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Assignment - Ex0

It’s always inspiring to learn from the past before we try to invent the future. So much of what robotics researchers are trying to do today is still so similar to what was trying to be accomplished in the 60’s. Navigation, manipulation, sensing, and generalization are just a few areas that remain just as relevant. At face value, the largest improvements have come about in speed, form factor, and cost. Additive manufacturing and websites like Digikey and McMaster have simplified the hardware side so much that even middle schools have more capable robots than the Stanford Research Institute had in the 60’s. Through these advancements, if anything, robotics has become very accessible to wide ranges of education and funding.

It’s fascinating that some of their largest findings, such as A* and Hough transform, are still taught in graduate classes today. Isaac Newton's quote, “If I have seen further, it is by standing on the shoulders of giants”, hasn’t lost any flavor in 300 years. So many breakthroughs we see in the news are actually smaller consecutive improvements that don’t make it to press. I was very impressed that they were trying to use a combination of simple commands which might generalize well to a wide variety of tasks. Although all their techniques were state-of-the-art back then, it’s clear that the last decade alone has ushered in huge advancements to the field of AI and robotics.

Undoubtedly, neural networks have created an entirely new approach to solving old problems in robotics. The ability for a robot to learn from its experiences has been critical for making robots useful in more complex environments. Probabilistic learning through simulations and real world interactions have made robots much more useful in our daily lives. Shakey would be far from helpful in getting your Amazon package delivered in two days, but Shakey’s findings helped us arrive where we are today.

Regardless of the source of improvement, robotics has certainly drastically changed since 1969. Today, numerous research groups around the world have been working tirelessly to solve: mapping unstructured environments, navigating dynamic scenes, manipulating non rigid objects, and teamwork in robots. Although the Holy Grail of robotics and AI, generalization, has yet to be solved, it’s clear that neural nets have made clear progress. I’m excited to learn more about the recent improvements in the coming weeks.

Their approach to generalization with simple steps reminded me about Braitenberg Vehicles. These vehicles have complex motions without computer programming. Their similarity to chemotaxis in bacteria is quite obvious. It’s very inspiring that simple commands can lead to complex results. Hard coding complex tasks can be futile, so at first, we might as well try to find a very simple solution. Simplifying solutions in engineering is often an elegant way to arrive with a better result. I’m inspired to approach problems in the same way this semester.