

Avionics Momentum Building for Autonomous Air Taxis



Nearly Three in 10 People Who Work at Avionics Companies Say Their Firms Are Developing Products for the UAM Market, Avionics International Partner Survey Shows

Some 30% of professionals in the avionics industry say their companies are actively developing products for the urban air mobility market, and more than half of those already have products in flight testing, a new survey shows.

The survey, co-sponsored by Honeywell Aerospace, questioned 300 avionics decisionmakers to gather an unparalleled view of the industry's commitment to the emerging UAM market and the challenges that must be addressed.

Urban air mobility refers to a new breed of quiet, short-range aircraft, many of them electric vertical takeoff and landing (eVTOL) designs. They promise road-weary commuters a way to leapfrog rush-hour gridlock. More than 200 such aircraft are now in

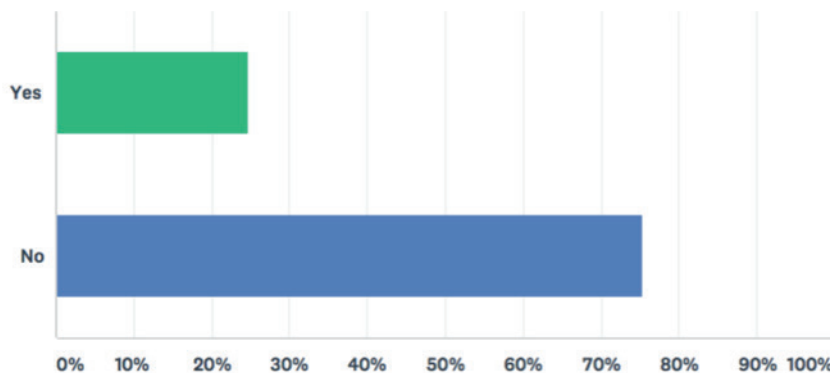
Companies Allocating Dedicated Resources for UAM

Nearly a quarter of survey respondents reported that their employers now have a team dedicated to urban air mobility products.

Twelve respondents said their employers had more than 100 people working on those products. However, most teams were much smaller: 77% of respondents said 10 or fewer of their co-workers were working full-time on UAM.

"That's how things get innovated in this industry – usually in small tiger teams," says Christopher Hawley, director of marketing for Honeywell Aerospace. "It indicates that these are advanced-tech groups at work."

Q4 Does your company have a team dedicated to the UAM market?

