



# **Hammarprodukt Firefly Bird Diverter - Proof of Function, Mortality Reduction and economical Drone Mounting**

Lars Hammar and Dr Klaus Schmitt

BirdLife Conference

Vilnius, June 28-29, 2018

## Why Bird Diverters are needed

- Bird collisions with power lines causes:
  - **loss of rare bird species**, often penalized
  - **damage** to the power distribution system
  - **power interruptions** and customer dissatisfaction
- The following video was recorded at location Kübassaare / Saaremaa Island / Estonia when one of several flying larger birds collided with an unprotected power line at dusk, as they were flying too low and could not recognize the power line.

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# HAMMARPRODUKTOR's INTENTION

- To make sure their products **Firefly** and **BirdMark** are always:
  - the **best functioning product** on the market
  - having the **highest reduction in bird mortality**
  - working over the **widest range of species**
- To learn from user experience and to continuously improve products
- To **achieve low lifecycle cost** by using long lasting materials and modern drone based installation
- To **scientifically prove how and why it works**



## SCIENCE WORK

Hammarprodukter is collaborating with Dr Schmitt in Germany, who is doing science about the vision of: bees, butterflies, deer, fish....

Human vision



Bee vision



Butterfly vision





and Birds!





# TASK

- **Evaluate the Hammarprodukter products** FireFly and BirdMark
- **Contribute Science** to make the products constantly better
- **Enhance** customer's **satisfaction**



## NEEDS OF END CUSTOMERS

- **Product proven to work** and to efficiently diverting / protecting birds
- Product proven to **work also under adverse conditions**, even if dirty and after many years in operation
- **Durable and long lasting product** without problems in operation
- Low effort and easiness of **installation without power interruption**
- **Low lifetime cost** = cost of product + installation + replacement per 10 years operation

## EXAMPLES FOR CONSTANT FIREFLY IMPROVEMENT

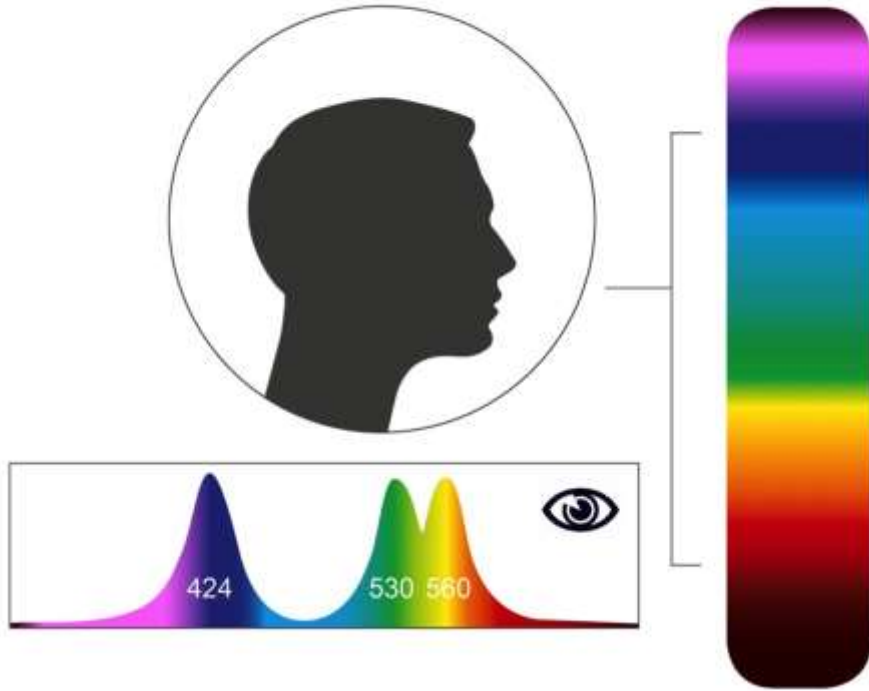
- Improved base plate
- Improved stainless steel swivel + ring for longer lifetime
- Withstands estimated more than one billion rotations in 10 years
- Drone installation for decreasing cost, even in hard to reach areas

