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## **Podcast Episode #6 – How a drone company overcame the limitations of indoor applications for restaurants, warehouses, with Junyang Woon, of Infinium Robotics, Singapore**

### **RAW TRANSCRIPT OF INTERVIEW**

**Balint:** Today I have a special guest who is truly passionate about a topic that is truly hot today, which is the field of drones and robotics. I'm interviewing Junyang Woon, CEO of Infinium Robotics, which is a company based in Singapore. Welcome Junyang to this episode.

**Junyang:** Thank you so much for having me here.

**Balint:** Your drone technology usage has generated quite a lot of publicity in new media in recent years, actually in the whole world, including coverage by BBC, CNBC, Bloomberg, even in Germany, Bild, just to mention a few major news outlets. You are apparently at the forefront pushing out the limits of what drones can be used for. Can you tell us about your company and actually what was your motivation for founding it?

**Junyang:** Ok, thank you for having me here. I'm the founder and CEO of Infinium Robotics. We started this company about 3 years ago and we actually want to focus drone technology in a very few applications. Drone actually technology has been existent for many, many decades, and it's only in recent years where the cost of components of producing drones has dropped significantly such that it can be used by everyone, consumers or business and therefore the uses of drones and applications of drones has grown tremendously. So at Infinium Robotics, we are actually focusing on indoor applications of drones. Why? So for drone technology there are a lot of concerns by the public regarding safety about whether you will hit someone or secondly whether you will invade privacy issues. So in Infinium Robotics we want to go around these issues and make sure that we apply the drone technology in areas and applications where these issues are not of concern. One of the areas where they want to apply drone technology is indoors. Why? Because you not only have no privacy issues because it's within a very confined space, secondly having a drone dropping on someone's head is much reduced because you're in an indoor environment, you're not flying the drones outdoors. Thirdly, it is also due to regulations; right now there are a lot of regulations preventing drones for being usage for many outdoor applications. Why? Because regulators are afraid that drones will collide with passenger airplanes and it will cause a mid-air collision, or even damage to the airplane so it's a safety concern. So in Infinium Robotics we want to apply drone technology which has advanced for many many years to areas where it has not been used before, such as in the warehouse where we use drones to do stock-taking. Stock-taking is actually one of the most tedious warehouse operations that the warehouse operator need to conduct. This is done usually once a month or even sometimes once a year for bigger warehouses. It's so tedious, you have to count



every single good on the rack along the warehouse, and the houses are also quite high, the height can be as high as 10 or 15 meters depending on how big the warehouse is. So the best way is to use an automated process, and how this automated process can be used is by using robots like drones. Why drones are best suited for this application? Because it can fly at high altitudes, so it can fly from zero meters to 15 meters in the warehouse. Of course there are challenges when it comes to applying drone technology in an indoor environment. Right now in the drone market, about 99% of the drone applications are based outdoors. Why is it so? Because in an outdoor application, GPS positioning is much more readily available which means when it comes to applying drone technology indoors, the GPS signal will be very weak. and it will be very difficult to rely on traditional positioning technology like GPS. Although it's the cheapest means of positioning methods available, but it is not available indoors. So even though there are a lot of benefits, advantages, such as there is no privacy issue, there is less minimal safety issue, and there is no problem with regulations but when you fly drones indoors, you have problems with positioning system and that's where Infinium Robotics has done a lot of years of research and we're putting a lot of effort to make sure that we're able to fly the doors indoors and not only only autonomously.

**Balint:** May I interrupt just for a second? You mentioned that this is where you've done a lot of work in recent years. Does it mean that you did more work on the software side or on the hardware side?

**Junyang:** Actually, we have done a lot of work both on the hardware and software side. Our research did not only start 2 years ago, before the company started; it started way before the company was started, by a group of researchers. We had the technologies to fly multiple drones simultaneously without colliding, so we have, I'd say, anti-collision trajectory planning for our drones so that we can fly many drones at the same time. And also while we are working on this solution for the warehouses, we are also coming up with new navigation technologies, positioning technologies that we can use in an indoor environment, like a warehouse.

**Balint:** Talking about the safety aspect, you mentioned that this is a concern for outside usage, I went a conference in 2014, a TEDx Zurich conference, where there was a presentation by Sergey Lupashin about Photokyte and he was talking about this, that he came up with a solution for outdoor usage, exactly for this reason, when you're above a crowd and you have a battery-powered drone, if the drone loses power because of lack of energy from the battery, it can fall onto the crowd, and he came up with a tethered drone, where the battery is on his back. What about the indoor usage, you don't have such issues?