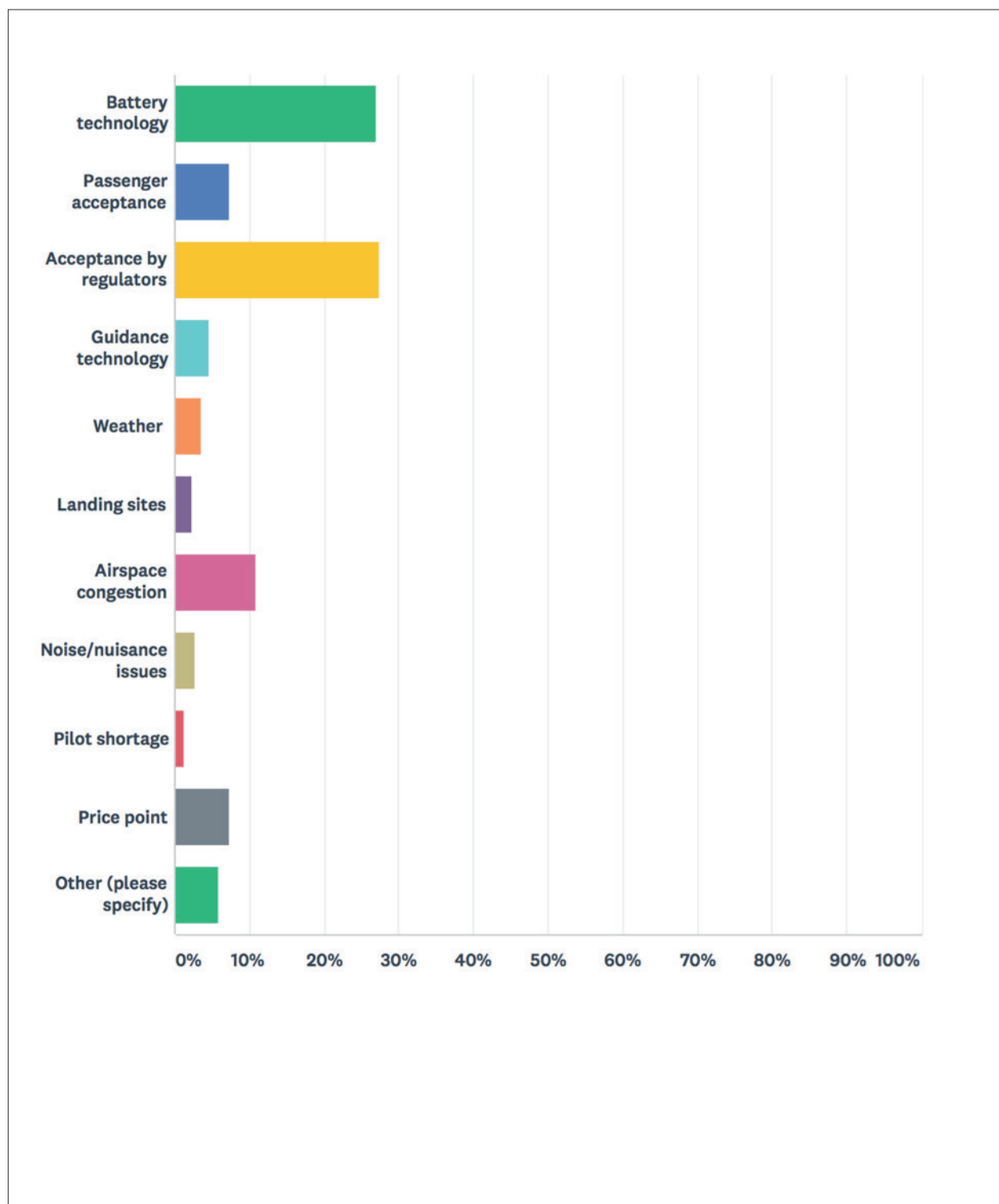


development, according to the Vertical Flight Society.

Avionics International surveyed managers and executives throughout the avionics value chain, including manufacturers, integrators and airline operators. They ranged from small companies to major firms with more than 10,000 employees.

More than half of respondents – 65% – reported that their companies are investing their own R&D dollars into UAM activities versus less than 30% that have received government funding and fewer than two in 10 being awarded venture capital dollars.

Q6 What do you see as the biggest challenge for the UAM market?
Choose one:



Other key study findings include:

- Autonomous flight systems represent the top electronics solution these companies are working on, followed by GPS navigators and a range of other products.
- 16% of respondents say their companies have products in flight testing and 5% say their companies have achieved certification.

Regulatory and User Acceptance

The survey also polled avionics executives on their top concerns as the industry tackles urban air mobility. Some 27% of those surveyed consider regulatory hurdles the top challenge, with battery technology coming in as a very close second.

“Fortunately, NASA and the FAA have recognized that air traffic in this space is limited so they have kicked off a couple of different activities –

“Some of the classic reasons why people don’t take public transit – constraints like needing to drop off kids to school on their way to work – applies to why they may not use air taxis for commuting.”

- Laurie Garrow, Associate Director, Georgia Institute of Technology’s new Center for Urban and Regional Air Mobility (CURAM)

funding research to look at unmanned traffic management, which includes drones and eventually the automated taxis that will fall under that same guidelines,” says Jim Sherman, director, Strategic Development for the Fairfax, Virginia-based Vertical Flight Society.

Sherman says part of the study will look at ways of automating parts of air traffic management that are currently done manually. The goal is to allow greater airspace access, control and spacing.

The lack of vertiports is a key concern, Sherman says. He points to the more than 5,600 heliports in the U.S. (a number closer to 8,000 if counting home-owner-operated ones), in which the greater majority are private and don’t meet FAA guidelines or, because of their location, are not subject to FAA regulation.

