

# Über drones

**Pentagon wants tech that can zap targets anywhere in under an hour. Some are reassured, others nervous**

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# 10 questions for the

*We decided to pose specific, written questions about aerospace to the presidential candidates in the belief that you live in a world of facts rather than campaign platitudes. Did the candidates rise to the challenge? You be the judge.*

## 1. NASA has been criticized for not having a vision. What is your vision for NASA?



**Bernie Sanders:** NASA may not have a single overarching goal like the one it had in the 1960s, but the agency continues to play a critically important role enhancing our understanding of our planet and the universe, and incubating technological advances that have widespread public benefit.

Human exploration of Mars does seem to be emerging as a top goal of NASA. As I will elaborate below, my administration would consult with stakeholders — including Aerospace America — to prioritize where to focus NASA's efforts.

That said, the value of NASA should never be underestimated: Its work paved the way for technological advances such as advanced computers, cellphones, global positioning systems and other satellite communications. NASA's innovations help keep us connected, track sea level changes and drought conditions, save lives and minimize damage during hurricanes, earthquakes and forest fires.



**Donald Trump:** NASA has been one of the most important agencies in the United States government for most of my lifetime. It should remain so. NASA should focus on stretching the envelope of space exploration for we have so much to discover and to date we have only scratched the surface. At some point, humans will need to find alternative energy sources, living space and greater technological innovation if we are to thrive as a world society. NASA should be on the point as we go forward.

### EDITOR'S NOTE:

The Kasich campaign declined to respond to our questions, but submitted an essay from an adviser (page 34).

The Clinton and Cruz campaigns had not responded by press time.

## 2. Do you think the U.S. spends too much on NASA, too little or is the budget about right?

**Sanders:** I support fully funding NASA, not only because of the potential of space exploration and revealing the mysteries of our universe, but also because of the many benefits our society receives from cutting-edge NASA research.

However, I am not prepared to say what the appropriate funding level should be for NASA until we get a handle on the revenue side of the budget. Otherwise, it is a zero sum game: To increase funding for NASA just means cutting some other domestic discretionary program.

We live in an era of manufactured budget crises because for decades, we have given massive tax cuts to the wealthiest Americans and hugely profitable corporations — and then we debate which agencies and programs to cut. As president, I will demand that the wealthy and large corporations pay their fair share in taxes, which will allow us to adequately fund the programs and services that bring widespread benefits to the American people — including NASA.

**Trump:** I am not sure this is the right question. What we spend in NASA should be appropriate for what we are asking them to do. We also have to balance our spending priorities based on our economic circumstances, and right now, those circumstances are quite challenging. Our first priority is to restore a strong economic base to this country. Then, we can have a discussion about spending.

# candidates

### 3. Would your administration continue planning to send astronauts to Mars in the 2030s? Why or why not?

**Sanders:** In the short term, I would continue planning for human exploration of Mars. However, as I mentioned above, this will require an “all-in” effort by the agency that my administration would evaluate in consultation with stakeholders to determine NASA prioritizes.

**Trump:** A lot of what my administration would recommend depends on our economic state. If we are growing with all of our people employed and our military readiness back to acceptable levels, then we can take a look at the timeline for sending more people into space.

### 4. What do you see as the role of government in space exploration compared to the private sector?

**Sanders:** While space exploration was once the exclusive realm of governments, the private space industry is increasingly commercializing space tourism, satellite launches, and more. This shift coincides with the U.S. government pullback from space exploration — exemplified by the end of the shuttle program, and the globalization of both government-sponsored space exploration and industry-sponsored investment.

The rise of the private space industry has many benefits, but it also raises serious issues, including safety and national security. Irrespective of a growing private sector space industry, there will always be a critically important role for government research, development and implementation, particularly in areas where there is no clear profit motive but where there is a huge potential return for the public.

Research at federal agencies like NASA, the National Science Foundation and the National Institutes of Health have launched countless technologies, new drug treatments and medical devices, cleaner air and water, better nutrition, and many consumer products that have benefited humankind in so many ways. Federal research and development also plays a critical role incubating ideas that the private sector later harvests: creating jobs, hundreds of billions of dollars a year in economic activity, and significant new tax revenues. There simply would be no private space industry without the groundbreaking work of NASA.

We need to support government-sponsored research to incubate the next wave of innovation and generate new knowledge and ideas that will help regain our economy’s competitive edge and improve the quality of life for Americans and all of humankind.

**Trump:** This is a great question. I think there needs to be a growing partnership between the government and the private sector as we continue to explore space. There seems to be tremendous overlap of interests so it seems logical to go forward together.



## 5. What do you think should be done to improve tracking of commercial aircraft?

**Sanders:** I find it incredible that two years since flight 370 vanished and more than six years since the disappearance of Air France flight 447, commercial flights are still not required to have tracking technology to locate aircraft when “flying black.”

While I would prefer the International Civil Aviation Organization to adopt global standards for aircraft tracking, I believe that should ICAO fail to act in a timely manner, Congress should enact requirements for all U.S. flagged airships and foreign flagged planes that fly in U.S. airspace. Not only would this improve airline safety, but also it would be enormously helpful in terms of national security.