**Junyang:** Ok, to be frank, having the battery problem resolved means having the drone tethered to the ground, and providing a constant electrical power to it, it's just one of the safety concerns that's been resolved. Even when the drone has enough power, things can happen to the motors, as well so there are still other ways how the drone can fall onto the ground, even if there's enough power. But the main concern is that if you're outdoors, if the drone flies above people's heads, the people on the



ground may not be aware that there's a drone flying above, so if a drone pilot flies a drone somewhere in a public, urban area, if he's not careful enough, the drone may actually crash onto the people underneath. So there's the risk that you fly drones outdoors, because we assume that the drone can fly anywhere outdoor as long as there's enough GPS signal and as long as the area is clear enough for the drone to fly, so a drone can fly anywhere, so it can fly in public or not so public areas. But when it comes to indoors, the technical issues still remain the same, however the risk is much reduced, because firstly, you're not flying as high as when the drone is flying outdoors, in other words, the area in which the drone could fall is not that much, so you fall within the space in which it was flying above, so if you're flying at 10 meters, you know that it roughly drops within 1 or 2 meter if something goes wrong. Most importantly in an indoor environment everyone who is in the same indoor environment knows that there's a drone flying, so everyone can avoid going under the drone, which is a main, key point, whereas outdoors it's very difficult to prevent that.

**Balint:** The regulations currently, at least in Singapore, allow drones to fly indoors like that as you described?

**Junyang:** Yes, correct. In fact, in most countries, flying indoors is outside the jurisdiction of the civil aviation authorities, because there's no concern for the drones to hit any of the airplanes that are flying in the sky because it's flying indoors anyway.

**Balint:** What was the motivation for founding this company?

**Junyang:** Actually the motivation for founding this company is that I previously worked in the military where I also dealt with drone technology and I'm from Singapore, and Singapore is a small country with very high labor wages and there's the problem of aging population in Singapore, as well, so the Singapore government has been trying to encourage technologies like robotics to improve productivity in industries where labor is very intensive, so for example logistics industry or other industries where manpower cost is relatively high. I thought to myself, instead of using drone technology in a military way, can it be used for civilian purposes as well? That's why I thought of founding this company, to help these industries to improve productivity, by using drone technology which is traditionally related to other non-peaceful means.

**Balint:** So you married your passion, your professional background in the military with the opportunity that offered itself, which is basically the essence of being an entrepreneur. What are the other applications for your drones? Currently you mentioned that one application is indoor for warehouses, but I also came across



some other interesting application, where you could be the first one to come out onto the market.

**Junyang:** There are other applications, such as using drones to deliver food items in restaurants. This is one of the showcase we've done online and I believe a lot of online media has picked it up. We actually showcased this technology in the food and beverage sector because we want to show the world that indoor drone technology has a place to play in many developed countries, where manpower is expensive and waiters, waitresses can be used in more higher value tasks, like speaking with the people, with the customers instead of doing mundane task of transporting food in and out of the kitchen which can technically be done by robots. Whether it should be done by ground robots or drones is a matter of discussion or debate but we wanted to showcase that our company, Infinium Robotics has the technology to deliver this drone technology in food and beverage sector.

**Balint:** How does the status of this application look like regarding deployment?

**Junyang:** We are in the final stages right now deploying drones in the warehouses, as well as in the restaurants. We are expecting the market for the warehouses in higher demand as compared to drones in restaurants because some restaurants may not want a drone to deliver food; some may want a ground robot to deliver food. Whereas in warehouses we have done some technical studies and business case studies that there's a large use case of drone technology in a warehouse to do especially like stock-taking.

**Balint:** Would you like to deploy especially the warehouse application, so the robots for this application geometrically constrained, so only in Singapore or you're looking at customers also in other countries, for example in the US?

**Junyang:** Oh yes, we're looking at customers everywhere else, because Singapore is just one stopping point, one market area we're targeting. Obviously, Singapore is a good market to target because it's one of the largest transit shipment hub of the world and one of the busiest ports of the world and the container shipping is one with the largest volume, the other ports that are comparable are like Rotterdam or Shanghai, for example so Singapore definitely ranks as one of the top. So there's a huge logistic sector in Singapore that handles the large amount of goods that flow through Singapore. There's a huge market to target in Singapore, especially because Singapore is a high labor wage country. I believe there are other countries similar to Singapore, like Switzerland, definitely it's one of the key markets and of course Europe. US is also a market that has a high labor wage, as well. So we're definitely looking at automating this process for these warehouses in the logistics sector.



**Balint:** I'm amazed by the importance of a business model, having a working business model, not only the technology itself, but also how it fits into the big picture. Regarding the business model, how did you put it together and validated the different aspects of this business model?

**Junyang:** You have touched upon a very important point. Business model is very important for every startup. So how we actually came up with the business model: one of the best ways of validation is talking to the customers. Like, for me, I'm in the robotics industry, I'm not in the logistics industry, but we are delivering a solution to the logistics industry, therefore it is important to understand their mindsets, and what is their concerns, what they need. These are the questions we should ask our potential customers and through asking these questions, you actually find out what is the main concern of these customers and if you can meet the need for these customers. So for the current business model we had to get industry data for example, then we have to look at various prices, costs, like wages, comparable solutions on the market, the size of the industry, the market, so all this would form together a part of the business plan. Of course, this is just the theoretical side of it. What we need to do also is to validate this theoretical model with the customers: ask them, if I charge this price, it is still something that you wanna consider buying. So this can actually help us to validate our business model.

