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## Tough 3D-printed drone features embedded electronics



Ben Coxworth | 8 hours ago



3 PICTURES

Phillip Keane with his 3D-printed drone (Credit: NTU)

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With the ever-present potential for crashes, collisions and rough landings, multicopter drones need to be built solid - the fewer separate pieces, the better. It was with this in mind that a PhD candidate at Singapore's Nanyang Technological University recently 3D-printed a working quadcopter, adding in its electronics as it was being printed.

Phillip Keane made his drone in partnership with Stratasys Asia Pacific, using that company's ULTEM 9085 thermoplastic resin as the printing medium. The aerospace-grade material is reportedly known for having a high strength-to-weight ratio, and for being flame-resistant.

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The aircraft was created using Fused Deposition Modelling technology, in which objects are built up a layer at a time out of molten material that is extruded from a nozzle. The entire build process took less than 14 hours, including three pauses during which electronics were manually placed inside the copter's chassis. Motors and propellers were added after the fact.



One challenge lay in protecting the electronics from the high temperatures that were generated while the resin was being deposited. In order to do so, custom heat-proof housings had to be added to components such as the circuit boards.

The finished quadcopter does indeed fly, and is described as being "extremely rugged" - its structure can support a suspended weight of over 60 kg (132 lb). Keane is now working on another 3D-printed drone which he hopes will be lighter and even more durable, along with offering better flight dynamics.

Source: Nanyang Technological University

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