# BIRD DIVERTER SCIENCE

1. **Vision of humans:** sensitivities of human eye receptors
2. **Vision of birds:** sensitivities of birds eye receptors
3. **Multispectral Photography:** how does it work in comparison with normal photography
4. **Recorded proof of FireFly working** in the field

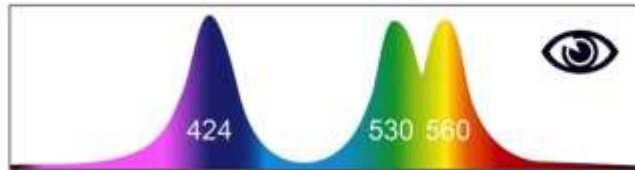
# VISION OF HUMANS

Human Vision

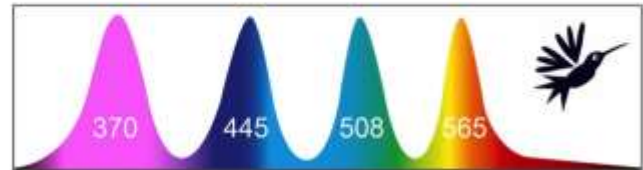


# VISION OF HUMANS vs BIRDS

Human Vision



Bird Vision



# VISION OF HUMANS vs BIRDS

But how do we now get from our vision...



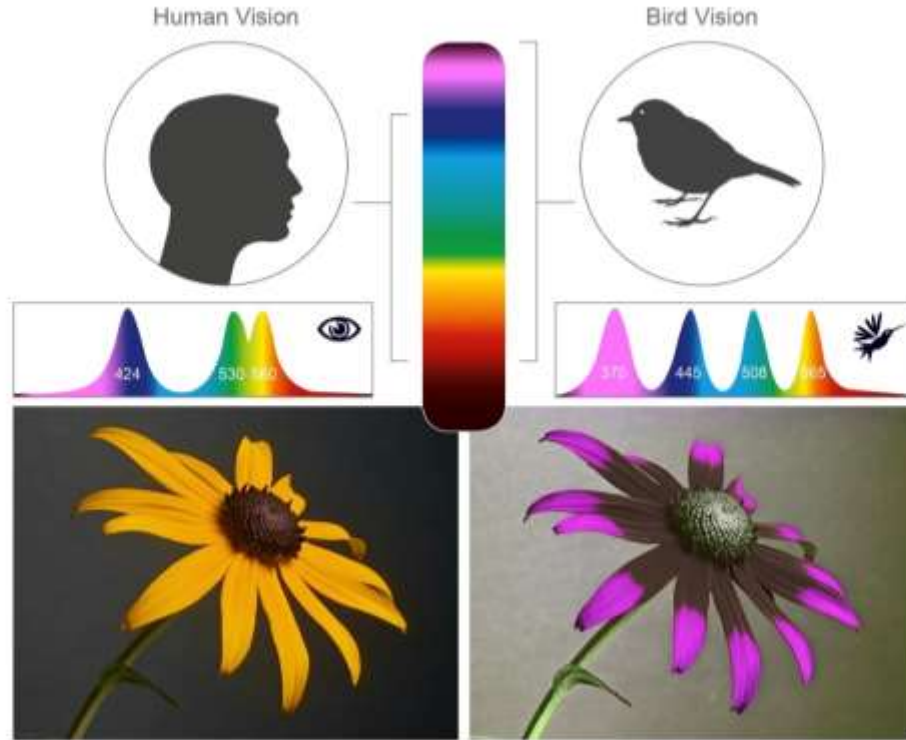
# VISION OF HUMANS vs BIRDS

To theirs...?