“I think that’s going to be the biggest challenge – making sure that these sites have consistent rules across the country, or at least across municipalities,” he says.

The regulatory acceptance hurdle comes as no surprise to Laurie Garrow, associate director for Georgia Institute of Technology’s new Center for Urban and Regional Air Mobility. The center is bringing together researchers to look at UAM from an interdisciplinary perspective.

“One of the most challenging aspects of this problem is that it’s not going to be solved with just traditional aircraft design experts, or by battery technology experts,” Garrow says. “It really will involve city planners, public policy experts, lawyers on the regulation side, and those focused on air traffic control in combination with classic engineering fields to make this a reality.”

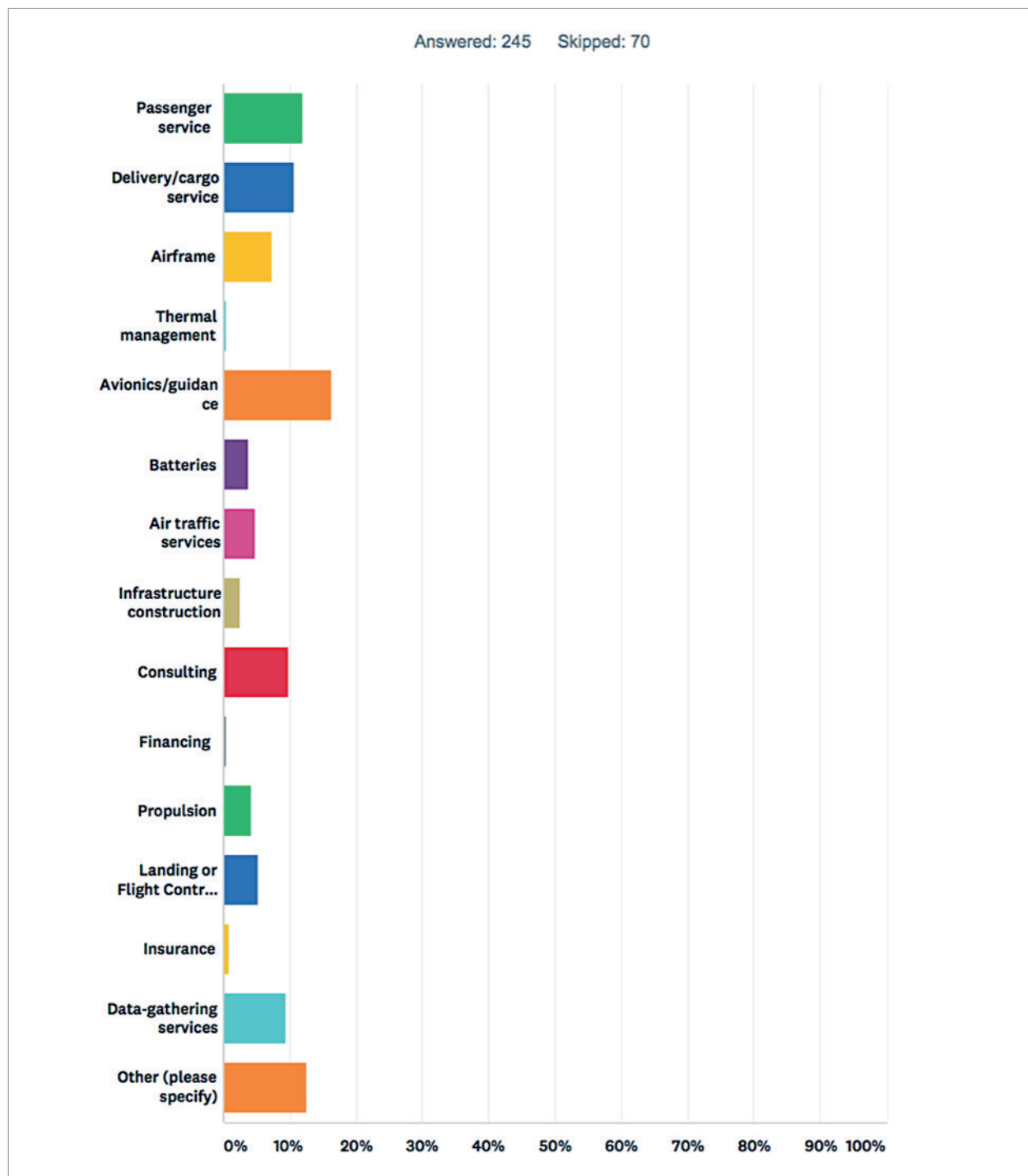
Georgia Tech participated in two NASA surveys that looked at the potential for eVTOL use for commuting in five U.S. cities. Garrow says the studies found that while more than half of people are enthusiastic about the idea of air taxis, their ability to use it for commuting is less certain.

