I have developed a system that is capable of quick and accurate detection of target objects using the deep learning method. Adding orientation with depth sensing then allows a robot to grasp the objects. The existing systems, which use the traditional deep learning method on RGB-D images for object detection and grasping point estimation and use more expensive and professional robotic platforms to grasp, are more time-consuming and less accurate in estimating the grasping point. To reduce the time spent for object and grasping point detection, I first adapted the Faster Region Convolutional Neural Network (Faster RCNN) method into my system, which uses only RGB images to do object detection and achieved a high speed. Using the limited area given by the RGB object detection results, along with a registered depth image provided by a Microsoft Kinect, the system achieved a high-speed success rate for robotic estimation of grasping points for each object. Then, using robotic kinematics, the system can quickly get the desired angle for each joint of the four degrees of freedom robotic arm. The arm can then pick up the object accurately following an appropriate path planning strategy for each object class. The system reduced the object detection and grasping point estimation time from over one second to an average of around 0.135 s. It also reduced the average absolute error rate in estimated grasping point to 1.59 mm instead of 18 mm although it achieved a slightly lower grasping and pickup performance at 87% compared to 90% achieved by the traditional method.