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The Aircraft Turing Test



Robert Plant, Associate Professor, School of Business Administration, University of Miami
6/12/2013
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The use of big data could bring unmanned flight to domestic markets, but the public will need to be won over first.

Pilotless drones

We have all seen pictures of "Unmanned Aerial Vehicles" (UAVs), or pilotless drones, as they are more commonly referred. These are usually small Predator or Reaper drones, made in the USA by General Atomics at a cost of approximately £6 million each, which are sent on search-and-destroy missions over enemy combatants in far-off lands. While these systems can fly autonomously using the big data from both onboard and external sensor systems to assist in avoiding enemy installations and deploy payloads, they are still are "piloted" by remote operators, potentially from anywhere on the planet.

But these Gen 1 and Gen 2 systems are just the precursor vehicles to much more sophisticated systems under development, such as Northrup Grumman's X-47B Unmanned Combat Air Vehicle, specifically designed for use on US Navy aircraft carriers as part of the \$813 million Unmanned Carrier Launched Airborne Surveillance and Strike System (UCLASS). In May 2013, the X-47B achieved two milestones, a launch from a catapult and a "touch and go" landing on an aircraft carrier, the USS George H.W. Bush (CVN 77). A complete landing is potentially scheduled for trial in the summer, following in the tire tracks of an F-18 that made the first successful landing on a carrier in 1994.

Non-combat unmanned flight

Civil aviation is also looking at the possibilities of unmanned flight. In the UK in May, just as the X-47B was being shot off the end of the aircraft carrier, a Jetstream 31 flew "unmanned" across the UK, sharing airspace with craft piloted by humans. The project was part of a Unmanned Aircraft Systems (UAS) test by ASTRAEA (Autonomous Systems Technology Related Airborne Evaluation & Assessment), a "UK industry led consortium focusing on the technologies, systems, facilities, procedures and regulations that will allow autonomous vehicles to operate safely and routinely in civil airspace over the United Kingdom" and funded with a £62 million of investment.

Similarly, in the US, the FAA is looking at testing systems so that airspace can be shared between "piloted" and unmanned aircraft in the same systems by 2015, and by 2018 there could potentially be in excess of 15,500 unmanned aircraft in FAA controlled airspace.

The public acceptance

The technology of pilotless flight is thus well on its way, and the infrastructure is being built to manage the congestion of pilotless craft above our heads, but the question remains as to whether the public would accept getting on an airplane without a human pilot on board. To this end, I propose an Aircraft Turing Test, along the lines of: If you were to get on an aircraft and it completed its task of delivering you safely to your destination and you could not tell if it was a human pilot or a computer, then the system would have in fact passed the test (we can assume that a pilot is on board just in case until the test has worked 100 percent over an extended time). Of course, this is the ultimate big data test, placing a human life directly in the control of an automated system, yet we trust other autonomous systems with our lives: elevators, existing auto pilots, and even space ships such as Apollo or the Shuttle, where the astronauts had very little direct operational control once the countdown was complete.

Perhaps the progression to autonomous flight would be stage-based. My father was a train driver back in the glory of mainline steam in England, when the trains were always on time, yet they did not have even a speed gauge on the footplate (the area the driver stood with the fireman). Eventually, the two-driver system was replaced by a single driver and computerized decision support systems, and in turn the sole driver was deemed unnecessary leading to the driverless trains in minimally complex environments such as airports, to which we trust our lives. Aircraft are not alone in this passenger trust relationship; we are seeing the same thing happen with driverless cars, such as that from Google. A Cisco research report of 1,514 customers aged 18 and older found that 60 percent of the Americans surveyed would place their trust in driverless cars.

So perhaps the same thing will happen with aircraft. I asked my two pre-teen children if they would fly a plane without a pilot; this resulted in a resounding "yes," with the rationale being "autopilots are more reliable than people" -- so, based on this informal study, perhaps trust in technology is a generational matter. Personally, I'm dubious, as the Turing test itself for AI has yet to be passed categorically. I think I will wait for that to occur before I get on a plane with just an "On/Off" button on the dashboard, and I will continue to say a big thank you to the pilot as I disembark.

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SharCo, User Rank: Petabyte Pathfinder
7/4/2013 | 6:09:58 AM

Re: It is not only the lives of those in the plane

I'm always all for back-up systems. If autonomous fails, simply switch over to manual. This can be easily incorporated, and even if not, I think having this option--which can definitely save lives--would be useful and beneficial.

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Mike Lata, User Rank: Blogger
6/19/2013 | 1:04:17 PM

Re: Taking it through series of tests !

