TOPIC: Featured Startup: Airgility

COMMITTEE: Economic Development and Technology Commercialization

DATE OF COMMITTEE MEETING: Thursday January 25, 2018

SUMMARY: Airgility designs and manufactures unmanned aerial systems (UAS). They were started by UMCP alumni utilizing UMCP licensed technology. They will provide a synopsis of their technology and business.

ALTERNATIVE(S): This item is for information purposes.

FISCAL IMPACT: There is no fiscal impact

CHANCELLOR’S RECOMMENDATION: n/a

COMMITTEE RECOMMENDATION: DATE:

BOARD ACTION: DATE:

SUBMITTED BY: Tom Sadowski (410) 576-5742
Airgility is a leading designer & manufacturer of unmanned aerial systems (UAS).

Our flagship product, the HorseSHU, is a transitional Vertical Takeoff & Landing (VTOL) aircraft capable of precision hover & high speed forward flight using its patent pending thrust vectoring lifting body design.
The Problem

The fastest growing market for drones is for commercial use… but available technology is mostly limited to consumer and military options.
Retro-fitting Existing Technology Doesn’t Work

NOT IDEAL
- Range
- Payload Flexibility
- Speed
- Resiliency

IMPractical / IMPOSSIBLE
- Simply not cost effective

www.airgility.co
One vehicle designed for many missions

Range - Payload - Speed - Flexibility

Increased ROI - lower training & maintenance costs

HorseSHU UAS

Sub-System Adaptability

SENSORY

COMMUNICATION

PROPULSION

MULTI-ROTOR

FIXED WING

SINGLE-ROTOR

Best Performance

www.airgility.co
Product

External Propulsion
Externally accessible, and unobstructed air cooling

Tilting Outboards
Counter-rotating rotors tilt up for vertical flight, and tilt down for efficient forward flight

Modular Shell Construction
Discretely compartmentalized sub-systems

No Landing Gear
Default prone landing position eliminates need for heavy landing gear

www.airgility.co
Prototype
Prototype
Flight Dynamics

1. Vertical Take-off & Forward Flight Transition
2. Mission Flight Segment
3. Vertical Flight Transition & Landing

Efficient Forward Flight like a Fixed Wing Airplane
Efficient Hovering Flight like a Helicopter
Vehicle Specs.
Wingspan ~14 in
Length ~16 in
Max Wt. ~3.5 lbs
Payload Wt. ~6 oz
Max Speed ~55 mph

1. **Center Section** – Avionics / Communication / Sensors / Payload
2. **Tilting Nacelles** – Propulsion / Landing System
3. **Aft Section** – tripod tail sitting design

- 3D Printed Shell Construction
- Specialized for one-way missions due to low price point, like drone hunting.
miniSHU Prototype
Technology Differentiators

MARKET SCALABLE
- High Lift/Drag Ratio @ high AoA:
  - Lower power consumption for all AoA
  - Greater flight time
  - Lift generation at high AoA

PAYLOAD FLEXIBILITY
- Adaptable to current and future tech:
  - Competitive in previously reserved markets: fixed wing, helicopter, multi-rotor
  - Long market stay potential

MULTI-MISSION
- Customizable to customer needs:
  - Wide payload flexibility in weight and volume
  - Wet or Dry Propulsion
  - Single point training and maintenance

EXOSKELETON SHELL
- Robust construction:
  - Hollow body for large internal volume
  - Light-weight shell
  - Minimal part count
  - Molded complex shapes

MODULAR SUB-SYSTEMS
- Adaptable to current and future tech:
  - Easily re-configurable center and outboard sub-sections
  - Low-cost sub-system mods w/out entire vehicle overhaul

Www.airgility.co
Intellectual Property

Utility patent application (WO201704093 – being licensed from UMD)

While there are a plethora of drone related patents, none combines the lifting wing, vectored thrust, and exoskeleton design to produce a combination of payload weight & volume with long range, high speed and overall practicality of a solution the market demands.
Industry – Drone economy

MANUFACTURERS
- Ehang
- Hover Camera
- Get
- Hexo+
- Yuneec
- DJI
- Teal
- Flypr
- I-Corsair

TERRESTRIAL IMAGERY & MAPPING
- Airware
- CrowdAI
- Propeller
- Sky Catch
- Unearth
- Drone Deploy
- 3DR
- TraceAir
- Hangar
- Dronatomy
- Bottlink
- Kespry

MARKETPLACE
- Drone Base
- Airstoc
- Hivemapper

PRECISION AGRICULTURE
- farmshots
- Raptor Maps
- Slantrange
- DroneSeed

NAVIGATION & AUTONOMY
- EchoDyne
- Iris
- CompoundHye
- Percepto
- Swift
- Skydio

INSPECTION & MONITORING
- BetterView
- SkySpecs
- CyPhy
- SkyX
- Flyability
- Airobotics

AIRSPACE MANAGEMENT
- Unifly
- Kittyhawk
- Vhive
- Airmap

MILITARY & DEFENSE
- I-APTOMI
- Airspace
- SkySafe
Industry – Civilian Drones

Pointing skywards
Civilian drones, worldwide

Number, m

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Forecast as of 2020:
- Commercial: 6.6
- Personal: 4.6

