



The Flightline



Volume 51, Issue 3 Newsletter of the Propstoppers RC Club, AMA 1042, September 2021



President's Message

Gentlemen,

While it has been a frustrating year with the virus, lack of an indoor facility, and TFR's, we managed to get in a good deal of flying and hold three nice picnic events. Thanks to Pedro, my son (Mike), Pete, Pete's wife (Ellen), Eric and Lamaar for their help with set up, clean up, photos and food. Thanks to all who took video and pictures and sent them to Larry for the newsletter.

We have also managed to sign up five new members this year. Four of which have now been highlighted in our newsletter, and I have recently been informed of another prospective member in waiting.

I regret to inform the membership that Ken Merlino has decided to separate from the club and give up model aviation, at least for the time being. Thanks Ken for a job well done and for stepping up to fill that position!

Therefore, we need someone to step up and become Membership Chairperson prior to our December – January renewal period. You will only need a basic understanding of Paypal (to send out initial invoices and acknowledge receipt of payment) and EXCEL. With EXCEL we can supply you with the template all you would have to do is fill in the information, save it, and be able to attach the file to an e-mail for the officers. You will also supply the membership with new membership cards. The vast majority of this is completed in December. Our membership has been great about getting their dues in early.

We are also in need of some members to step up and form a picnic committee for next year.

Thanks to all of you who contributed time, effort, materials, and money to the club this year. Thank you for being so helpful and welcoming of our new members.

Finally, thank you for being good model aviation citizens!

Mike

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Agenda

Propstoppers General Membership Meeting
Saturday, October 9th with Sunday October
10th as a rain date.

Call to Order 12:00 Noon

Minutes of the June meeting

Treasurer's Report – Pete

Membership – Ken

Website – Mike

Newsletter – Larry

Safety – Eric and Ryan

Old Business

- Drexel/Widener programs support
- Safety Committee
- Other

New Business

- Proposed Budget
- Elections
- Membership Chair
- Picnic Committee
- Other?

The meeting will convene at 12 noon followed by flying, unless we get a TFR.

Should a TFR be in force for that weekend, we will make it a work day.

The job is to clear the two sections of brush across from the runway and the remainder of the trees at the West end of the runway.

If we are able to fly we will call a work day later in the fall.

Propstoppers RC Club of Delaware County, Pennsylvania.

Club Officers

President:
Mike Black

Vice President:
Pedro Navarro

Secretary:
Richard Bartkowski

Treasurer:
Pete Oetinger

Membership Chairman:
Ken Merlino

Safety Officers:
Eric Hofberg
Ryan Schurman

Newsletter Editor:
Larry Woodward

Facebook Editor:
Ryan Schurman

Webmaster:
Michael Black

Propstoppers Web Site;
www.propstoppers.org

Contact: Propstoppers@gmail.com

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Indoor Flying at the Brookhaven Gym

The Brookhaven Community Gym is currently being used by the Delaware County Court, but is expected to be available to us in the Fall.



Minutes of the Propstoppers Model Airplane Club, June 12, 2021

Call to Order: The meeting was called to order by President Mike Black at 10:22a.m. at the Gateway Community Church Flying Field.

Minutes of the April 2021 meeting were approved as printed in the newsletter.

Treasurer's Report: Treasurer Pete Oetinger reported that the club is in good financial shape with a \$5300 balance.

Membership: Membership Chair Ken Merlino, reported that we have 46 total members of which all are fully paid up for the current year.

Newsletter: Editor Larry Woodward: Mike noted Larry's good job. New member interviews were well received. Andy is taking pictures of the field events to send to Larry.

Website: Webmaster Michael Black, reported that updates were made to the Field information page. Editing capability still needs to be improved. Mike and Larry are working on it and will reach out to IONOS to try to resolve it.

Safety: Safety Officers Eric Hofberg and Ryan Schurman: No report

Old Business:

- Ridley Creek State Park: Bob – Ridley Creek State Park is not on the list of state parks that allow RC flying. Bob and Mike are starting the process to try to add it to the list.
- Field Maintenance: Chuck will be contacted to bring the brush hog to CA Field – soon. He currently cuts CA on Thursday or Friday evening and Elwyn on Monday or Tuesday evening.
- Elwyn Field: Maintenance informed Mike and Eric that the farm property all the way to the train will be sold off. Our field is evidently out of play because of the springs.

New Business:

- Picnics: Mike donated his old grill. Burgers and dogs were provided. A chain and lock will be purchased to lock it to the fence or table. A picnic will be held in July and another in August.

Fields at Elwyn and Gateway Community Church are now fully open for members and guests.

We respectfully ask all members to stay in compliance with any PA orders. The fully vaccinated are no longer required to wear a mask.

Please respect those who are continuing to wear masks or who are not vaccinated, by maintaining social distancing.

LOA with Philadelphia International.