**Balint:** When did you found the company, at which stage, was it during the validation or before or after?

**Junyang:** I founded the company after the validation of the technology and so after I founded the company, then I continued with the validation of the business model. So it is an on-going process, because I don't think you can get it right the first time, unless you have been thinking about it for many many years. Then it could be possible to get it right the first time. For me it took quite some time before I got the business model right.

**Balint:** As for the funding aspect, which is also another important topic, for the company to operate, especially at the beginning, how does the situation look like for you, how is the the company funded?

**Junyang:** The company was founded using seed funds from angel investors, and also we had financial support from the government and this actually helped to push the company to this stage.

**Balint:** Where do you manufacture?



**Junyang:** We actually manufacture currently in Singapore for lower quantities, but we expect to have the need to manufacture in a lower cost countries, such as China or Taiwan, once the volume has increased. There are pros and cons for doing that, but we prefer at the earlier stages to have a closer control of our quality. That's why we wanted to have the manufacturing base where our research is done as well.

**Balint:** Let's move on now to the so-called ultrafast round of questions. This means, I will ask you 4 questions and it would be great if you could answer these short. The first question is that if you could time-travel like in the movie Back to the Future, to the time when you were in your twenties, what notes, recommendations would you take back from now to give yourself?

**Junyang:** I would say, dare to try earlier, to not be afraid of making mistakes, especially in the early twenties, because you have so many more years down the road and you can recover from any mistake you make. If you don't try, there is no risk, then there's no gain. That's what I'd be telling myself.

**Balint:** I think it's very good, there are many people, who have it in their mind somehow, but it doesn't actually surface, this thought. The second question: if you had to name one book, which one had the biggest impact on your professional career?

**Junyang:** There are a number of books which has impact on my career and how I conduct my business as a leader in a company. The Seven Most Effective Habits of a Leader is one of the books that I would recommend, that's by Steven Covey. I think it touches on a lot of core principles in which these can help to make your life more efficient and effective, and also to deal with the people around you

**Balint:** It's also on my list. The third question: I'm amazed by people's habits. What is your habit, your daily routine, morning, evening routine?

**Junyang:** Well, the routine I have is pretty simple, which is that the first thing I wake up in the morning, I look through the emails, of course you have to kiss your loved ones, it's very important. Then after that it's going to the daily grind of doing things, but I would say, the first 15 mins of the day I look through the calendar, what I have to do, after I wake up, and then I visualise how my day will look like so then I will have an easier workflow for myself. Towards the end of the day I also reflect on what has happened during the day, so if there are mistake that were made, I make sure that I learn from the mistakes, not to repeat them again in the future. If there are things that I've done well, I look at why I've done them this way and if there are any better ways how I could improve it. So this is the kind of daily routine I have.

**Balint:** Yes, I think these are quite powerful to form your habits, and in the morning to get into a good mood and at the end of the day to learn from your mistakes, but also from what was working during the day. The last question: in your work you're in





Singapore but you're communicating with worldwide customers; what are the critical cultural differences that you encountered during your work and how did you resolve those issues?

**Junyang:** Time difference is one of the major issues that we have to deal with, when it comes to video conference calls and to do with the sales partners or customer from another country. Apart from that, there is actually not much cultural differences that you would expect, apart from the known, detailed characteristics. I think doing business is pretty much the same way in developed nations, but when we venture into more developing nations, we have to pay special attention to local jurisdictions, and to the local way of doing business. For example in some countries, you can never sell a foreign product in a country unless you have a local partner. So there are some countries in Asia, for example, countries like Vietnam or Myanmar or even to some certain extent Korea or Japan, because they have their own unique languages and English is not widely spoken in these countries. So it is important to have a local partner.

**Balint:** So, Junyang, let's wrap it up, the interview. I appreciate very much, the interview. You, listener, I hope you could also learn something about drones and in which direction the industry is going. As a last question, what is the best way for the listeners to reach you, Junyang?

**Junyang:** Well, the best way to reach me is through our website: [www.infiniumrobotics.com](http://www.infiniumrobotics.com). There is a contact us form that you can fill out. Contact us if there's anything the listener requires

**Balint:** Are you on social media as well?

**Junyang:** Yes, we are on social media as well. We are on LinkedIn, Facebook, as well.

**Balint:** This is also on your website. So again, I appreciate and I'm looking forward to seeing one of your drones here in Switzerland.

**Junyang:** Definitely. Thank you so much for this interview.