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Adaptative Scheme for Asynchronous Processing of event-based vision algorithm
Overview

• Introduction
• Adaptive Scheme for Asynchronous Processing
• Experimental results
• Conclusions
• Future work
Introduction

• This work is an extension of a previous publication in an ICRA 2020 workshop [1].

• Dynamic package size adaptation during asynchronous event processing to take full advantage of the event cameras.

Event Processing

- Image-based (Synchronous)
- Event-based (Asynchronous)
  - Event-by-event
  - Event packets
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- Adapting to the environment (i.e. event generation).
- Adapting to the event-based algorithm computational cost.
- Computing events as soon as possible.
- Preventing overflow.
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Random event discard procedure to reduce the risk of algorithm overflowing

Dynamic packet size variation

Event camera → $\gamma$ filter → Packing → Algorithm

Compute event rate

$e$ → $e_\gamma$ → $E$ → $\Delta t$
Experimental Validation (I)
Experimental Validation (II)

- **Event Rate**
  - $R_{\text{events/s}}$
  - $t \text{ [s]}$

- **Algorithm Time (Normalized)**
  - Algorithm time
  - Mean algorithm time
  - $t \text{ [s]}$

- **Events per Packet**
  - $\gamma_{\text{max}}$, $\gamma$
  - $t \text{ [s]}$
Conclusions

- Adapting computational load $\rightarrow$ Responsiveness vs. overflow avoidance.
- Processing in low computing capacity devices (e.g. on-board computers).
- Processing in operations with high event generation (e.g. perching).
Future work

• Integration on-board the ornithopter.
  • Probably not in the 1st iteration.

• Paper for a journal special issue + open source ASAP release.