Please comply with the following rules to stay in compliance with our FAA Agreement:

- Maximum altitude 400 feet
- In case of Fly-away call 215-492-4123 immediately. This is a direct line to the TRACON Office at Philadelphia International Airport.

Field mowing schedule:

Elwyn Field on Monday or Tuesday evenings and CA Field on Thursday or Friday evenings depending on weather conditions.

Tuesday morning breakfast at the Tom Jones Diner have resumed subject to the Diner's procedures.

- Historical Aircraft sponsored by Mid County Flyers at Grimes Airfield: Aircraft are required to be of the 1941 and earlier era. The flyer will be sent out when it is received.
- AI noted that the May's Landing Fly In is in August. A flyer will be sent out when it is received.
- Andy asked a question about remote ID – it is not needed at AMA Fields.
- RC Flying Test (TRUST) is coming up. AMA is scheduled to be one of the administrators. The test is designed to improve our knowledge and safety. The 15 minute videos on the AMA Website are very informative. – check them out on the website.

Adjournment 10:41 AM

CA Field Work

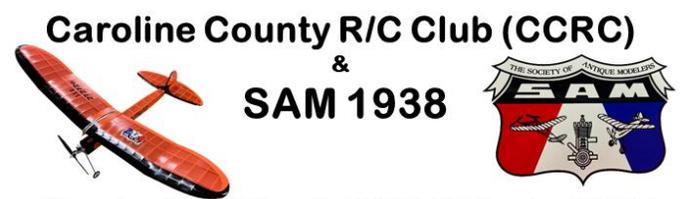
Special thanks to Mike Keenan, Pedro Navarro, Wes Ohlerking, and Chuck Seiwel for assisting me with the brush and tree removal along the flightline at CA Field. This work was carried out on two separate occasions and took about 5 hours to complete.

Chuck was instrumental in enabling us to get through the brush so we could remove the trees. If you encounter him at either of the fields please thank him for his efforts.

We hope to continue the tree removal along that line all the way to the fence. We also hope to remove the two brush stands across the runway, so we can plan to add a taxiway or runway on the other side of the field.

Thanks to these gentlemen we have a much cleaner view of our aircraft taking off and landing.

Mike



**Maryland Fall Classic SAM R/C Contest 2021
Saturday October 2nd & Sunday October 3rd**

Saturday Events		Sunday Events	
1	1/2A Texaco	1	Wakefield
2	A/B/C Ignition Combined	2	Fox-a-Coy
3	Electric LMR	3	Brown Jr. LER
4	Speed 400 LMR	4	Back Up Time/Fun Fly
5	A/B/C Glow Combined	Contest Director: Bill Davidson wadavidson@uavsolutions.com	

- Registration at 9:00 AM, Current AMA Membership Required
- \$20 Entrance Fee for All Events and Includes Raffle Tickets
- Pilot Meeting 9:45 AM, Flying 10:00-5:00 PM
- Unique Plaque Awards for 1st place in each category
- SAM 2020 Rules Apply
- Mufflers Not required for this event
- Raffle: Kits, Building Materials, R/C Equipment
- Lunch available at the field (Small Fee)
- Sunday: Final Events, Backup Time, & Fun Fly



Field: Denton Flight Facility
27050 Redden Rd.
Denton, MD 21629
GPS: 38.84069, -75.75803

Hotel: Days Inn & Suites
23450 Sussex Hwy
Seaford, DE 19973
302-629-4300



Editor's Notes:

By Larry Woodward



Well, the summer has ended here on Cape Cod and I will probably be back in PA by the time you are reading this. The flying has been good this summer in between the hot and humid spells, the rain, and the hurricanes. But, I've no cause to complain. My worst days are better than many people's best in this uncertain and turbulent time. I hope all of you have been able to recover to some degree from the stresses of the last year. I'm looking forward to increased opportunity to get together with friends, old and new, on and off the field.

My flying arrangement here is quite informal compared to the Propstoppers club fields. We are all AMA members but are not a recognized club with a sanctioned field. We simply show up every morning at the parking lot of a local beach in a state park. Both the town and the Park Service are aware of our flying and have been very cooperative with us, without actually giving us official recognition or permission. This "Don't ask don't tell" policy means we all essentially "agree" to get along and be mindful of each other and all the various groups and individuals who share this wonderful place. It works pretty well and is a nice testament to the better side of humanity.

We show up at 7:30 every morning and leave by 9:00, when the parking lot opens for the beach crowd. We avoid flying over the beach, anyway, and try to confine our activity to the great salt marsh that lies behind the dunes. It is a fabulous place to fly. Wide open space stretches out for miles with nothing and no one to raise concern. Except maybe, the ospreys nesting about 200 yards to the East of our flight area. Not that they seem to mind. We are very strict about keeping flight activity away from the nest. And for their part, it is quite common for the adults to come right through our flight pattern carrying a fish for the chicks without giving us any notice.