However, flight tracking is just the first step. The goal should be to move toward the ability to stream data in real time from aircraft that are experiencing an emergency.

**Trump:** Technology will allow us to do more in the future. Using space assets seems an idea worth exploring. If it is economically feasible, placing tracking satellites in orbit may be one step on the way to better international flight safety.



## 6. How great an impact do you think commercial aviation has on climate change and would your administration continue NASA's Environmentally Responsible Aviation program?

**Sanders:** While the aviation sector produces less than 3 percent of human-caused carbon dioxide emissions, it is imperative that the fast-growing industry continues to improve aircraft efficiency and seek alternative biofuels to displace traditional hydrocarbon-based jet fuels. To my mind, climate change is the single biggest environmental threat facing our planet, and we must drastically reduce carbon emissions from the combustion of fossil fuels if we have any hopes of avoiding its worst consequences.

The federal government and the aviation industry must work together to develop viable biofuels that meet the understandably rigorous quality requirements for high performance aviation fuel. That is why I strongly support government-funded research into low-CO<sub>2</sub> aviation biofuels, including NASA's Environmentally Responsible Aviation program. In 2013, I introduced the Climate Protection Act that would triple funding for advanced energy research, including biofuels research.

I am optimistic about recent advances in advanced biofuels – including those derived from oil crops like *Jatropha* and *Camelina*, cellulosic ethanol, waste fats and oils, biomass sugars, and algae – that could not only move us away from fossil fuels, but also provide an economic boost to rural economies in many parts of our nation.

**Trump:** I think the level of impact commercial aviation has on climate change is minimal. We should spend our resources on programs and activities that advance and protect the interests of the United States.

## 7. What is your position on development of technologies for a supersonic air transport?

**Sanders:** While I understand the allure of civilian supersonic travel, given the enormous challenges facing our country, this would not be a priority for my administration. While I do support NASA's High Speed Civil Transport re-

**Trump:** The free market will determine if supersonic air transport is feasible. I trust the free market system to inform of when and how this is to be done.

**SANDERS' RESPONSE, continued next page**

**SANDERS' RESPONSE, continued**

search program, I do not believe we should be investing significant additional taxpayer funds on something with such limited public benefit.

I believe the private sector should and will respond when and if there is sufficient demand for civilian supersonic transport. In the post-Concorde era, that response seems to be limited to the design and early development of business jets, an industry that does not, in my opinion, need subsidy or support from the federal government.

**8. Should drones be allowed to travel in U.S. airspace alongside piloted aircraft?**

**Sanders:** Clearly, the domestic use of drones has enormous potential for commercial and public safety applications. In my state of Vermont, public agencies are using drones to monitor remote roads and rivers during storms, and out West drones have been enormously helpful fighting wildfires.

The recent surge in availability of unmanned aircraft has created a host of issues related to privacy, safety, nuisance concerns, and differentiating between recreational versus commercial use of these craft. Many model plane enthusiasts believe recent FAA rules are too restrictive, while many businesses want to see a loosening of limits on commercial activity. Meanwhile, civil liberties groups are concerned about the potential for violations of personal privacy, and overreach by government agencies. Moreover, the FAA is becoming increasingly concerned about model airplane operators who endanger the safety of others because of reckless use of model aircraft.

Clearly, there are competing interests that must be weighed against each other. As a bottom line, I believe domestic drones must not negatively affect the safety of commercial or general aviation. Moreover, given the sordid recent history of NSA [the National Security Agency] spying on Americans, we must have a national discussion on the privacy ramifications of drones to balance use of these aircrafts with the right to privacy.

**Trump:** Right now, it is hard to fathom drones operating in the air route structure of the United States. It seems prudent to keep drones and manned vehicles separate until technology has improved and our ability to deconflict is more certain.



**9. What would be your administration's top defense priorities in aviation and space?**

**Sanders:** Under a Sanders administration, the U.S. will continue to have a strong national defense program that will meet our domestic and foreign challenges, including a robust Air Force and Air Reserve component. However, getting our country's bloated military budget under control will be one of my top priorities. At a time when our national debt is more than \$18 trillion and when we spend more on defense than the next nine countries combined, we can address the rampant waste, fraud and financial mismanagement that have plagued the Pentagon for decades, without negatively affecting military readiness.

**Trump:** In military aviation, to explore all options that improve survivability and lethality. In space, to make sure we have redundant and robust systems to satisfy navigation, surveillance, communication and other needs.

## 10. How would you rank government spending on aviation and space technologies compared to other priorities?

**Sanders:** I would not rank these priorities against other domestic needs. However, I will say that in regards to aviation, our airports are clearly not keeping pace with increasing passenger and cargo demand.

The North America Airports Council says our airports need \$76 billion over the next five years to accommodate growth and improve safety by replacing antiquated 1960s radar technology with a new satellite-based air traffic control system. The FAA estimates airport inefficiencies cost our economy almost \$25 billion a year.