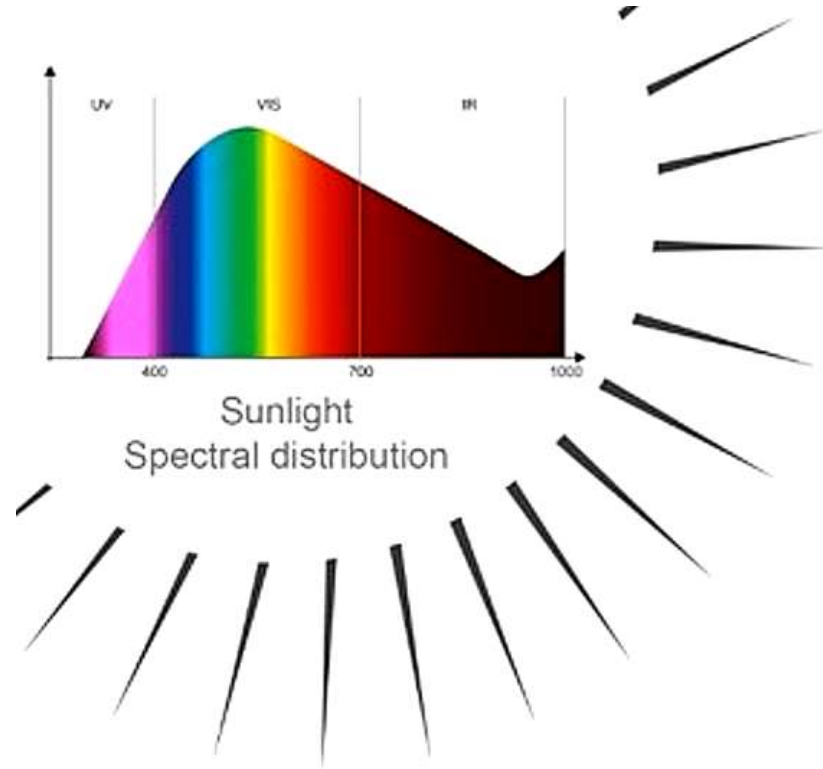




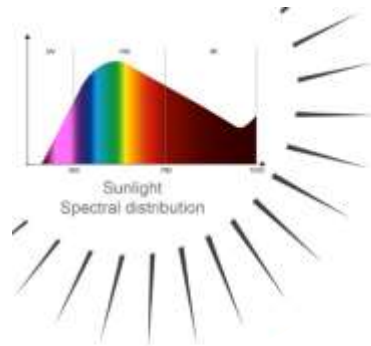
# VISION OF HUMANS vs BIRDS



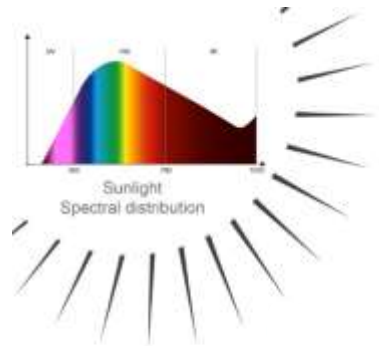
# MULTISPECTRAL PHOTOGRAPHY, HOW DOES IT WORK...