The whole area is within the state park and is a nationally significant wildlife preserve. We are keenly aware of the responsibility that entails and make every effort to be good stewards and gracious guests. For example, when we arrived this morning there was a group of about fifty birders, with long lensed cameras on tripods, on a guided tour of the area. Birders and



View from our flight line of the Osprey nest, upper left corner, on a pole structure in the marsh.

other nature lovers commonly pass by our flight area and engage us in conversation. Most are happy to see us and find our activity almost as interesting as the wildlife.

But occasionally we will hear the wrath of someone convinced that we alone are the cause of wildlife decline. Such times require our most subtle tact and diplomacy. We know we are always, perhaps, only one complaint away from eviction. When we see groups like today, our practice is to automatically suspend any flying that day and leave the area for them to enjoy.

The only real disadvantage of our arrangement is that we have no way to create a runway. All our flights must take off and land in the marsh grass, which is about four inches high in the spring and gets to a foot or more by end of summer. So all take offs are hand tossed and landings are a gentle “plop” into the grass. None of our aircraft have wheels, which get tangled in the grass on landing and pull the nose over. This precludes most large models and EDF jets that do not hand launch easily.



This summer we started a new activity to address this problem. The beach slope here is very shallow and sandy. The change in height from low to high tide can reach ten feet or more. So, at low tide there are literally miles of exposed sand flats. The ones closer to the beach will be high and dry for hours and the surface can be quite hard and smooth. So now about once a month, when the tides are right, we have “sand flat” flying days. Its great fun and we all bring out our “big guys on wheels” and EDF’s for a little runway practice.



Another favorite we really enjoy is slope soaring when the wind is coming from the right direction it is deflected by the dunes and creates a very nice lift zone. Our favorite plane for this is the original three channel Radian. But this summer brought a new contender when one member showed up with this beautiful glider he built with his 3D printer. It took ninety hours of time to print, and it looks fabulous.

Looking forward to seeing you at the field,

[Click here for a short drone video of slope soaring over the dunes](#)

Larry

Member Profile

Meet new member Dave Mcfadden



This is my first RC club ever. I had been to one or two RC airshows, and thought it great. I am a beginner, as far as flying Radio control and I'm off to a slow start. Many other projects seem to keep my flying at a minimum. I've flown only a few times so far.

I've always had an interest in aviation as far back as I can remember. I started out with rubber band models when I was about 8 or nine years old. Spent many hours stick building these things and then flying them. I went on to acquire my private pilot license when I was in college. Love it!



I had an interest in helicopters about 12 years ago, and built an ultralight, and also the Trex 600. Only got as far as hovering both. Sold the ultralight, and the Trex has been sitting on my shelf.

Recently retired, now I want to try to learn to fly the Helio. That is the main reason, for joining Propstoppers.

Mike Black is my neighbor and has encouraged me to start back with this hobby. I fly a trainer (Timber) and Mike and Eric have been very helpful and supportive since joining.

Goals for the future are to become a competent pilot in both fixed wing and helicopter.

Dave



Meet new member Paul Pujol



I can't remember a time when I wouldn't look skyward when I heard a plane overhead. Wings and motors are a good combo. My first flying model circa 1971 was a line control Cox PT 19 Trainer with a .049 super bee motor. A buddy and I went halvesies on that venture. It was 1990 when I took up the hobby again with another line control. It wasn't enough excitement, so I had a brief foray with free flight models powered by .049 motors. That was a lot of walking and searching for planes.

My first radio control plane came in 1991, A Hobbico Sturdy Birdy with an OS 25 motor and Futaba Attack 4 channel. I made 5 flights and crashed 5 times the first day out. The last crash sent me back home for repairs. Soon after I was flying and landing. The Sturdy Birdy was a bit of a flying brick, but good for self instruction. The wing has survived numerous crashes and a midair collision that sent a balsa trainer to the bone yard.

The Sturdy Birdy was electrified this past summer and with a new aluminum channel fuselage, returned to the sky at the Elwyn Field. Takeoff and flight were good. Landing approach not so good and the birdy spent a couple of nights in a tall tree. Fortunately, the wind was kind and blew her out of the top for a manageable 15 foot recovery. Broken motor mount and some new scratches and dents in the wing are all the damage.



My next project in the winter of 91/92 was a Goldberg Anniversary Edition Cub kit paired with a K&B 60. If you like slow and lumbering, this is the plane. Then, some low wing planes, a Diamond Dust delta wing, and Airmadillo Kombat rounded out the fleet.

I would fly in New Jersey at an abandoned airport just over the Commodore Barry Bridge. I met some folks that became close friends. What started as a handful of rc pilots turned into fun flies with dozens of pilots on Saturdays and Sundays.

I took a break from the hobby circa 1998 as kids and business took up spare time. I bought a small electric plane circa 2017 and it was just like riding a bike, I could still fly. I also played around with a couple of small 4 prop drones that were the rage.

