A. Supplementary Materials

A.1. Performance and Complexity Trade-Offs in Tracking Algorithms

Table S1. Performance comparison of various tracking methods in terms of model size (Parameters in millions ↓), speed (Frames Per Second, FPS ↑), and Higher Order Tracking Accuracy (HOTA ↑) on the MOT17 dataset. DragonTrack achieves a balance between model size, speed, and tracking accuracy, outperforming other methods in HOTA.

Method	Parameters (M) ↓	FPS ↑	HOTA ↑
Tracktor++ [3]	59.0	1.5	44.8
MPNTrack [6]	N/A	3.5	49.0
CenterTrack [39]	50.0	22.0	52.2
QDTrack [19]	56.0	20.3	53.9
FairMOT [37]	**35.0**	25.0	59.3
StrongSORT [10]	58.0	25.0	63.5
HybridSORT	N/A	**30.0**	64.1
ByteTrack [36]	N/A	**30.0**	63.1
MOTR [35]	41.0	7.5	57.8
DragonTrack (Ours)	45.0	10.0	**65.3**

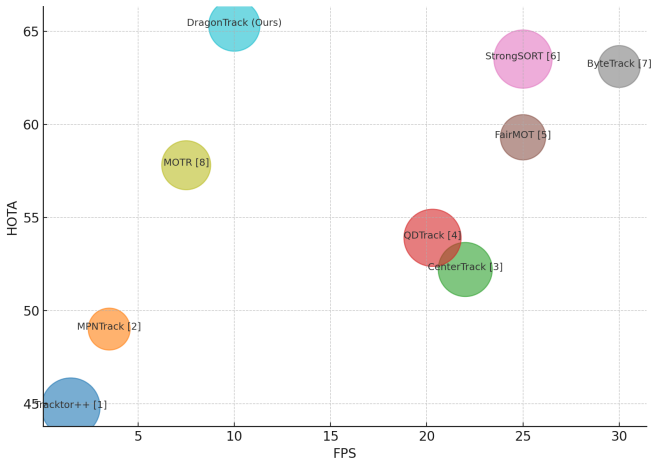

Figure S1. FPS vs HOTA comparison between DragonTrack (Ours) and other tracking methods. The bubble size represents the number of parameters for each method, while the position of each circle reflects its real-time performance (FPS) and tracking accuracy (HOTA).

In this subsection, we compare several state-of-the-art multi-object tracking algorithms in terms of their speed (FPS), accuracy (HOTA), and model complexity (number of parameters). The results are summarized in Table S1. The visual comparison between these methods is shown in Figure S1, where each method is represented as a bubble whose size is proportional to its number of parameters, plotted with respect to its FPS and HOTA scores.

From the Table S1, it can be observed that DragonTrack, our proposed method, achieves the highest HOTA score (65.3) while maintaining a moderate FPS of 10. With 45 million parameters, DragonTrack strikes a well-balanced trade-off between speed, accuracy, and model complexity. In comparison, methods like ByteTrack and StrongSORT achieve higher FPS values (30 and 25, respectively) but offer slightly lower HOTA scores. These methods prioritize faster processing at the expense of accuracy. On the other hand, QDTrack and CenterTrack perform well in terms of FPS (20.3 and 22), but their HOTA scores are lower, indicating a trade-off between speed and tracking precision. Simpler models like Tracktor++ and MPNTrack show both lower FPS and HOTA scores, illustrating their limitations in terms of both speed and accuracy. These observations underscore the advantages of DragonTrack in achieving a superior balance between performance and tracking accuracy.

A.2. Tracking Triplets: An In The Wild Example of Identical Toddlers

Ensuring toddlers' safety and accurately monitoring their movements, especially in homes and childcare facilities, is crucial for guardians and professionals in child development, nursing, and health [13,15]. Tracking tasks become significantly complex with identical children, like twins or triplets, due to their similar appearances and frequent obstructions in visibility, challenging the efficacy of multi-person tracking (MPT) algorithms. The need for robust identification methods to avoid misidentification is emphasized, pushing for advancements in tracking techniques. These advancements aim to improve the HOTA metric, ensuring a balanced evaluation of detection and association, moving beyond traditional metrics like the MOTA.

An application of DragonTrack versus ByteTrack [36] on a YouTube video of triplets demonstrates the importance of these advancements in Figure S2, with full details available in our Supplementary video.

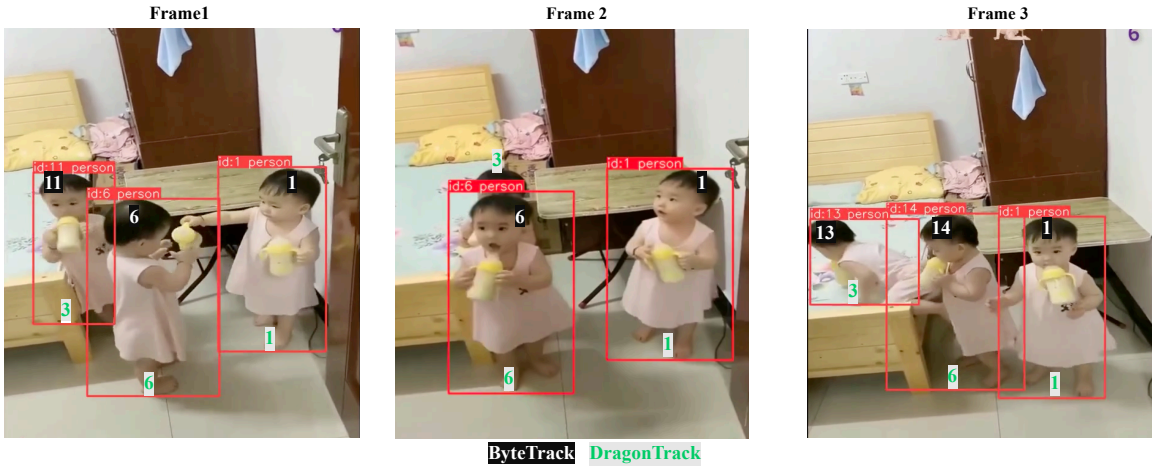

Figure S2. Tracking performance comparison between DragonTrack and ByteTrack [36] using an in-the-wild example of identical triplet toddlers found on YouTube.