

# PHANTOM IRON DRONE

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“Innovation is taking two things that already exist and putting them together in a new way.” - Tom Freston

Our team strived to make unparalleled innovations in order to make your life easier. Join us in our flight to top!

## Abstract

Nowadays, drones are considered to be the future of technology and transportation. The research about drones is increasing due to its market demand. Many improvements are being done in order to increase its performance. Our team, Phantoms, is also committed with this development. Phantom's improvements will strive for efficiency, durability and security to the drone which is what the customer is looking for. Although drones are being used in fields like agriculture, photography or transport, the DJI Phantom 3 Standard Drone is more focused on recreative use. The drone is formed by four propellers (with their corresponding motors), a battery, a camera (with its supporting structure) and a curved body that put all the parts together. Apart from that, the team has added some parts such as solar panel, lens protector, propeller's protector and floaters.

## Introduction

Drones are becoming increasingly common in our skies. Below Figure 1 shows us the mass amount of industries in the United States only using drones to enhance their products. The photography industries reaching angles and heights at a fraction the cost and time to get a human to take the same quality picture. Framers are able to monitor their crops better, specially irrigation and pesticide treatment, increasing their gross income from the initial investment of a drone. The drone industry is booming, Figure 2 by Forbes, in the U.S. today the industries is valued at 3.6 billion dollars and this number is only increasing. By 2025 this number should reach upward of 5 billion dollar in the United States alone. How? With teams like ours, the Phantoms, continue to innovate the drone, while amplifying it's daily use for all markets. Who knows, maybe one day you might get your pizza delivered to you by a drone, if it means shorten deliver time and increasing profit it's a win win for the business if the drone can perform up to standards.

## Results

### Improvements

DJI Phantom 3 Standard Drone has had a lot of success among young people who have enough experience to fly a drone. “Phantoms” want to spread its popularity among people of every age. That is why the team has introduced improvements such as:

- **Floaters** - They allow the drone to land in water, which makes the product suitable for any kind of environment. They will be made out of plexiglass in order to reduce the total weight of the drone but keep the drone durable.
- **Propeller's protector** - Although these are very common among drones, the DJI Phantom 3 Standard Drone does not provide ones. For that reason, the team has designed a new concept of propeller protector that will increase the drone stability and safety especially while the plane is flying.
- **Lens protector**- This new accessory will contribute to the durability of the camera, shielding the camera from any dust that can cause damage to the camera when it is not in use.
- **Solar Panel**- The team will also add a solar panel on top of drone in order to increase the time of flight, and as a way of absorbing solar energy and use it as a backup generator for landing if during flight the drone loses power.
- **Paint Job**- The team completely redid the paint on the drone to fit an Iron Man theme throughout the drone. The name assigned to the finished product is “The Iron Drone”, to relate with theme of the colors. The sole purpose of this was for aesthetics making it more pleasing to the eye.
- **Carbon Fiber**- Since the objective of the team is to improve durability and reduce the weight, carbon fiber is essential to make the drone exclusive.

The Economic Impact Of The Commercial Drone Sector  
Direct economic impact from the UAV industry in the United States (billion U.S. dollars)

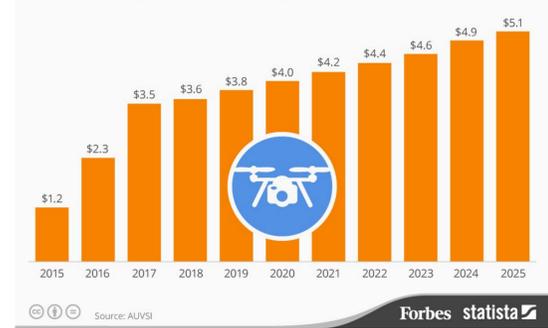


Figure 3. UAV industry economic impact in the United States until 2025.

## Scientific Merit

Drones have the capability to transform business and the technology is mature enough to be rapidly adapted to accommodate all sorts of problems. The introduction of drones into the workplace will create cost savings, reduce human risk, and save time on operations. The goal of this project was to enhance drone technology and uncover new applications for this machinery.



