2019 IES AVIATION LIGHTING COMMITTEE MEETING, MONTEREY

LED
More Than Just a Light

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Kerr Avionics

LED LIGHTS CAN BE ENCODED WITH IQVR.

IQVR stands for **I**nstrument **Q**ualified **V**isual **R**ange-a concept developed in early 2006 as the result of discussions with the FAA's GPS Team Lead, Calvin Miles who named the process.

IQVR exploits nature of **LED lights** to **exceed Infra red sensor performance on "HOT" incandescent runway lights in fog.**

- **IQVR integrates airport LED approach, runway edge, and taxiway lighting with on board EFVS guidance systems by applying software -with only modest modifications to lights and on board flight guidance systems.**

LED LIGHTS CAN BE ENCODED WITH INFORMATION

Encoding LED Runway and approach lights and adding IQVR synchronous detection software to the on Board EVFS sensor enables:

- Up to 300% increase in visual range over Infra red in daylight FOG.
- Mitigation of Wrong Surface Operations through positive “machine” identification of:
  - Runways
  - Taxi ways
  - Turn offs
  - Gates
  - Aeronautical Obstruction Lighting
  - Helicopter Landing Pads

OPERATIONAL BENEFITS

Greater Efficiencies Across the Board

IQVR

- Reduces weather related diversions
- Improves on time departures/arrivals
- Reduces SMGCS delays
- Lowers fuel costs & scheduling complexities
- Estimated Yearly CARBON Emission Reduction in US of 850 Million Pounds

Creates a virtual operational **"CAT 1.5" ILS** for equipped aircraft without changing IFR Approach Minimum Categories, or ILS technology.

Biggest winners:
Airports, Fleet Operators, The Environment.

OPERATIONAL BENEFITS

- Slash missed approaches due to visibility
- Slash weather induced diversions
- Reduce Wrong Surface Operations
- Encode Rwy and Airport ID in the lights
- Augment traffic flow efficiency's of ADS-B
- Provide non-RF backup to ILS/GPS precision approach guidance
- Verify SVS by registering display with “real world +/- one (1) foot vertical – clearing way for Heads Down to Touchdown;
- In US: reduce Carbon emissions by over 850 million pounds

STATUS REPORT
Current Development

IQVR has attained
DoD Technology Readiness Level 5.

TRL 5: "Validation of large scale prototype in Relevant environment."

- Tests at SANDIA NATINOAL LABs Fog Chamber in Albuquerque late 2017
- Tests at Oregon Institute of Technology Light Scatter Lab early 2018

Next Steps: TRL 6 and 7

MARKET SECTOR VALUE

Airports

Competitive advantage

- Reliable IMC arrivals
- Safer ops
- Smoother traffic flow
- CAT 1.5 ILS
- Mitigation of SMGCS
- Reduced missed approaches
- Eliminates wrong surface operations

Airlines/ Corporate

Improves EFVS 3X

- Reliable arrivals
- Lowers fuel burn
- Preserves legacy EFVS with slight mod
- Highest immediate economic impact on Regionals and box haulers (**CAT 1.5 ILS**)

FAA

Breaks LED regulatory log jam

- *Enhances* ADS-B traffic flow
- Relieves congressional pressure
- Turbo charges Obstruction lighting and Rotor wing PinS ops

Environmental/ Political

Reduce Carbon emissions by almost one billion pounds

STATUS REPORT
Current Development

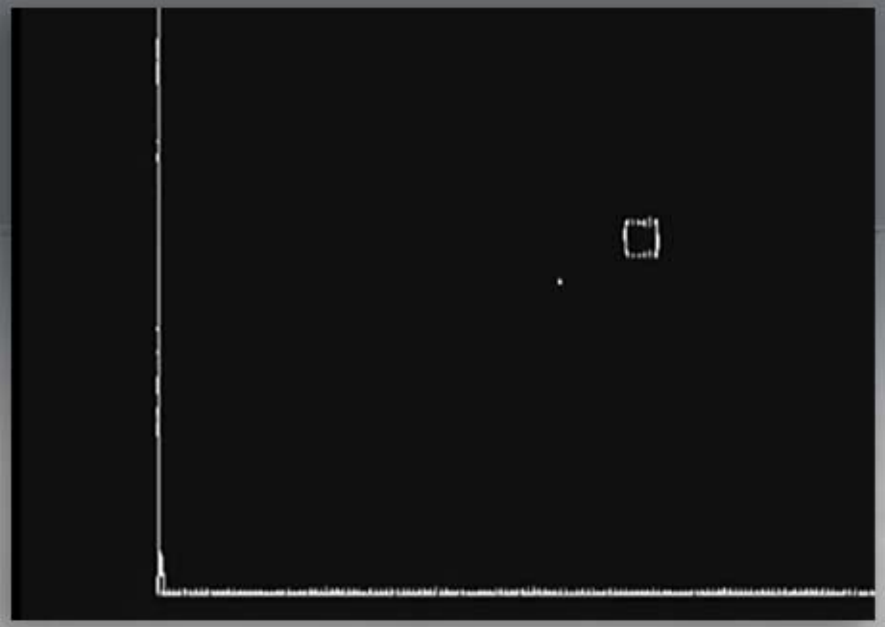
Cooperative Research and Development (CRADA) executed with FAA

