

Animatronics Engineer

Team 33300C

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Growing up in Central Florida, we have been fascinated by the technological



A Original Abraham Lincoln animatronic

changes stemmed from robotics at Walt Disney

World. From the first Abraham Lincoln

animatronic in the 1964 World Fair, to the Na'vi

River Journey shaman at Disney's Animal

Kingdom, animatronics have dramatically

changed over time¹. Animatronics engineers work

as a team to accomplish an overall story just as a robotics team works together to

accomplish a goal. While there is no animatronics degree, animatronics engineers need

a mechanical or electrical engineering degree to create the robot inside the animatronic.

The very first type of animatronic was made for cuckoo clocks. The little bird would pop out at a certain time. Walt Disney started the modern era of animatronics. The first few things



B

Old cuckoo clock

Disney

made

were birds and people, like Abraham

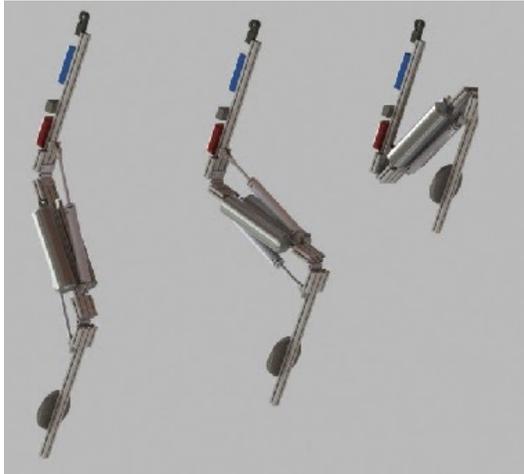
Lincoln². Now, the most advanced

animatronics are still at Disney, and used in



C Abraham Lincoln animatronic with other presidents in The Hall of Presidents at Disney's Magic Kingdom.

restaurants and rides to entertain guests. Some of the most advanced animatronics can lasso a rope³. Ten years into the future, you will most likely be able to have conversations with animatronics and won't be able to tell the difference between



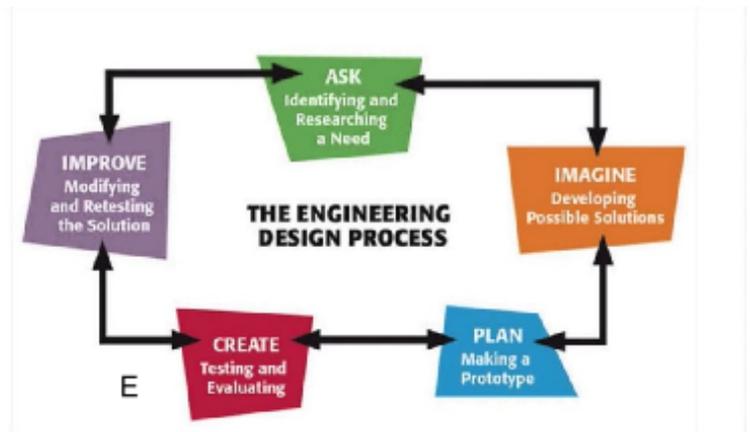
D Stickman acrobatic robot

animatronics and humans. In a research experiment titled *Stickman*, Walt Disney Imagineering is building a robot that can do acrobatic tricks. It uses a pendulum to launch itself into the air. The robot is used in a laser range so it can adjust itself or correct itself in mid-air⁴. In the future, animatronics will most likely be able to do more stunts and will have a

higher chance of being more interactive and intelligent.

Animatronics engineers begin with an engineering degree, usually in mechanical or electrical engineering. While there is no specific school for animatronics technology, some colleges offer robotics courses that work with animatronics or animatronic-like creations and figures⁵. In an interview with Liz Diaz, Senior Ride Mechanical Engineer at Walt Disney Imagineering, we learned that animatronics engineering has many features. There are many jobs involved with animatronics engineering, such as mechanical engineering, electrical engineering, software engineering, and artistry. More colleges are now tying these all into one program⁶.

Animatronics engineer is a broad term with many different roles or jobs. You need different degrees for different roles within animatronics. Creating an animatronic involves planning, designing, developing, artistry, testing, and maintaining. This is similar to the engineering design process in robotics which includes



asking, imagining, planning, creating, and improving. Just as there are many jobs needed to create an animatronic, there are many crucial roles needed to have a



F Team 33300C working on their robot for the 2020-2021 Rise Above game.

successful robotics team. Some robotics team positions include designers, builders, programmers, and drivers. Animatronics is similar to competitive robotics because in competitive robotics, there are team members that may have different roles. They all have a different set of

skills that are crucial to the team. But in the end, they all work together as a team to complete their end goal. Our team's end goal is to make it to the VEX Robotics World

Championship. At the world championship, we are reminded that it's a small world because we get to meet and work with teams from all over the world.

Best known for his role as a member of the build team on *Mythbusters*, Grant Imahara was an electrical engineer and roboticist. After graduating from the University of Southern California with an electrical engineering degree, Grant worked with Industrial Lights and Magic, a movie special effects company founded by George Lucas⁷. While there, he worked in animatronics, creating a “custom circuit to cycle the Energizer Bunny's arm beats



G Grant Imahara with the Energizer Bunny.

and ears at a constant rate”⁸ and “became the chief model maker specializing in the animatronics used for the Star Wars films”⁹ Grant then worked with *Mythbusters* from 2005 to 2014. He used his animatronics experience to build human-like robots to stand in place of humans to test myths where it was too dangerous to have a live human in the experiment. After *Mythbusters*, Grant worked as a consultant with Disney Imagineering



H Baby Yoda gets happy when he sees a chicken nugget.

creating autonomous animatronic stunt doubles. His final personal project before passing away in July, 2020, was creating a Baby Yoda animatronic that would visit

children in the hospital. Grant said, "I did all the mechanical design, programming, and 3D printed the molds. He's currently running a continuous sequence, but soon I'll be able to trigger specific moods and reactions, as well as incorporate sound."¹⁰ Grant's work with animatronics has proved that animatronics can be used to help people.

Over time, we have seen the advancement of robotics and animatronics. As animatronics become more realistic, education has adapted for the changing career of animatronics engineers. Animatronics is no longer just mechanical engineering but now it's a combination of engineering and artistry. Teams are needed to create the ultimate experience whether it be an animatronic for a ride, or a robot for a competition. Our skills being developed on a robotics team are preparing us for entry into a STEM career of animatronics engineering, where we are inspired to use animatronics for entertainment purposes, and also to further help people.

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