Figure 4. Real life standard model in action (Brodkin, 2015)

### 40 Uses for Drones

Practical applications for Unmanned Aerial Vehicles

1. Disaster & hazard monitoring
2. Emergency disaster medicine
3. Emergency response
4. Disaster relief & post-disaster assessment
5. Search & rescue
6. Crime scene investigation
7. Criminal surveillance & tracking
8. Police response coordination
9. Security surveillance
10. Training & evaluation
11. Chemical & biological monitoring (pollution, pesticides, herbicides...)
12. Inventory & monitoring
13. Inventory & monitoring
14. Pest & disease detection & management
15. Precision agriculture & management
16. Environmental hazard assessment
17. Environmental impact management & compliance
18. Invasive species & pest control
19. Wildlife & habitat monitoring & protection
20. Environmental hazard assessment
21. Construction management
22. Environmental assessment
23. Infrastructure engineering
24. Landscape architecture, Urban design
25. Mapping (archaeology, resource, topography...)
26. Site analysis, planning & design
27. Advertising & marketing
28. Art (commercial design, fine art, social practice...)
29. Entertainment (film, television, live events...)
30. Investigative journalism
31. News photography & videography
32. Aero-technology (robotics research & development)
33. Documentation (incident reporting, building verification, site status...)
34. Exploration (water, oil, gas, mineral...)
35. Infrastructure (agriculture, medicine, industrial...)
36. Pick-up & delivery services
37. Exploration
38. Group activities & events
39. Hobby (do-it-yourself & kit builders)
40. Personal photography & videography
41. Remote control flying

Figure 5. 40 uses for drones in the future (Pinterest 2017)

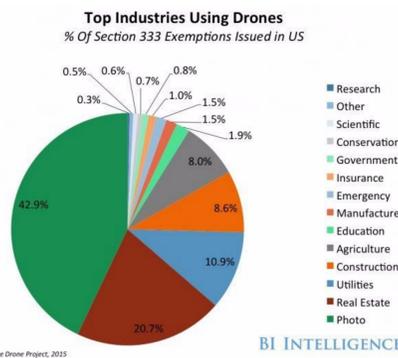


Figure 1: Top Industries Using Drones (Andrew, 2016)

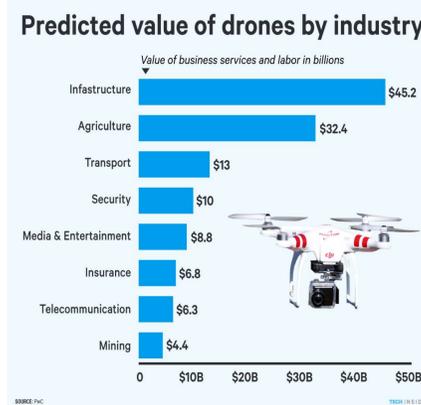


Figure 2: Predicted Value of Drones (Divya, 2017)



## Cost Analysis

Table 2. Cost evaluation done the the drone for specific parts. All information was found on Amazon

Part Name	Quantity	Price of Each Part (In dollars)
Main Blades Propellers	4	1.25
2.0MP HD Camera	1	9
4GB SD Card memory	1	7
3.7V 650mAh Li-poly Battery	1	15
High-speed reader	1	10
Toughness bumper cover	4	7
USB charging cable Chronos	1	5
Transmitter	1	13
Motor	1	4
Landing Gear	2	1
Upper Body Cover	1	5
Lower Body Cover	1	5
Motor Cover	4	3
Electrical Board	1	4
Gears	4	1
Motor Holder	4	0.5
Mini Encapsulated Solar Cell Epoxy Solar Panel	1	10
Propeller Guard	4	1
Floaters	2	7
Camera Lens Cap Protector Cover	4	6
Iron Man Paint Job on Carbon Fiber	1	25
<b>Total</b>		<b>\$180</b>

## Methodology

Table 1. Project activity shows the steps we took to complete the project. For more information ask the members

Project Activity	November			December			January					
	1	2	3	4	1	2	3	4	1	2	3	4
Preliminary Ideas and planning												
Research and inputs												
Preliminary Design												
Refinement of Design												
Analysis of Data												
Finalising Design												
Drafting of report												
Finalising report												
Preparation for presentation												
Finalise Presentation												
Prepare documents for submission												
Represents the team's forecasted schedule												
Represents the actual progress of the team												

## Conclusion

The overall management of the project has been successful. Productivity was going well, considering how the members worked as a single unit; organization and communication being the reasons. It began with the design process, as each member chose parts and measured, which then led to sketching, before creating the parts on CATIA. There were 15 parts in total, and divided evenly among the members. There were deadlines set for the parts, and goals were accomplished within the timeframes.

For the our product, the Iron Drone, came to a total cost of \$180 with all the improvements added to the original drone only increase the price by \$71. By adding a solar panel, lens protector, floater, guard, and a unique paint job we overall enhanced the abilities of the drone as well as the overall aesthetics. We kept the original drone material, hard plastic and steel, almost identical to keep the low price and the durability. The final drone was a complete success, our altercations all fit in very well into the simple drone. In this case we all agreed to schedule group meetings in a more organized matter to allow for any adapting and also at an earlier time in the day. If we had more time instead of plastic, the material will be carbon fiber to improve durability and in case of impact, the drone will absorb shock better. However, the team consider that it was an overall success.

## References

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