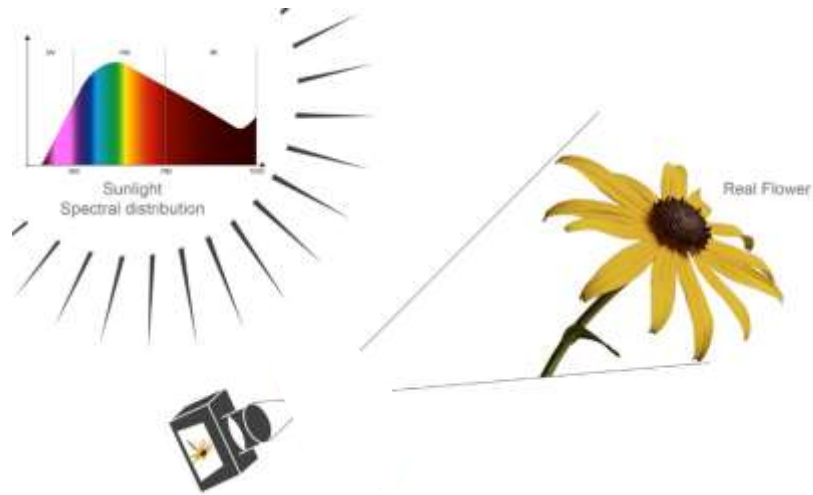
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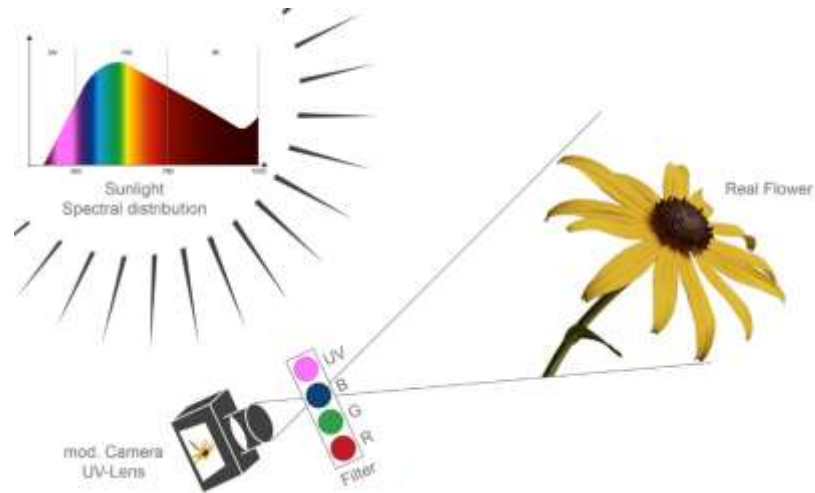
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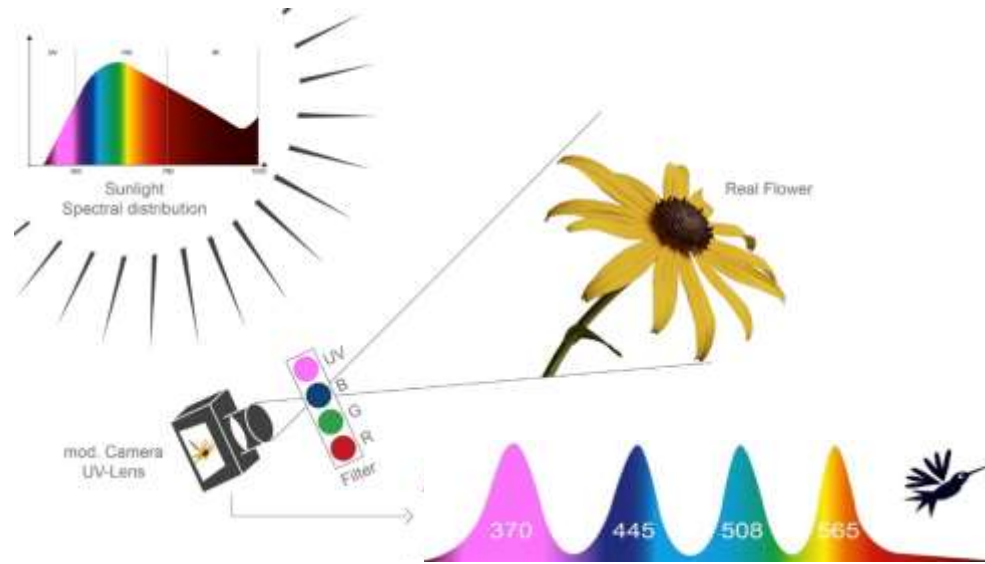
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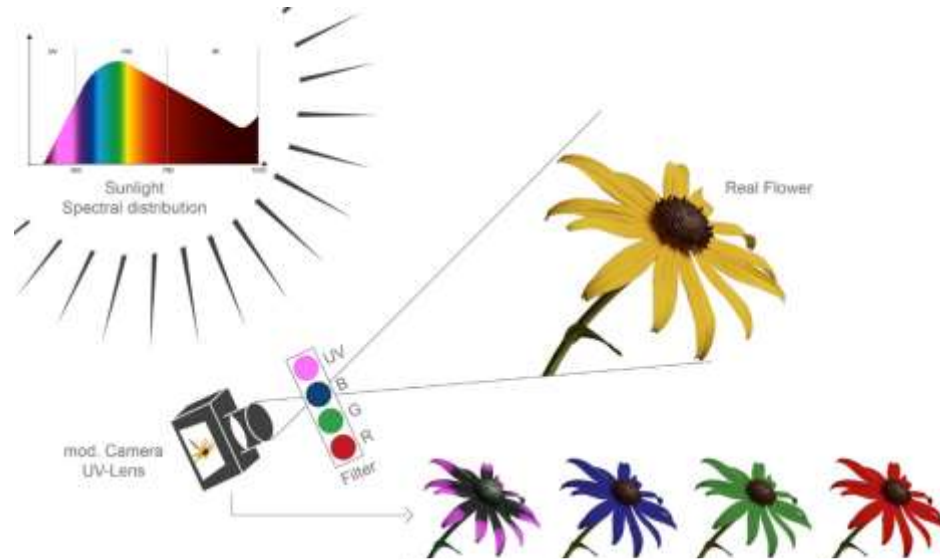