So this past summer, I started flying the electric plane more and got the idea to electrify a couple of the gas planes. The Cub weighed in at 8 lbs. all up. I was not comfortable flying that at the school yards, so I joined the AMA and registered with the FAA. In the process of exploring the sidekick app, I discovered an AMA club called the Propstoppers with a field about 2 miles from my house. I had heard of the propstoppers back in the 90's.

I took a trip up to the field on a Tuesday morning and met a great bunch of guys. I flew as a guest and couldn't wait to join the club. I visited the CA field on a Sunday evening and met some more great guys, and was treated to a fantastic heli show.

It is really great to see other aspects of the hobby, like ducted fan planes and helis. I hope to get my first ducted fan model soon and am also interested in exploring heli flight. Everyone I have met has been helpful as I learn the ins and outs of electric flight. Especially helpful were Eric Hofberg and Mike Black with getting me set up as a member and making me feel welcome. I really enjoy flying at Elwyn in the evening as the sun sets and the sky puts on a colorful show. Paul



Summer 2021

In spite of TFR's fun flies and picnics break the back of Covid isolation.

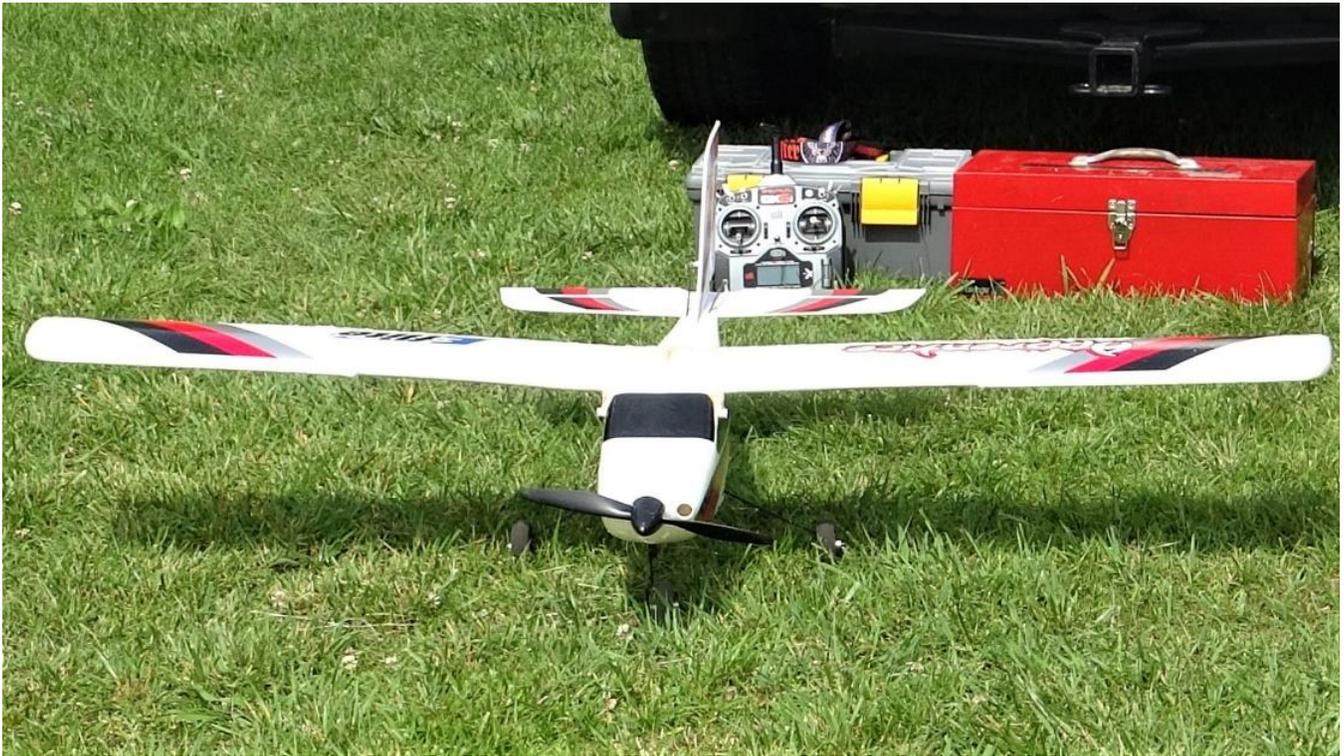
By Larry Woodward, with thanks to Andy Peterson, Eric Hofberg, Mike Black, Dylon Deprospero and Pete Oetinger for sending in photos and videos.











Drexel Engineering Project Summer 2021

Propstoppers Again Support Drexel Engineering Students Aero Design Class

By Dave Harding

For some years now we have supported Drexel Engineering Professor Yousuff's Aero Design class. The class teaches all the basic elements in aeronautical design from Lift, Drag, Propulsion, Stability and Control and overall take off and range performance.