“Some of the classic reasons why people don’t take public transit – constraints like needing to drop off kids to school on their way to work – applies to why they may not use air taxis for commuting,” Garrow says.

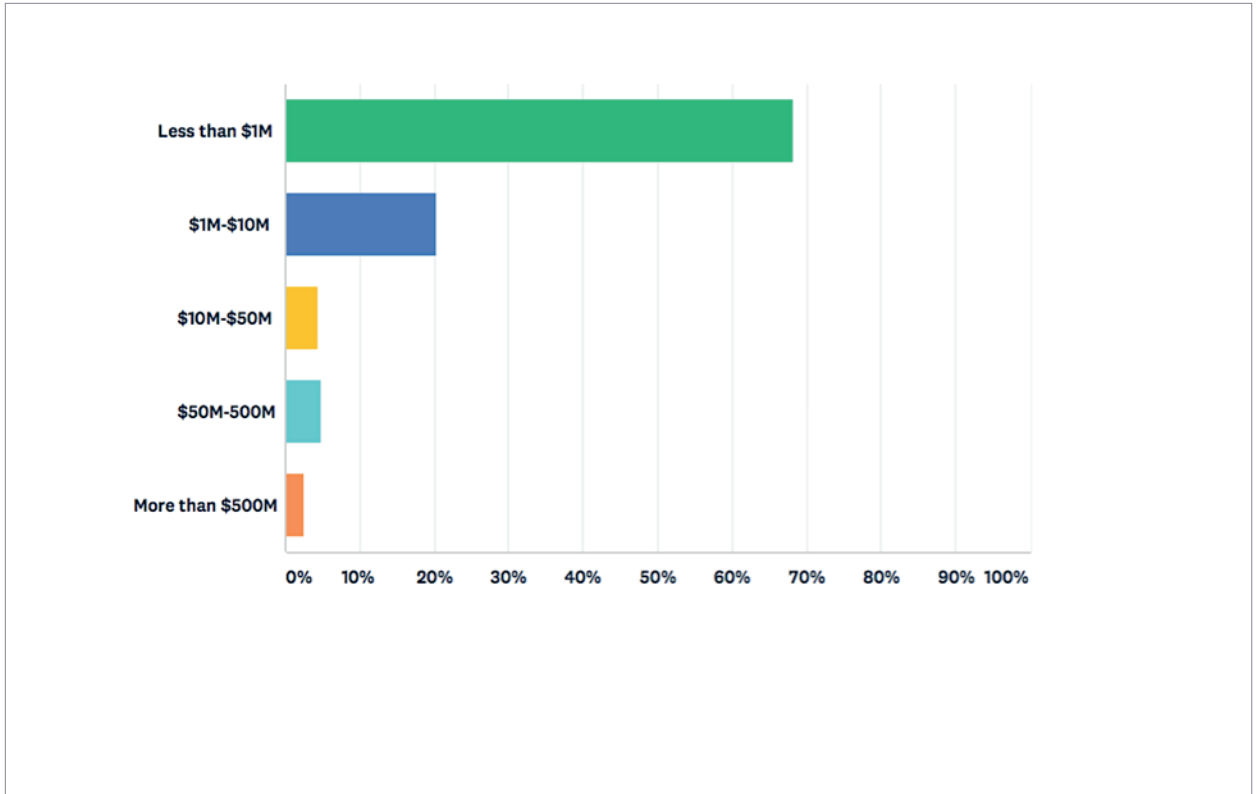
Battery Advancements & Autonomous Flight Key to Business Case

Battery technology has long been recognized as a key challenge, but that hasn’t stopped a lot of leading companies from putting their bets on electric propulsion, says Hawley.