Disclosed funding, $m

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Number of deals

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Sources: Gartner, CBInsights, Economist.com
UAV Market 2017-2021

Military
$29.9B US TAM
$70.1B Global TAM

Commercial
$20.5B Global TAM

U.S. Commercial Major Sectors
Through 2022

- Construction
- Agriculture
- Energy & Insurance
- Transportation Logistics
- Civil Government

$1B
2016
$6.5B
2022

$29.9B US TAM
$70.1B Global TAM

$20.5B Global TAM

www.airgility.co
How it started
The Founding Team

EVANDRO VALENTE
CTO & CoFounder
Leads Product

• 11 years Aerospace Engineering Faculty, University of Maryland
• 15+ years UAV vehicle design, fabrication, advanced composites, assembly & integration and flying
• M.S. Aerospace Engineering, University of Maryland

PRAMOD RAHEJA
CEO & CoFounder
Leads Business

• Captain, United Airlines
• 27 years aviation operations experience
• 12,000+ commercial flight hours
• B.S. Aerospace Engineering, University of Maryland
• Serial Entrepreneur
Team

SCOTT STRIMPLE
Chief Pilot/ Director of Flight Operations

JAMES KING
Engineer, Flight Controls & Autonomy

UMCP INTERN TEAM

- Captain, United Airlines
- 27 years aviation operations experience
- 25,000+ commercial flight hours
- Unmanned Systems Commission, State of Virginia
- Task Group Lead, FAA Standards

- B.S., Aerospace Engineering
- M.S. Candidate, Aerospace Engineering, Univ of Maryland
- Focus: Autonomous Vehicles and Flight Controls

www.airgility.co
Advisors

NAVIN GANESHAN
Chief of Product, Gemini Data IOT, HW, SW, Drones, Security

ELLEN CHANG
Founder, Lightspeed Ventures

TOM MAST
VTOL Expert, American Airbus & Bell Helicopter Design Engineer

GLEN HELLMAN
Executive Leadership & go to market advisor

DR. JEWEL BARLOW
Director of UMD Wind Tunnel

DR. INDERIT CHOPRA
World renowned rotorcraft expert

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Product Milestones

Aircraft Development
- Q3 '17
- Q1 '18
- Q3 '18

Fight Control Platform
- Q4 '17
- 21 '18

Modular Systems Development
- Q1 '18
- 21 '18
- Q3 '18

Customer Trials
- Q4 '18

Manufacturing Readiness
- Q4 '18
Business Milestones

- LightSpeed Innovation Aerospace Business Accelerator
  - www.lightspeedic.com
  - 11/11/17 – 02/28/18

- MIPS Program Start – Wind Tunnel Partner
  - Wind Tunnel Model
  - 8/01/17 – 07/01/18

- 4th Law (MOU attached)
  - https://www.4th-law.com/
  - LightSpeed Cohort Member
  - 12/16/2017

- Threat Surface Solution (letter)
  - www.threatsurfacadesolutions.com
  - Radio Freq. Hardening
  - Attack Tree & Mitigation
  - 12/27/2017

- AccuStrata Inc (letter)
  - www.accustrata.com/
  - Fraunhofer (letter)
  - www.cese.fraunhofer.org/
  - 12/27/2017

Fall 2017

- Glenn Martin Wind Tunnel Partner
  - HorseSHU Aerodynamic & Controls R&D

- 4th Law Joint Proposal CALYPSO PROGRAM – U.S. AIR FORCE
  - 3 Phase – Prototype, Operational Demo, Mass Production VTOL UAS
  - Multi Million Contract, 2018 to 2024

- Strategic Partners
  - RF communication
  - SBIR preparation
  - Experimental Software Development
“We believe there could be immediate revenue as a result of their finalized design and demonstration.”

Katey Grogan, HurleyIR

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“The versatility of the design is allowing the integration of leading edge RF, sight, and sound sensors, without sacrificing aerodynamics”

Colin Bowers, Co-Founder
Threat Surface Solutions Group

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Brian Golden
Chief Product Officer & Co-Founder
Iris Unmanned

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Chief Product Officer & Co-Founder
Iris Unmanned
Fundraising & Future Planning

TEDCO MII Phase 1
$115K
June 16

Prototypes Completed
June 17

TEDCO & Seed Round
January 18

Team Formed
April 2017

MIPS Award
$100K
August 17

Maryland Momentum Fund
February 18
Airgility currently has manufacturing capability here in College Park. Our vision is to expand our in-house manufacturing production and help grow the Maryland economy.

- Grow into larger space in hubZONE somewhere near College Park or Baltimore area
- Establish a presence near the UM UAS Test Site

**BENEFITS:**

- New jobs in manufacturing, engineering, operations, marketing and support.
- Increased tax base
- Maryland becomes a leader in manufacturing

To accomplish this requires key partners and financial support to establish the facilities, purchase/lease the equipment, and connect with workforce development programs to ensure a steady supply of skilled trades professionals.