In the past, the final class test was to "design" an airplane to meet a specific criteria; "Fly 12 passengers and luggage 5000 miles." Students broke into teams and designed these airplanes "on paper." They defined all the parameters we are familiar with; wing area, propulsion, size and shape of the fuselage, etc. From these they estimated weight, drag, etc. and computed the final performance.

About four years ago Professor Yousuff asked us if there wasn't a way to have the students actually design, build and fly a model airplane; based of course on the engineering that they learned in the class.

We suggested that was not reasonably possible in a ten week class. But Chuck Kime suggested if we provided a basic airplane fuselage to include propulsion and control the students could design and build the wing and tail which we could then fly for them. To make it easier we provided wing ribs and other elements and materials to support the construction.

It is a popular class which usually attracts 60 or so engineering students and has been quite successful from the start. Indeed most of the students are thrilled to reduce their book learning to actual functioning hardware. And what better way than to actually see your design fly?



Here is the basic airplane we provided.



It is designed to mount 6 inch chord wings at a range of longitudinal locations and the empennage is mounted on a carbon tail boom, which also is designed to accommodate mounting the tail at a range of longitudinal locations. These factors are key in supporting the student's design to achieve the specified stability; location of wing, tail and overall CG being the prime parameters.

Here are typical wings and tails;



One of our challenges was to provide a control setup that could be attached to the student's empennage. The key requirement being to accommodate a wide range of longitudinal placement. We decided to use pull – pull controls with the students attaching their rudder and elevator horns to the provided servos.



The initial pull-pull controls were connected with threads to the standard thread terminations. They were fiddly to thread and the tiny screws hard to handle.

The other problem in this and prior events was warped wings. In the first program where we flew at CA field, I was able to send two teams to my daughter's house where they used a clothes iron to fix the warps. Those teams were thrilled to see their repaired airplanes fly.

2021 Summer Semester Class

The 2021 Summer Semester class had 55 students, but of course, was conducted virtually. This was probably okay for much of the technical analysis subjects, but did not provide an in person interchange, particularly during the construction period of the last two weeks. Not to mention this being the end of the school year and end of University in all the subjects being taken by each student.

Nevertheless, with weather and TFRs threatening, the event was set for Elwyn Field on a Sunday. Propstoppers supported the activity enthusiastically. Mike Black and Al Tamburro did the flying. Remember, every flight was a "FIRST FLIGHT." Surprises abound!

Murray Wilson and Mick Harris supported the assembly and fixes necessary to prepare each team's model for flight.

We prepared the four basic airframes and tried to address some of the prior difficulties in the flying aspects of the program.

I thought I came up with a way to simplify the controls connection but it failed almost completely. Very sorry about that. It worked on my bench but I failed to describe the necessary steps to assemble it. The result was a substantial assembly issue at the field. This in turn resulted

in difficulties in getting the control stroke and centering but worse the assembly often resulted in slack.

All this affected many of the flights, some catastrophically. Nevertheless the students worked diligently to get it as close as possible, often having to reset after a failed flight. There must be a better way to do this.



For Sunday's program I had planned to bring something to allow us to straighten warped wings; a 1 KW inverter, but forgot to make the arrangements. Again; very sorry!

But undeterred the Propstopper contingent developed a number of ways to straighten warped wings including slashing the covering and taping over the bay. Al Tamburro also had a rubber band squeeze trick. Then for mild warps the dihedral wings could be attached in a yawed position to achieve side to side lift balance.

Another unexpected, problem this time was the number of poor structural wings; primarily associated with joining the two halves. One team built their wing with no connection between spar halves; only Leading Edge and Trailing Edge strips were connected. They told me they didn't know what the ply dihedral laminates were for!

Then there was the problem with the tail mounting tubes being oversized and therefore sloppy requiring crummy fixes and often tails that were rather skewed!

So dealing with all these challenges we "worked" from 9:30 till 4 pm to complete at least one flight for each of the ten team's models. Here are a few flights:



So, some lessons learned;

The introduction of the requirement to design, build and fly the wings and tails as the final course task is made in one lecture about half way through the course. This adequately depicts the overall requirements, But, it seems to me an additional session just before construction begins would be very useful in describing the details of design and construction. This is where the evil warp and its correction would be explained along with other details not obvious from the general requirements.

However, if the next course favors the design, build, fly conclusion we obviously need a better basic airframe design in terms of tail mounting and control connections.

I think for an outdoor program the basic propulsion and control components fit the need. We just need to devise a better fuselage / tail mounting and perhaps some easy to install pushrods in lieu of pull-pull strings.

But I have another observation relating to Sunday's event, and that is how impressive were all the teams in dealing with all these issues. One might even argue that the need to devise solutions to the kind of problems few of them had ever seen added to the experience; at least for those who ended with a successful flight.

