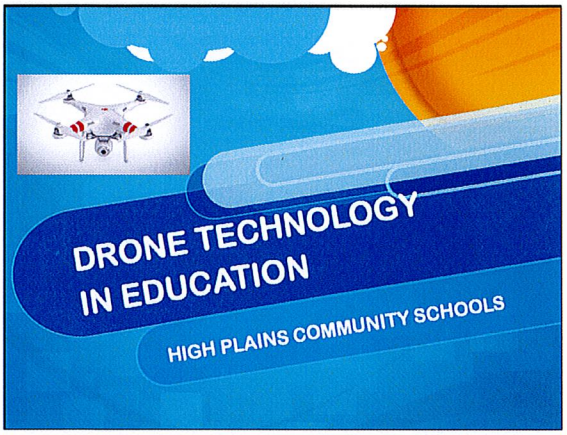


PRESENTED BY:

- CAMERON HUDSON
  - 9-12 PRINCIPAL
- TOM HOFMANN
  - AGRICULTURE EDUCATION INSTRUCTOR

OUR PRESENTATION TODAY WILL:

- PROVIDE A DEFINITION OF A DRONE (UAV)
- DETAIL HIGH PLAINS COMMUNITY SCHOOLS DRONE PROJECT FROM 2015 UNTIL NOW
- EXPLAIN FAA RULES AND REGULATIONS ON DRONE TECHNOLOGY AND HOW IT RELATES TO AN EDUCATIONAL SETTING

WHAT IS A DRONE?

- "A drone, in a technological context, is an unmanned aircraft. Drones are formally known as unmanned aerial vehicles. Essentially a drone is a flying robot"
- "UAV" – UNMANNED AERIAL VEHICLE

WHY DID WE GET ONE?

- Career Pathway Opportunities
- UAV Technology cuts across disciplines – learn and apply skills in
  - Math, Electronics, Aeronautics, Physics, Programming, Project Management, and more.....
- Promote High Plains Community Schools
- Real World Applications

WHY DID WE GET ONE?

- A Leap Ahead in Technological Engagement
- Software Development
- High – Tech Careers
- The Cool Factor

HPC DRONE PROJECT TIMELINE

- SPRING OF 2015 COMPLETED A PERKINS GRANT FOR A DRONE IN OUR SCHOOL
- RECEIVED DRONE IN SUMMER OF 2015 AND NAMED IT "STORM COPTER" –
- INITIAL FLIGHT JULY 12th, 2015
- TRAINING OF "SELECTED" STAFF AND SCHOOL PERSONEL IN AUGUST AND SEPTEMBER OF 2015

HPC DRONE SPECIFICATIONS

DJI PHANTOM 3

- DRONE / CONTROLS / IPAD
- THREE BATTERIES / CHARGER
- CARRYING CASE
- EXTRA PROPELLORS

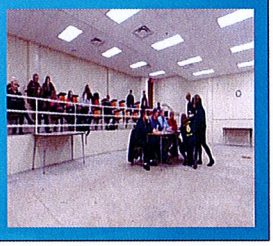
WHO CAN FLY "STORMCOPTER"?

- 5 CURRENT TEACHERS WHO ARE TRAINED TO FLY "STORMCOPTER"
- STUDENTS ARE ALLOWED TO FLY WITH TEACHER SUPERVISION –
  - DURING OR AFTER SCHOOL HOURS
  - ON AND OFF SCHOOL PROPERTY
  - EDUCATIONAL PURPOSES ONLY

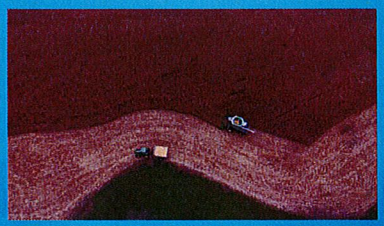
AGRICULTURE EDUCATION

PRECISION AGRICULTURE

AGRICULTURE EDUCATION

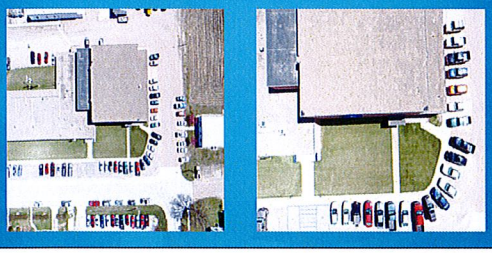


AGRICULTURE EDUCATION



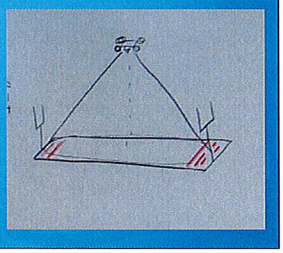
NURSERY / LANDSCAPING

FACILITY PLANNING



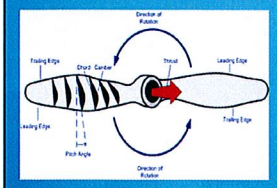
MATHEMATICS

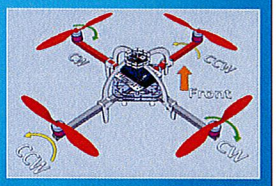
- Law of Cosine / Sine –
  - Determining missing angles / sides to solve a problem.
- Propeller Revolution
  - Determining Velocity needed for lift to reach a height or speed



SCIENCE

BERNOULLI'S PRINCIPLE

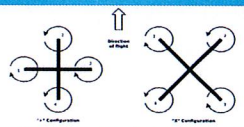




SCIENCE

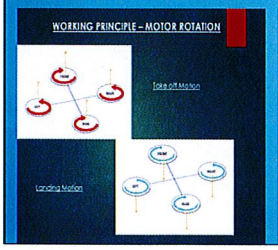
- Parameters needed to determine stall speed.
- Electricity and electric motors.
- Lessons about battery chemistry and capacity.
- This drone runs on a small microcontroller, computer programming is also a part of the discussion.