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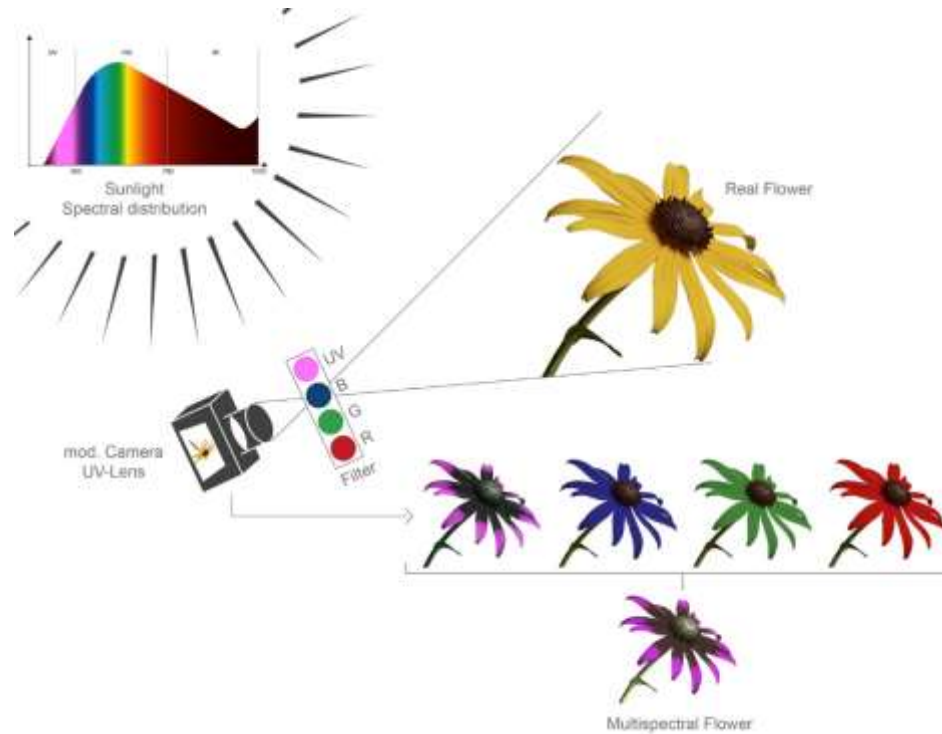