Here are Murray's thoughts on the day:

I too was impressed by the determination of the teams to get their 'planes flying one way or another, despite most of them being built so inadequately. This applied especially to the pair of lads who spent hours trying to sort out the badly warped wing.

I asked them how it had become so badly warped and was told the wood they'd been given was already warped like that. I didn't ask the obvious question, "Why didn't you ask for some different wood?" Until the tail boom broke off it was flying true and straight. How much out of the horizontal to set the tailplane to counteract the wing warp was calculated by one of the team and he clearly was spot on. That other team which fitted the control horns to the rudder and elevator but omitted to hinge them, how could that be? In general it did not seem much 'design' had gone into the tail assembly, the tendency was for the fin and rudder to be much too small.

The structural deficiencies were so fundamental that it was clear few if any of the youngsters had ever had a manual hobby. We knew that was likely, but still they seemed amazingly clueless? And the covering, mostly it was so poorly done that I concluded they had not had access to anything like a suitable application tool. If so they probably cannot be blamed for that. As the warped wing team showed by the time they made theirs flyable, you don't really need all that much covering!

I think that most of the youngsters will have found their Saturday moments of truth to have been a very valuable part of their course, as you said, they really were determined to get their creation to fly. I enjoyed the day, the five plus hours went quickly, even without any lunch and I learned quite a lot too. Let's do it again and next time each of us bring a car load of tools and materials.

Murray

Propstoppers Remember September 11

September 11, 2021 club picnic honors the memory of 2001 with fellowship and a demonstration of giant scale models by the Schurmans

By Andy Peterson



Beside the burgers and dogs grilled by our club President Mike Black, the big event at this picnic was the powered demonstration of two Giant Scale Airplanes thanks to Tom and Ryan Schurman.

Tom first unloaded his Stearman from the back of their large trailer, and proceeded to demonstrate the upper and lower wing assembly technique. That big 13 horsepower seven-cylinder radial engine with the 34- inch propeller was impressive.





This 1/3 Scale Stearman with 116 inch wing span, which Tom purchased in a tan primer paint coat condition with no engine, was sanded down and repainted by Tom in Stearman Yellow, and to which Tom added a 7-cylinder, 13 horsepower radial engine and a 34-inch wood propeller for an all-up weight of 60 pounds with fuel.

This 2 cycle engine is fueled with 91 octane Ethanol-free gasoline to which 40:1 ratio oil is added. Tom demonstrated the engine start, with the help of Ryan on the ignition switch control. The procedure went as follows: Tom rotated the propeller, by hand, with ignition off, to prime the engine, then with ignition on, he cranked the propeller several times until the radial engine came to life. This engine was much quieter than I expected. Tom then did a slow taxi down and back on the field, revving to engine from time-to-time. Tom pointed out that for this Stearman to be ready to fly,



he would have to spend at least an hour installing and tensioning all of the guy wires and torquing all of the strut bolts. While it would have been a real treat to see this Stearman airborne, just looking at this size aircraft moving along our runway was very satisfying. Just for reference, a Stearman Model 75 has a wing span of 32 feet 6 inches (386 inches).

Ryan then extracted his BVM 1/5 scale F-16 Turbine-Powered Fighter decked out in Belgian Airforce stripes from his trailer and proceeded to complete final assembly in preparation for a demonstration in front of our assembled group.

This model has an 80 inch wing span with a dry weight of 46 pounds (60 pounds with fuel and other equipment). The engine powering this F-16 is a turbo-jet producing up to 60 pounds of thrust.

Ryan pointed out that a certification is required under the AMA Large Turbine Model Airplane (LTMA) -class airplanes that fit into the LTMA-1 category for aircraft that weigh more than 54 pounds with fuel.

With his F-16 rolled out onto our runway, Ryan explained the start sequence with a fire extinguisher standing by. After ensuring that the fuel valve is on, the jet nozzle is clear, and no wind up the tailpipe, he was set to go through the start procedure. This start sequence has been programmed into this aircraft's computer so that when it sees max throttle and max trim, it starts the sequence. The throttle is then set to min, while the starting occurs.



Once everything is fired up, the fire extinguisher is removed from the runway. Ryan then started his smoke ejector to show the jet plume, before starting his taxi down the runway in preparation for a simulated take-off run toward our group. After ejecting smoke, he made a high-speed run for about 50 yards before chopping the throttle, taxiing past us and then returning. Prior to shut-down Ryan fired-up the afterburner lights located in a ring just outside the tailpipe. After shut-down Ryan then answered questions from our group.

[Click here for video of Tom's Stearman taxiing the runway.](#)
[Click her for video of Ryan's F-16 taxiing the runway](#)



‘We’ve beaten nature’: the flying microchips that can measure pollution

Tiny devices inspired by winged seeds have the potential to stay airborne for hours

Submitted by Dave Harding

[Rhys Blakely](#), Science Correspondent
Wednesday September 22 2021, 4.20pm BST, The Times (London, UK)

Science

Tiny devices inspired by winged seeds have the potential to stay airborne for hours



Scientists have created the world’s smallest glider: a microchip fitted with wings that is designed to float on a breeze.