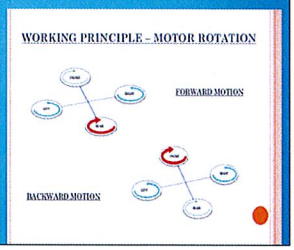
SCIENCE



- Four **equal** propellers generating four thrust forces
- Two possible **configurations**: "+" and "×"
- Propellers 1 and 3 rotates CW, 2 and 4 rotates CCW
- Required to compensate the *action/reaction effect* (Third Newton's Law)
- Propellers 1 and 3 have opposite **pitch** w.r.t. 2 and 4, so all thrusts have the **same direction**

SCIENCE





DIGITAL PHOTOGRAPHY

HPC-TV

- GREAT ADDITIONAL TOOL FOR FILMING OUR WEEKLY TELEVISION NEWSCAST
- FOOTAGE FOR SHOW INTRO
- ADDITIONAL FOOTAGE FOR HIGHLIGHT VIDEOS FOR FOOTBALL AND SOFTBALL SEAONS HIGHLIGHT VIDEOS

HPC-TV

ATHLETIC TEAM USE

- PRACTICE VIDEO
  - FLOWN ABOVE AND BEHIND PRACTICE
  - VIDEO DOWNLOADED INTO HUDL FOR COACH TO BREAK DOWN AND SEND TO TEAM
- GAME FOOTAGE WITH OPPONENT PERMISSION
  - FOOTBALL END ZONE CAM

PUBLIC RELATIONS

- Missing Cattle in a cornfield - didn't find them but we tried! Great public relations!
- Aerial Photography of Farms and Homes
  - Pictures emailed to patrons who have requested to have the pictures taken. Great public relations!

CAREER PATHWAY

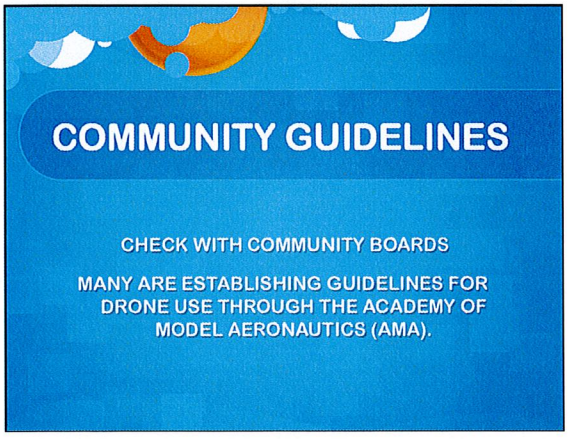
- The kids with smart phones in their pockets and learn how to code in grade school will take UAV technology to the next level. We want to be one of those schools.
-
- KEEP YOUR UAV IN EYESIGHT AT ALL TIMES AND USE AN OBSERVER IF NEEDED.
- REMAIN CLEAR OF ALL MANNED AIRCRAFT OPERATIONS AT ALL TIMES.
- DO NOT FLY OVER UNPROTECTED PERSONS OR MOVING VEHICLES, AND REMAIN AT LEAST 25 FEET AWAY FROM INDIVIDUALS AND OBSTACLES AT ALL TIMES.

FAA MODERNIZATION REFORM ACT OF 2012

- INDIVIDUALS WHO FLY WITHIN THE SCOPE OF THE PARAMETERS OF SECTION 336 OF PUBLIC LAW 112-95 DO NOT REQUIRE PERMISSION TO OPERATE THEIR UAV; ANY FLIGHT OUTSIDE THESE PARAMETERS (INCLUDING NON-HOBBY AND NON-RECREATIONAL) REQUIRES FAA AUTHORIZATION. FAILURE TO DO SO CAN RESULT IN A FINE OR CRIMINAL PROSECUTION


FAA RULES AND REGULATIONS
AS OF DECEMBER 21ST, 2015 THE FAA REQUIRES ALL OWNERS OF SMALL UNMANNED AIRCRAFT, OR DRONES, WEIGHING BETWEEN 0.55 AND 55 POUNDS TO REGISTER ONLINE.
FLY NO HIGHER THAN 400 FEET AND REMAIN BELOW ANY SURROUNDING OBSTACLES.
THERE ARE TEMPORARY FLIGHT RESTRICTIONS AROUND STADIUMS AND RACETRACKS. STAY CLEAR!


FAA RULES AND REGULATIONS
CONTACT THE AIRPORT AND CONTROL TOWER BEFORE FLYING WITHIN FIVE MILES OF AN AIRPORT OR HELIPORT.
UAV CANNOT WEIGH OVER 55 POUNDS.
DO NOT CONDUCT SURVEILLANCE OR PHOTOGRAPH PERSONS IN AREAS WHERE THERE IS AN EXPECTATION OF PRIVACY WITHOUT THE INDIVIDUALS PERMISSION.


COMMUNITY GUIDELINES
CHECK WITH COMMUNITY BOARDS
MANY ARE ESTABLISHING GUIDELINES FOR DRONE USE THROUGH THE ACADEMY OF MODEL AERONAUTICS (AMA).


RESOURCES
KNOW BEFORE YOU FLY
HTTP://KNOWBEFOREYOUFLY.ORG
FEDERAL AVIATION ADMINISTRATION
HTTPS://WWW.FAA.GOV/UAS/MODEL_AIRCRAFT