Q7 What aspect of UAM holds the best promise for your company?
Choose one:



Q9 What do you expect your company's revenues from UAM to be in 3 years? Choose one:



“We believe [the first] vehicles in development will be certified in the 2023 time frame.”

- Jim Sherman, Director, Strategic Development for Fairfax-based Vertical Flight Society (VFS)

“There’s a belief that the battery technology is advancing fast enough that it’s going to be viable at least for these short urban air mobility missions,” he says.

The survey shows avionics companies are focused on a wide range of avionics and electronics solutions for UAM – but that autonomous flight systems are of paramount interest.

There’s a good reason for that, says Rolly McFarlin, Honeywell’s senior director of new

business development for electronic solutions.

“To really get seat costs down to make this a viable market, you’ve got to get the pilot out of the aircraft,” he says.

Honeywell experts say pilots will play a role in early UAM vehicle operations, but eventually aircraft will fly themselves – both because of scale and cost.

“Once the market increases to thousands of vehicles, there won’t be enough trained pilots to fly these vehicles,” says McFarlin. “Autonomy is being driven by the pilot shortage and the business case.”

Another critical focus for companies is on miniaturizing existing avionics technology used in commercial aviation so it can work inside the much smaller and lighter UAM vehicles.

For example, Honeywell has successfully shrunk its fly-by-wire system – a fully electronic flight control system developed for airliners – to the size of a paperback book.

“We’ll continue to look at how to integrate more capability into the package and get the overall weight and size down, and we’ve already made a quantum leap in that area,” says McFarlin.

The Avionics International survey found that companies are focusing on multiple technologies beyond batteries and fly-by-wire computers to address the UAM market, including:

- GPS navigators
- Transponders
- Primary flight and multifunction displays
- Detect-and-avoid processors
- Vehicle management
- Navigation receivers
- Radar
- Electro-optical sensors and cameras
- Instrument landing
- Artificial intelligence

Timing of UAM’s Return on Investment

The survey also asked respondents where they expected revenues from UAM to be in the next three to 10 years.

- In three years, 5% of respondents think that their companies could make between \$50M and \$500M while 3% think their companies will be making more than \$500M from urban air mobility.
- In 10 years, 2 out of 10 respondents see revenues as high as \$10M a year, while 8% predict their companies will earn more than \$500M annually from UAM revenues.

The varying outlook echoes the differing opinions of academics, government officials and

industry associations over the timing of widespread UAM adoption.

“We believe [the first] vehicles in development will be certified in the 2023 time frame,” says the Vertical Flight Society’s Sherman. “There are still a lot of other activities that need to happen between now and then – structural and network work and an air traffic management protocol that needs to be developed.”

Garrow cites the two market studies that NASA commissioned with Booz Allen Hamilton and Crown Consulting, which estimate that it will be about 10 years before the UAM market is profitable enough for widescale use.

The Vertical Flight Society and NEXA Capital Advisors recently released a study on 74 metro cities primed for UAM adoption. They predicted that the UAM market will reach \$318 billion between 2020 and 2040 in those markets alone, fueled by eVTOL operators, vehicle manufacturers and infrastructure providers.

One thing everyone agrees on: Significant hurdles remain before UAM goes mainstream – everything from battery limitations to local regulations and government certification of aircraft. But as the survey shows, many companies are actively placing their bets: setting up engineering teams, flight-testing products and dedicating significant resources to the vision of a clean, quiet, and readily available new form of air transportation.

Data for the Urban Air Mobility survey was collected from October 31 through November 12, 2019. The survey was sent to a list comprised of aviation original equipment manufacturers, systems integrators and commercial/business airlines directors, managers and executives who are part of the Avionics International readership. The survey closed with 313 usable responses. The margin of error is ±5 percentage points at the 95% confidence level. Avionics International thanks those who generously took time to complete the survey.