TRL 6: "Prototype system tested in intended environment close to expected performance."

TRL 7: "Demonstration system operating in operational environment at pre commercial scale."

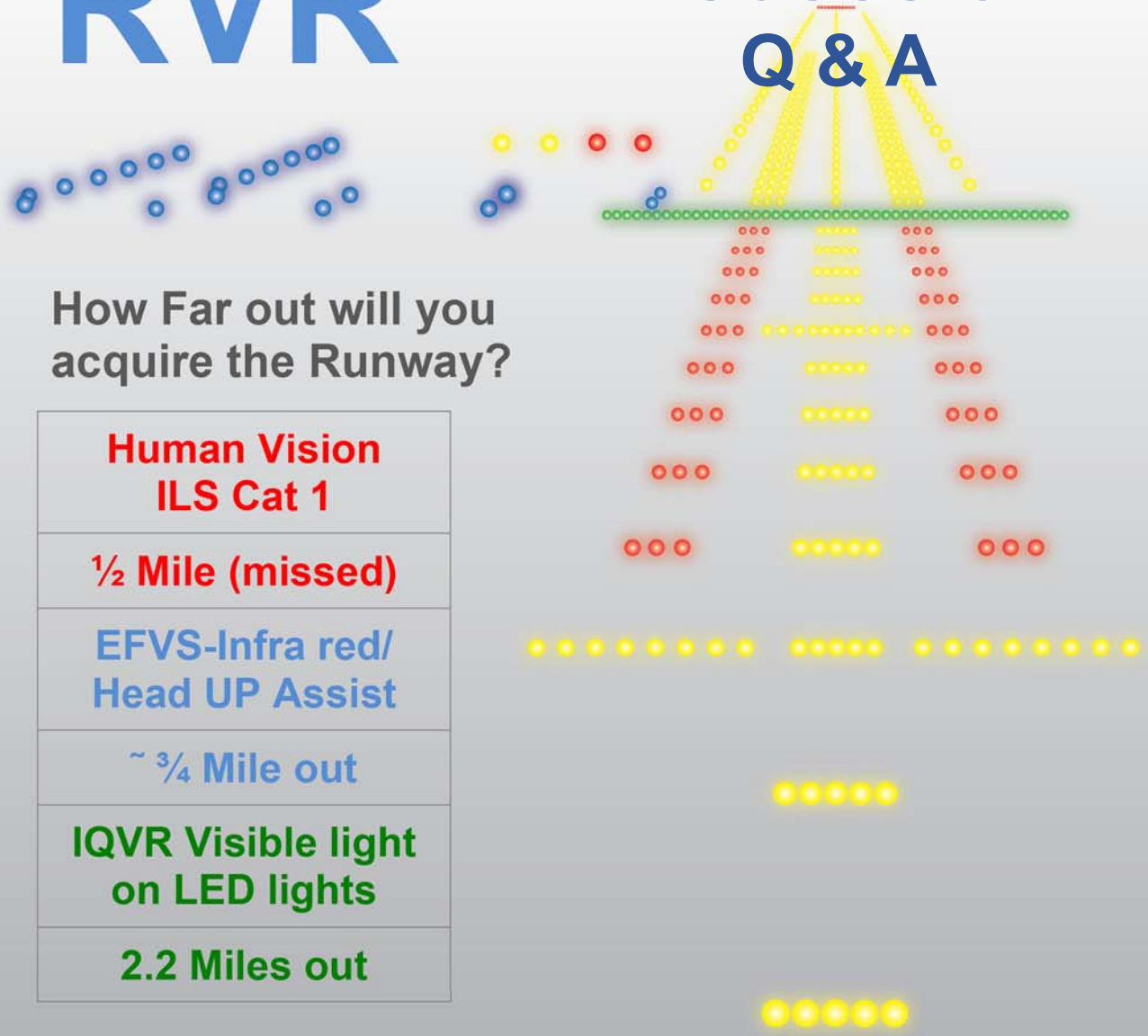
- Flight tests to begin shortly at FAA Hughes Technical Center, Atlantic City NJ.