I think that unmanned aircraft technology is advancing at a rapid rate just as unmanned cars are evolving. Big data is definitely making an infounde in this regard, along with other technologies that are making it impossible. The problem with all of these initiatives is that they bring less control to us and more control to the govt. or other companies. We still want some controlover our lives, or at least I do.

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Qasim Bajwa, User Rank: Gigabyte Governor
6/14/2013 | 4:08:42 AM

Taking it through series of tests !

Not completely negating the idea, because it involves innovation, and I'm so IN for innovation. Maybe if the system is first tested on smaller aircraft, personal jets, Hell's, maybe it will catch attention.

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About Drones, well in military it's not always winning, things do tend to go otherwise. Drones are becoming a useful asset to the Forces because of its NO loss of risk at all at ONE end, the remotely controlling pilot and the strategic team making use of the drone on sight are not harmed by anything that happens with the drone mid air or in combat.

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Qasim Bajwa, User Rank: Gigabyte Governor
6/14/2013 | 4:03:45 AM

Re: It is not only the lives of those in the plane

Rationally speaking, I think Daniel has a point here, what if the system suddenly fails a division by zero check forgotten by the developer at the production site? Will there be a pilot to take over control of the plane I'm flying in? I think not, because that would really not fit the whole concept of autonomous airlight.

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Even for cargo planes, Risk still is high. I think further advancements in autopilot can be made but completely taking human pilot out of the picture, I don't know including me many wouldn't be able to absorb the whole idea. It's going to be a long road of acceptance.

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Saul Sherry, User Rank: Blogger
6/14/2013 | 3:50:02 AM

Re: It is not only the lives of those in the plane

Point well made and taken - so what is there is a wider exploration of what you have already pointed out on the DLR? An entire nation's train networks run automatically. Big data would of course play a role, by removing the human role could efficiency be boosted in a way which was noticable? A properly built railnetwork with sensors all along could cut down on service outages (getting to problems before they happen)...

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James M. Connolly, User Rank: Blogger
6/13/2013 | 1:10:55 PM

Re: Real Time Reality

@saul. Even with an unmanned cargo plan we're talking about more than 100 tons of steel, aluminum, jetfuel, and your cows falling 35,000 feet onto someone's house. That isn't a pretty sight.

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miguelmalvarez, User Rank: Bit Player
6/13/2013 | 12:33:38 PM

It is not only the lives of those in the plane

The problem is, as @James explains, not only a the people inside the plane, but that the a crash can cause (potentially) much damage. I know this could be a relatively small probability for countries with disperse population (e.g., USA or Australia) but potentially the damage can be massive. Imagine a crash in the middle of a city...

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If pilotless planes are allowed for non-human transportation and something goes wrong, someone would have to make sure that the plane either lands or it crashes in a non-populated area.

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Saul Sherry, User Rank: Blogger
6/13/2013 | 12:25:02 PM

Re: Real Time Reality

Let's explore this... what if there were cargo planes? So no lives on board (except maybe a few cows here and there) - would we embrace that possibility?

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James M. Connolly, User Rank: Blogger
6/13/2013 | 10:15:39 AM

Re: Real Time Reality

I'll join in the chorus of keeping a pilot on board but turning more of the control over the technology. It would let airlines (don't forget about the big cargo carriers like FedEx and UPS) to eliminate the copilot while being confident that the computer is unlikely to go to sleep.

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Going completely pilotless is a step too far for me. I have visions of a real "blue screen of death".

On a serious note there have been some instances of runaway planes, one of the best known probably being the private jet carrying pro golfer Payne Stewart a few years ago. A pressurization malfunction of some sort killed everyone on board but the plane kept flying over the US midwest. The Air Force followed it for a couple hours until it ran out of fuel and crashed. Even though it appeared that nobody was alive on board what could the fighter pilots do? Whether they shot it down or let it crash there was the risk that people on the ground could die.

Let's avoid having to make that decision with a jumbo jet full of passengers. With an electric subway train you can turn off the power. There's no safe option for a plane. I'll let someone else take the Turing test.

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miguelmalvarez, User Rank: Bit Player
6/13/2013 | 6:01:57 AM

Re: Real Time Reality

I completely agree with @Saul and @Daniel. In my case the "line" to decide if a transport system is suitable to be 100% directed by a computer is the following question:

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"if something goes wrong, can we push a button, stop all systems and be safe?"

This would be, at least relatively, true for almost all transport systems with the exception of planes.

However, some people would say that the whole plane is already full of code and electronics... I think it is a good intellectual discussion, but I would like that a person is in the cabin.

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