The “microflier” devices, which can be as small as a millimetre across, are designed to carry sensors for tasks such as monitoring [air quality](#). “Our goal was to add winged flight to small-scale electronic systems,” Professor John Rogers, of Northwestern University in Illinois, said. “Over the course of billions of years, nature has produced seeds, such as those of the sycamore tree, with very sophisticated aerodynamics. We borrowed those design concepts, adapted them and applied them to electronic circuit platforms.”



The size of a grain of sand, dispersed microfliers could monitor air pollution, airborne disease and environmental contamination

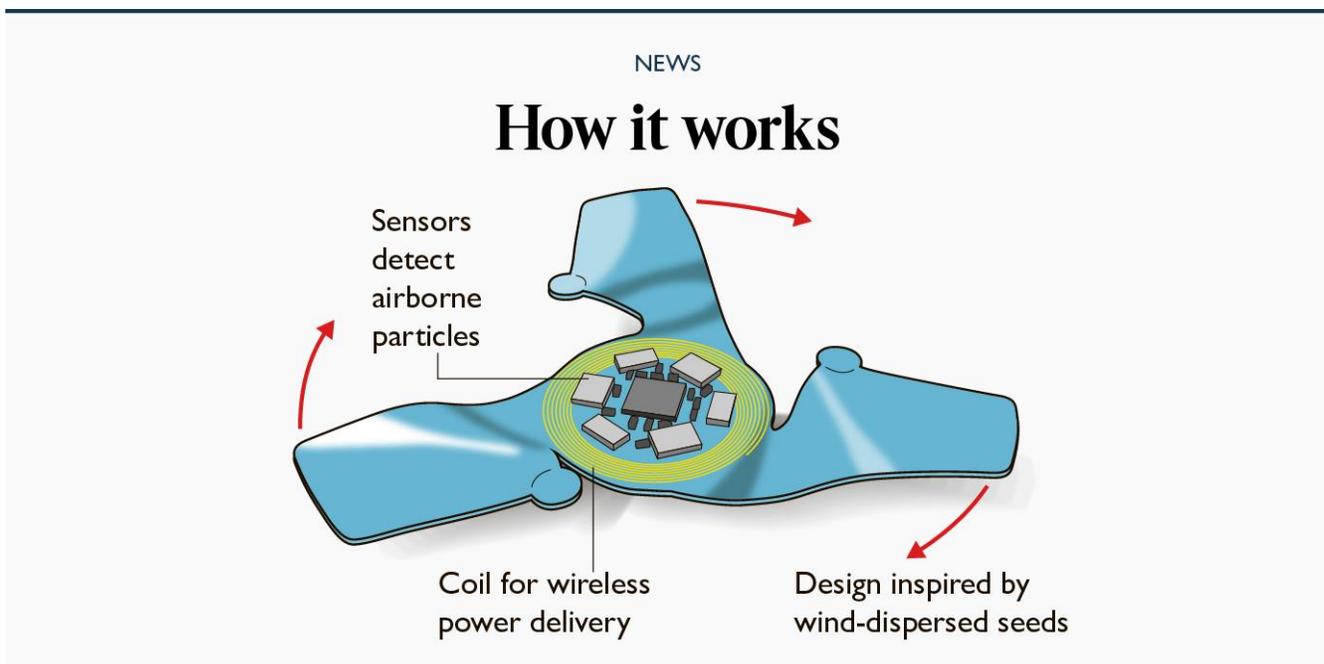
NORTHWESTERN UNIVERSITY

The researchers say that their design is more efficient than many that have evolved in nature. In a perfectly calm environment a seed from a maple tree will fall at about 40cm a second, Rogers said; a microflier descends at about half that rate, 20cm a second. By contrast a grain of rice will fall at about 400cm a second.

When dropped from a plane with the right wind conditions a microflier could stay aloft for hours, Rogers said.