# MULTISPECTRAL PHOTOGRAPHY, HOW DOES IT WORK...



# MULTISPECTRAL PHOTOGRAPHY, HOW DOES IT WORK...



# HOW DO BIRDS SEE OTHER BIRDS...



# HOW DO BIRDS SEE OTHER BIRDS... POSSIBLY LIKE THIS!



## PROOF OF FIREFLY FUNCTION

- Presenting here **videos shot in human vision and simulated bird vision** June/August 2017 at daytime and also at nighttime to show the afterglow function.
- Videos were recorded at location Kübassaare / Saaremaa Island / Estonia, **proving several flying birds were successfully diverted.**
- **Long term video recording** has now been permanently installed at this Kübassaare power line **for continuous monitoring.**

**HD Video will be shown here.....**

## FireFly for efficient Reduction of Bird Mortality

Within the **DANUBE FREE SKY** project, a part of the EU funded Danube Transnational Project, the Raptor Protection of Slovakia organization runs an ongoing project to **test the efficiency of bird diverters**, based on 8.000 installed different diverter types on 27ml / 43km power lines of **22kV, 110kV and 400kV** – soon to be extended to 50ml / 80km.



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## FireFly for efficient Reduction of Bird Mortality

For the **Firefly diverter**, the **project statistics prove** that the reduction in bird collision rate 2016-2018 is in comparison to the years 2014-2016 before:

- **20kV / 110kV lines: 97% reduction**
- **400kV lines (on earth wire): 92% reduction**

with installed FireFly Bird diverters.

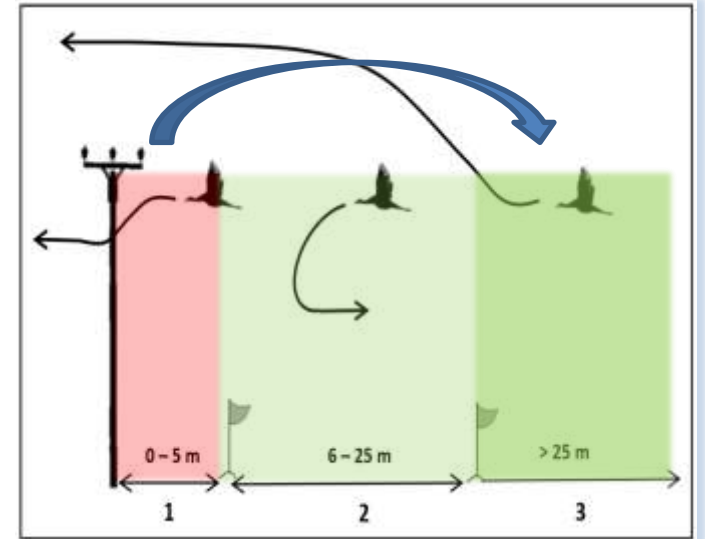


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## FireFly for efficient Reduction of Bird Mortality

The project statistics further prove that Firefly diverters lead to an **efficient change of bird flight behavior** when approaching power lines, by:

- **reacting earlier** and
- **much further away**
- **giving more time** to change flight path so as to **avoid collisions**.



## FireFly for efficient Reduction of Bird Mortality

- Further studies conducted in Portugal [...] have proven a reduction of bird mortality of...
  
- Firefly has been tested and recommended by EPRI 2016

## Installation using drone technology

- 3 years of R&D
- Capable of working on live wires
- Specially designed for bird diverter installation
- 2 different versions



## Installation using drone technology

- No need to cut power in lines
- No negative effects on environment – crops, birds etc.
- Capable of operating in any terrain scenario – Over water, valleys, forests near inhabited areas
- Only a crew of 2 needed
- Time & Cost Effective – 150pcs/day
- Continuous operation thanks to rapid battery exchange



**HD Video will be shown here.....**

**HD Video will be shown here.....**





## Summary

- **Firefly and BirdMark** are products proven to work successfully for a long period of time, with a warranty of 5 years.
- Neutral studies prove **significant reduction in bird mortality**
- **Science based constant product improvement** and **proof of product function** safeguards customer's investment decisions
- **Drone mounting reduces lifecycle cost considerably** and hence forms an **efficient solution** to our customers.

**QUESTIONS?**

**THANK YOU!**