Data Tool for Drone Simulations and Machine Learning

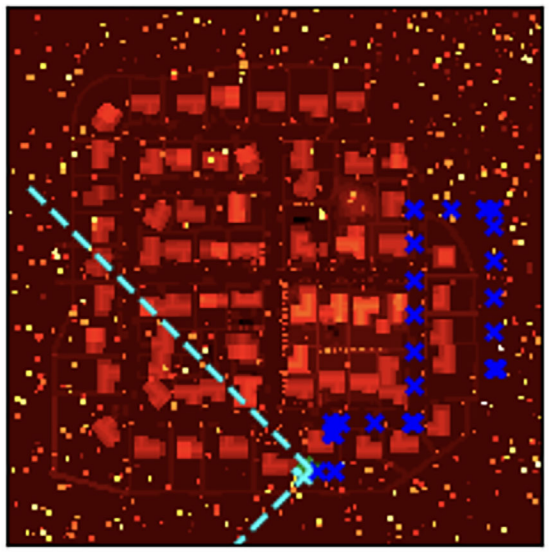


Drone autonomy is an interdisciplinary domain that requires rigorous systems engineering to integrate codependent modules into a cohesive pipeline. Such modules include those used for sensing, perception, navigation, and mapping. Diverse datasets and environments are required to properly develop each of the modules, however real world datasets are lacking in not just their availability but more importantly in their flexibility. For example, training a navigation model can require having access to various sensor data at dynamic coordinates – a requirement that typically can not be fulfilled by static pre-collected real world datasets. To this end, simulation environments play a crucial role due their primary strength in flexibility, at the cost of a weakness in realism – even though cutting edge physics engines such as Unreal Engine help mitigate this weakness. We present a data tool which can be used to help develop each of the varying modules, and draw parallels between simulated and real world environments. Specifically, our tool can be used to access dynamic drone sensor data from Microsoft AirSim, and then be further used to build each of the codependent modules typical in drone autonomy. This includes approaches in machine learning, reinforcement learning, object detection and segmentation, depth extraction, navigation, mapping, and other logics.

Tim Johnsen *and Marco Levorato*

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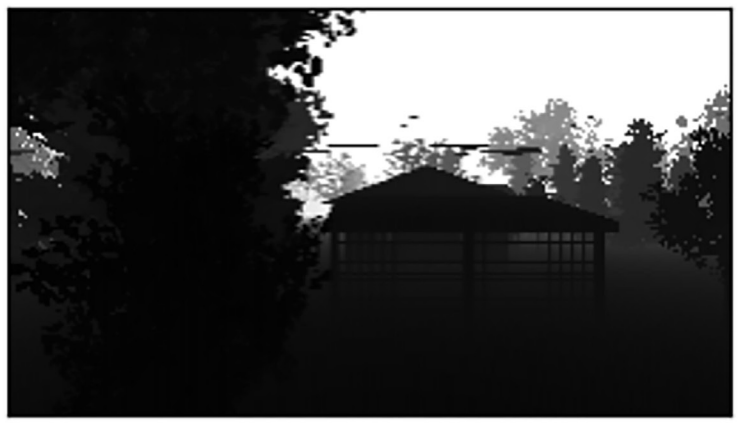
Aerial View



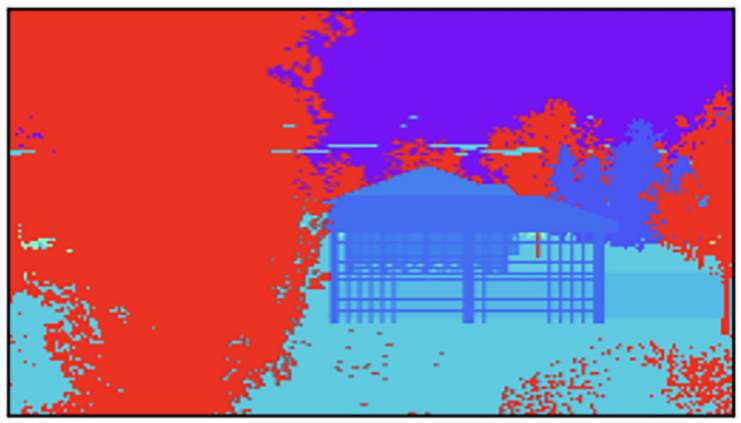
RGB Camera

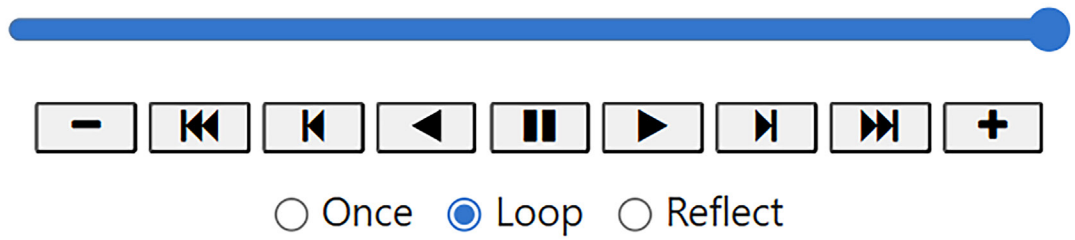


Depth Sensor



Segmentation





○ Once ◉ Loop ○ Reflect

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collected 32 many data points!
SceneV1 has shape of (32, 3, 144, 256)
DepthV1 has shape of (32, 1, 144, 256)
SegmentationV1b has shape of (32, 144, 256)
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