1. 设备选择：鲁班猫 4

	树莓派 4	树莓派 5	鲁班猫 4	鲁班猫 5
CPU	Quad-core Cortex-A72(ARM v8) 1.8GHz	Quad-core Cortex-A77(ARM v8) 2.4GHz	Quad-core Cortex-A76+Quad-core Cortex-A55 (2.4Ghz + 1.8Ghz)	
RAM	LPDDR4 2133MHz 1,2,4,8 GB	LPDDR4x 4167MHz 1,2,4,8 GB	LPDDR4x 4167MHz 4,8,16 GB	
PCle	N/A	PCle 2.0	Mini-PCle	
WIFI	802.11 b/g/n/ac 2.4Ghz/5Ghz		N/A	
HDMI	2 x micro HDMI		Mini-HDMI 2.1	HDMI 2.0
Input power	5V/3A DC	5V/5A DC	5V/4A	12V/2A

● 鲁班猫比树莓派要多出 4 个核心的 CPU 在模型推理时可以提高效率

● 鲁班猫 5 与鲁班猫 4 在 CPU 和 RAM 上一致，只是多了预留接口

2. 模型选择：Ultralytics Yolo11-n

Models	Task				
	Object Detection	Instance Segmentation	Pose/Keypoints	Oriented Detection	Classification
YOLOv7	√	×	×	×	×
YOLOv8	√	√	√	√	√
YOLOv9	√	×	×	×	×
YOLOv10	√	×	×	×	×
YOLO11	√	√	√	√	√
YOLO12	√	×	×	×	×

Model	size (pixels)	mAP^{box} 50-95	mAP^{mask} 50-95	Speed CPU ONNX (ms)	Speed A100 TensorRT (ms)	params (M)	FLOPs (B)
YOLOv8n-seg	640	36.7	30.5	96.1	1.21	3.4	12.6
YOLOv8s-seg	640	44.6	36.8	155.7	1.47	11.8	42.6
YOLOv8m-seg	640	49.9	40.8	317.0	2.18	27.3	110.2
YOLOv8l-seg	640	52.3	42.6	572.4	2.79	46.0	220.5
YOLOv8x-seg	640	53.4	43.4	712.1	4.02	71.8	344.1

Model	size (pixels)	mAP^{box} 50-95	mAP^{mask} 50-95	Speed CPU ONNX (ms)	Speed T4 TensorRT10 (ms)	params (M)	FLOPs (B)
YOLO11n-seg	640	38.9	32.0	65.9 ± 1.1	1.8 ± 0.0	2.9	10.4
YOLO11s-seg	640	46.6	37.8	117.6 ± 4.9	2.9 ± 0.0	10.1	35.5
YOLO11m-seg	640	51.5	41.5	281.6 ± 1.2	6.3 ± 0.1	22.4	123.3
YOLO11l-seg	640	53.4	42.9	344.2 ± 3.2	7.8 ± 0.2	27.6	142.2
YOLO11x-seg	640	54.7	43.8	664.5 ± 3.2	15.8 ± 0.7	62.1	319.0

- YOLO11 比 YOLOv8 参数量少
- YOLO11 比 YOLOv8 准确率高
- YOLO11 比 YOLOv8 CPU 推理速度快

3. 整体流程：

数据集准备 → 图像标注 → 模型训练 → 模型导出 → 模型部署