We must make it a priority to pass a long-term FAA reauthorization bill that fully funds the Airport Trust Fund and lifts the cap on passenger facility fees. However, we must go much further. That is why I introduced the Rebuild America Act last year, to modernize our nation's infrastructure, from roads and bridges to the electric grid and broadband. The bill would invest an additional \$12.5 billion over five years to improve airports across the country, and \$17.5 billion to deploy NextGen satellite technology that will make our skies safer and our airports more efficient.

**Trump:** This, again, may not be the right question to ask. We ought to place our priorities on spending where that spending does the most to advance and protect the national interests of the United States. The people, Congress and the executive branch will determine those priorities in a deliberate and intentional manner.

### EDITOR'S NOTE:

The Kasich campaign declined to respond to our questions, but submitted this essay written by campaign adviser Robert Walker, a retired Republican congressman from Pennsylvania and a former chairman of the House Science, Space and Technology Committee.

## Maintaining U.S. 'superiority' in space, aviation

America's space program is in need of a 21st century vision. The three phases of our space endeavors — military, civilian and commercial — all need to be given renewed focus. Our military space program is essential to all of our warfighter missions, but its vulnerabilities to attack must be addressed and new generations of satellites based upon modern technologies must be deployed. NASA's role must be redefined. NASA has become too much a logistics agency concentrating on space station resupply and environmental projects. The civil space program must reorient itself to focus on exploration and the development of the technology that would enable exploration of the moon, Mars and beyond.



Space has become steadily more important to our economy, our defense and our everyday pursuits. Swiping your credit card at the gas pump involves satellite technology, a small piece of billions of dollars of transactions that are space dependent. Every phase of military deployment relies on space-based assets and the development and launch of those assets is a multi-billion dollar enterprise. Yet, despite its importance in our economic and security calculations, space policy is uncoordinated within the federal government. A Kasich administration would end that lack of proper coordination by reinstating a national space policy council headed by the vice president,

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**Kasich Campaign essay, continued**

which would have as its mission to assure that each space sector is playing its proper role in advancing U.S. interests. Such a council would create lower costs through greater efficiencies such as insisting that space products developed for one sector, but applicable to another, get shared and not duplicated. It makes little sense for numerous launch vehicles to be developed at public expense, all with essentially the same payload capacity. Coordinated policy could end such duplication of effort and perhaps determine that there are private sector solutions that do not require government investment.

A 21st century space program must be increasingly agile to address real threats and real opportunities. It is increasingly clear that government bureaucracies are incapable of acting with the speed required to maintain a technological edge. Therefore, the commercial sector of the space community must be integrated and relied upon to deliver more of our space capabilities. The Defense Department needs to restructure its acquisition policies so that commands have sufficient funding to buy commercially available products that fulfill their missions at lower costs. It is recognized that here are certain high-value space assets that will never be duplicated by commercial products, but the vast majority of defense satellite usage is obtainable from commercial vendors. Moreover much of the launch capacity needed for Defense missions can be done in the future using launch service provided by commercial companies.

Government must recognize that space is no longer the providence of governments alone. All across the globe investments are being made and technologies developed, which will allow non-government entities greater space access. Today, commercial communication satellites and commercial observation satellites are vital parts of the economy outside the government's direct responsibility. Space tourism, allowing hundreds, then thousands, then millions, of average citizens their chance to leave the bounds of Earth is in its infancy, but it holds the promise of a new and exciting economic opportunity and the promise of significant technological breakthroughs. Government's role in these developments

must be to stay out of the way as much as possible, assist where it can in technological advances and regulate lightly so that relative safety can be maintained, but regulatory overreach cannot strangle the industry.

A Kasich administration space policy will strengthen our military space mission and assets, reorient our civilian space program toward deep space science and exploration, and promote increased cooperation with the commercial space industry to provide the capabilities the nation needs to maintain its day-to-day presence in low earth orbit and beyond. We believe such ambitious goals are achievable within current budget allocations if missions are clearly defined, duplicative programs are eliminated, efficiencies are achieved through better coordination, the commercial sector is used more effectively, and space leadership has the regular attention of the president and his administration.

With respect to aviation, development and implementation of the technologies needed for the NextGen air traffic control system should provide for better aircraft tracking. Climate change should be addressed, but the component parts of the program must be evaluated, and the next NASA administrator will have that evaluation as one of his or her responsibilities. While the commercial sector can and should be a driving force behind the development of supersonic transportation, the federal government can lend technical expertise and research assistance where necessary and helpful, in a neutral fashion.

Drones have to be considered a part of future air safety calculations and appropriately regulated, with the additional knowledge that the potential of the NextGen system anticipates the use of pilotless aircraft at some future date. Our defense policies with respect to space and aviation must be focused on maintaining technological and strategic superiority. Our highest spending priority is to balance the federal budget during an eight-year Kasich administration, and we believe we can maintain the focus on the objectives above by approaching these issues thoughtfully and working together to achieve common sense reforms to our spending policies, procurement policies and regulations. ▲