Vision Based Robot Intelligence

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Robots prevalence in industry and homes has continued to develop over time. But there is still much to do before autonomy can be achieved in a cost-effective manner. One step to reaching this goal is the ability of robots to use vision and identify objects in their environment. For my project I have developed a robot using stereoscopic vision to find and calculate the distance of objects, doing so in a cost-efficient manner. The robot I have made consists of a chassis made from LEGO Mindstorm pieces and two off-the-shelf webcams. The robot is capable of locating a specific object, e.g. a Rubik's Cube, by searching images captured by the mounted webcams. Then it uses the location of the object in both images to calculate the distance of the object with reasonable accuracy. The robot repeats this process multiple times, with more accurate measurements closer to the object. Once close enough the robot makes a final calculation, moves to the object, and grabs it. It does all of this autonomously, after initial calibrations. The robot had great consistency in measurements, failing only a small fraction of the time. I have tested the robot in many conditions, where the robot succeeded in completing its task. In the future, I would like to make the program more robust, and also optimize its speed.

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