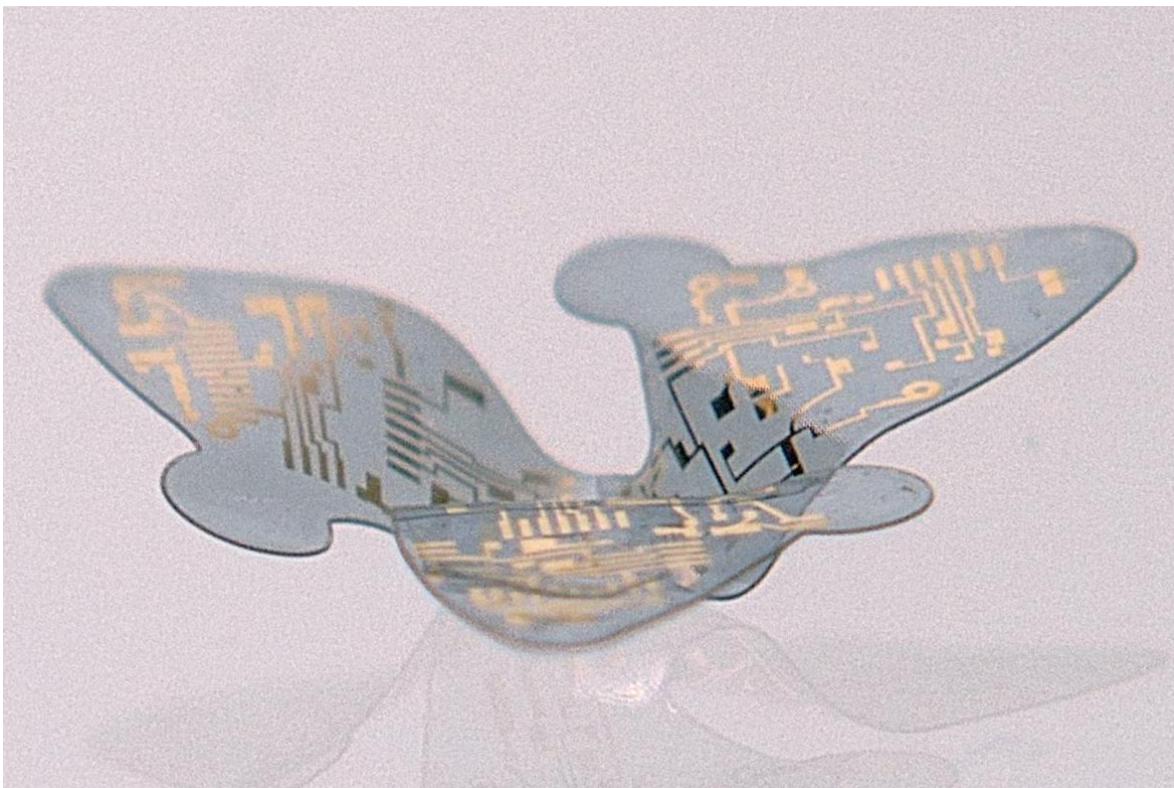
His team took inspiration from the tristellateia plant, a flowering vine. Its star-shaped seeds have bladed wings that catch the wind to fall in a slow spin. “These biological structures are designed to fall slowly and in a controlled manner, so they can interact with wind patterns for the longest possible period of time,” Rogers said.

Electronic components are placed at the center and in the laboratory the researchers built a version that could be powered wirelessly. This prototype measured about 3cm across, its relatively bulky dimensions being dictated by the size of commercially available electronic parts. As it falls its wings create a slow, stable rotation.



One version of the device, described yesterday in the journal *Nature*, was fitted with sensors to detect particulate matter in the air. In another, they incorporated pH sensors that could be used to monitor water quality and photodetectors to measure exposure to light at different wavelengths. The researchers are also working on building the devices using so-called transient electronics: hardware that can harmlessly dissolve in water when it is no longer needed. They have already used these materials to build a pacemaker that can be reabsorbed into a patient’s body. The same techniques could be applied to create microfliers that degrade and disappear in groundwater over time, they say.

The manufacturing process drew inspiration from a child's pop-up book. The microfliers are built from two layers of flat material. One is rigid and the other stretchy. The stretchy layer is pulled tight across the rigid one; when the stretched substrate is relaxed, a controlled buckling process causes the wings to "pop up" into a precise three-dimensional shape.



The helicopter-like structures are smaller than equivalents found in nature, such as seeds
"We think that we beat nature," Rogers said. "At least in the narrow sense that we have been able to build structures that fall with more stable trajectories and at slower terminal velocities than equivalent seeds that you would see from plants or trees.

"We also were able to build these helicopter flying structures at sizes much smaller than those found in nature. That's important because device miniaturization represents the dominating development trajectory in the electronics industry."

A Moment in Flight:

Flight Video by Pedro Navarro

Summer 2021 has not been the best flying season for many reasons. But, the joy of flight is never lost. Here Pedro has created a little excitement to lift the spirits by pairing the flight to the Little Richard classic “Long Tall Sally.”

Editor

Click below to see this issue’s Moment in Flight.

[The sport Cub S2 and Long Tall Sally](#)



Endnotes and Links

THE NEWSLETTER OF SAM 26, THE CENTRAL COAST CHAPTER OF THE SOCIETY OF ANTIQUE MODELERS. JUNE 2021 #362: Submitted by Dave Harding [News 362.pdf](#)

AEROCOM Journal of the JOHN D. ODEGARD SCHOOL OF AEROSPACE SCIENCES, Sumer 2021
Article: [PERLAN PROJECT PUSHES ENVELOPE OF POSSIBILITY](#), by Jonathan Gehrke
Submitted by Pete Oetinger