CHAPTER 4

EXPERIMENTS AND ANALYSIS

Finally, we run both the original YOLO and modified YOLO with object detection by applying it directly for parking slot availability detection and we measure the FPS (Frame Per Second) and the power usage in 1 minute as shown in Figure 6. Table 1 shows the first 10 seconds for FPS and power consumption. Regardless of whether there are moving objects or not, the original YOLO version always detects objects of every image frame captured from the camera. The result shows that the original YOLO for parking lot detection takes 23.46 FPS and 288.961 mW during the first second. Whereas the modified YOLO takes 15.28FPS with 83.148mW consumption and 17.02 FPS with 8.515 mW consumption when there are moving objects and no moving object respectively.

The top left of Figure 6 shows FPS measured in one minute and the original YOLO performed better than the modified one. In contrast, on the right shows, the power consumption measured in one minute and our modified algorithm used less power. We already mention that the original YOLO for availability parking slot detection always detect objects whether or not there are motions, hence it always utilized the full capacity of the GPU for one minute. The power consumption is about 4816 milliWatts (mW) per second and a total of 288,961 mW in 1 minute with an average speed of 23 fps (frame per second).

Our energy-aware algorithm is run to first actives the camera for capturing the scene, where we purposely configure so that there are no moving objects in the parking lot area. The top right of Figure 6 shows the experimental result of our algorithm only consumes less power which is 142 mW per second on average. Comparing to the original code, the power consumption is reduced by (4816 – 142) / 4816 * 100 % is 97 % per second. But, the top left of Figure 6 shows the average frame per second is 17, so the speed is reduced to 17 fps from 23 fps, which is 26 % slower.

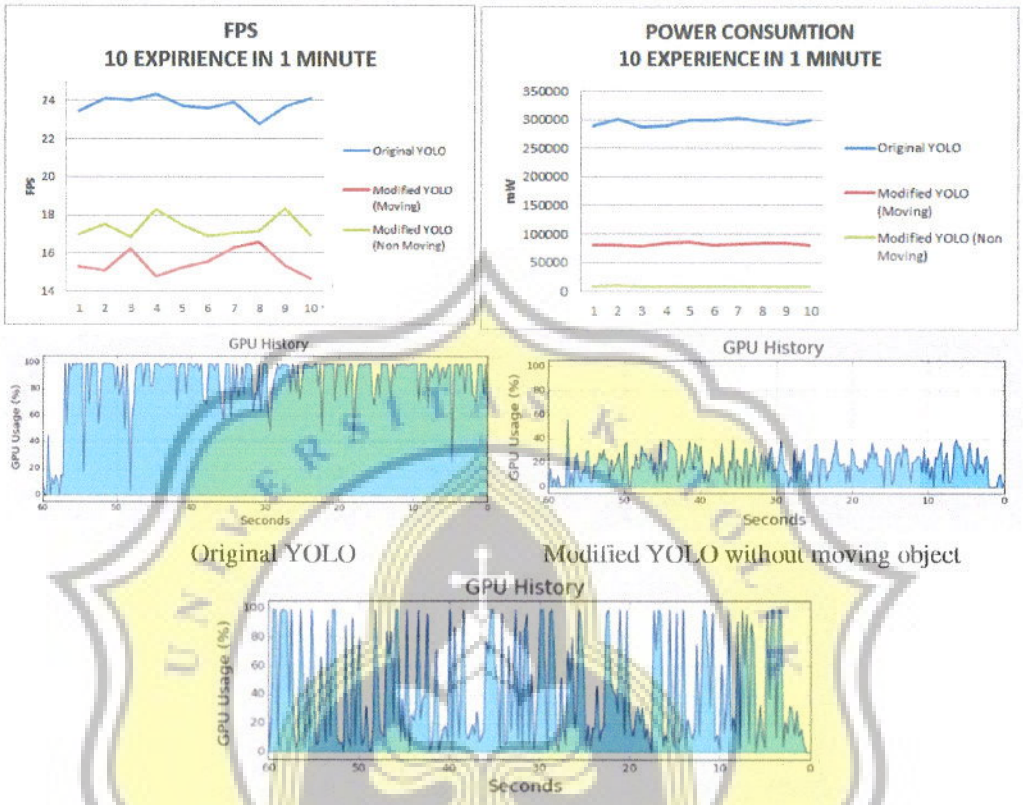

Figure 6. The Results Represented in Graphic Charts

The results shown in the top right of Figure 6 is that when there is a moving object in the parking lot area, the average power consumption of our algorithm for parking lot detection is 1386 mW which reduction of (4816 – 1386)/4816 *100% is 71% per second. The average fps is reduced to 15 fps from 23 fps, which is 34.8% slower. On the middle of the Figure 6 left shows the GPU utilization for the original YOLO while on the right is the modified YOLO when there is no moving object, and at the bottom is the modified YOLO when there are moving objects running in 1 minute respectively.

For every image frame captured from the camera, we first check if there is an object motion if there is then YOLO object detection is invoked. The snapshot of our parking lot availability detection results is shown in Figure 5. The dashed line bounding boxes are the empty parking slots and the solid line bounding boxes are occupied slot.