OUR KITTY HAWK MOMENT



RVR

DISCUSSION
Q & A



1400 ft
(1/4 MILE)
Ceiling Indefinite

How Far out will you acquire the Runway?

Human Vision ILS Cat 1
½ Mile (missed)
EFVS-Infra red/ Head UP Assist
~ ¾ Mile out
IQVR Visible light on LED lights
2.2 Miles out

IQVR Enabled systems will **acquire the runway** landing environment up to **300% sooner** than Infra red enhanced vision systems.

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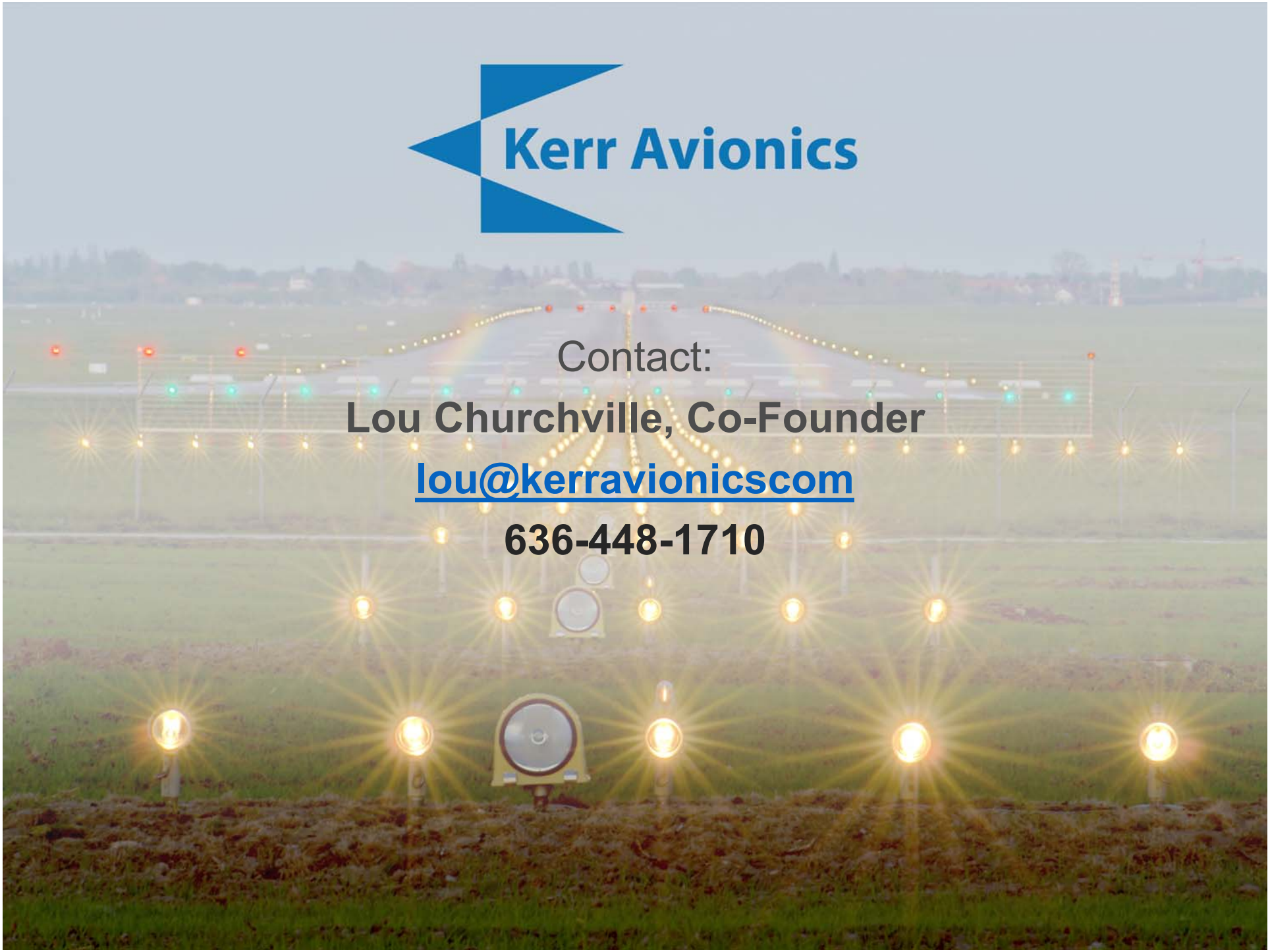

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