

I SPY WITH MY FLYING EYE

A little lateral thinking has transformed the prospects for tiny robot planes

1. A TINY, pilotless spy plane that can be fired from a cannon is under development at the Massachusetts Institute of Technology. The minuscule aircraft is designed to emerge from the case of an artillery shell and fly over enemy territory, sending back both video pictures of the target and its coordinates.
2. Trials this summer showed that the plane, called the Wide Area Surveillance Projectile (WASP), is airworthy and could survive being blasted out of a cannon, says John Deyst, professor of aeronautics and astronautics at MIT and principal investigator on the research project. So the team is continuing to work on it.
3. The WASP is the latest twist in the development of expendable drones that can fly over enemy territory. Some are already in use, but they have to be launched from a runway some distance behind the front line, taking up to an hour to reach their target. What's unique about the WASP, says Deyst, is that it will – hopefully – be cheap, have a fast response time, and be controlled by a local commander.
4. The aircraft is meant to be packed into an artillery shell case that has a diameter of 12.7 centimeters. Its wings, stabilization fins and propeller fold back into its fuselage.
5. The shell could be fired from an artillery piece or a naval gun. When it is over its target – which could be as far as 20 kilometers away – a parachute will emerge, yanking the craft out of the shell (see Diagram). The spring-loaded wings then extend to a span of about a meter, at which point a diesel engine switches on. The plane will hold enough fuel for about half an hour's flying. It will send back video images of the target, along with its coordinates, obtained from Global Positioning System satellites.
6. Deyst's team faced two major technical challenges: one was to design a plane that could fold into a shell and still operate after surviving the huge acceleration of being fired from a gun. The other was to make the plane airworthy.
7. The team tackled the two problems separately. An unpowered model has now survived simulated firings. And a lightly larger has been tested for airworthiness. Deyst says the next challenge is to build a single model that survives both tests. The main emphasis now is on developing electronic components that are robust enough to survive the firing forces, he says.

8. Work on the WASP project has been carried out over the past two years with funding from MIT and the Charles Stark Draper Laboratory in Cambridge, Massachusetts. Now, Deyst says, he is looking for more funding from the USA Army, Navy, or the Defense Advanced Research Projects Agency to continue developing the drone.

9. The MIT team is not alone thinking along these lines: Science Applications International of San Diego, California, is working on **a similar project, with the aim of carrying a bomb or other payload.** Since the aircraft are designed to be expendable, one key factor is keeping the cost down to about \$20 000, says Mark Roth, one of the researchers.

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19 September 1998 New Scientist www.newscientist.com