So you want to start a Drone Company?

There are tremendous opportunities in the world of aerial robotics. However, as in any “Gold Rush” the majority of enterprises will end up failing. In the case of Camera Drones, it would likely take years and billions of dollars to create something which could sit on the same shelf as the current generation of DJI equipment. This particular market is “go big or go home” in that it already represents millions of “person-years” of research and development.

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Some companies are trying to save time and costs by using “open source” software and hardware to create their consumer drones. This is probably a bad idea for any number of reasons - the largest being that your entire company rests upon a relatively shaky foundation. Also, the open source means that many other companies can produce machines similar to yours. This effectively become a “race to the bottom” with little hope of long term profitability. A sad example of this is/was the firm [3DR Robotics which fell from the sky](#) in their failed attempt to compete in the Consumer Drone Market.

One way to think of it may be to consider Intel. Sure, there are other makers of CPU's and other chips - however, Intel enjoys 80% of the x86 CPU market and 99% of the market for computer server CPU's.

This is not to say that the Aerial Robotics field doesn't have room for others - there is an almost limitless potential in the field. However, it would be a difficult and capital intensive venture to attempt beating DJI at their own game.

### Summary

The above is an attempt to put some of the history of DJI into a single article. Reading this article as well as the links provided below should bring those interested in this fascinating company up to date. Please leave any comments or additional links in the feedback (Facebook comments) section below.

[Our Article comparing popular Camera Drones for the 2016/2017 time period.](#)

[DJI Online Store - showing all available Models.](#)

Additional Links about DJI

<http://www.scmp.com/news/hong-kong/article/1370451/apple-pearl-river-delta-dji-innovations-taking-flight>

<http://blogs.wsj.com/corporate-intelligence/2014/11/10/qa-chinese-drone-founder-explains-why-steve-jobs-is-his-role-model/>

<http://www.forbes.com/sites/ryanmac/2015/05/06/dji-drones-frank-wang-china-billionaire/#3c9e6f3a210c>

<http://www.theverge.com/2016/9/27/13059144/dji-robomasters-robot-drone-battle-video-frank-wang-interview>

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## Related posts:

1. [How many consumer drones, toys aside, exist in the USA as of Jan, 2016](#)
2. [Is 3D Robotics Falling from the Sky?](#)
3. [Counting Drones - How many? Which ones?](#)



#### 4. Opportunities in Aerial Robotics 2014