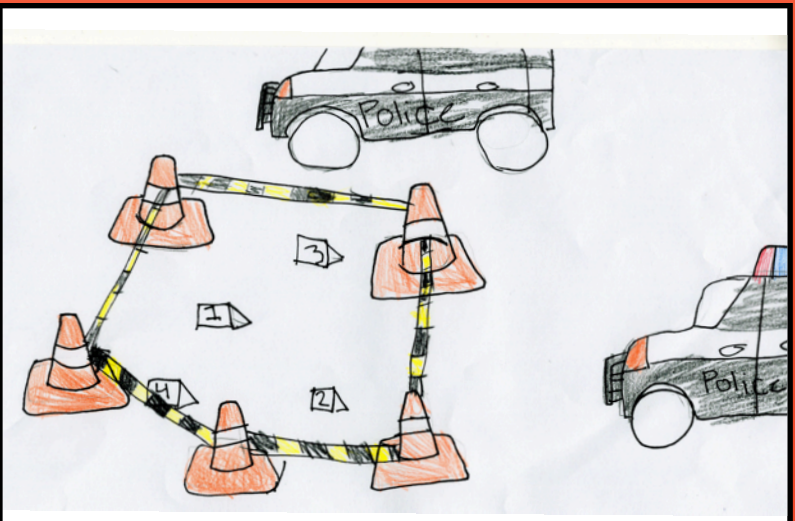
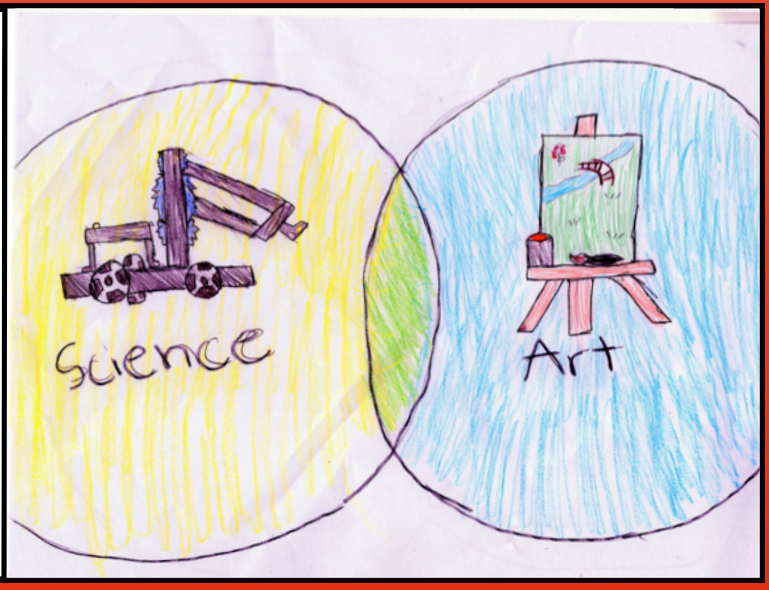
# COMBINING SCIENCE AND ART FOR THE FUTURE

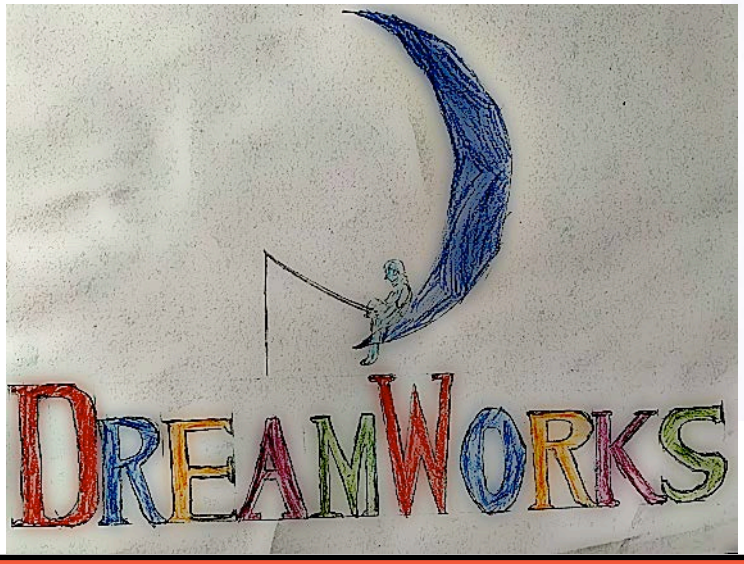

THEY ALSO WORK ON MANY OTHER TYPES OF PROJECTS LIKE CREATING ANIMATIONS FOR MEDICAL EXPLANATIONS, RECREATING CRIME SCENES AND ARCHITECTURE.




WE'RE INTERESTED IN IT BECAUSE IT'S A MIX OF SCIENCE AND ART.



MARLA TANIGAWA IS A DIGIMATTE SUPERVISOR AT DREAMWORKS AND HAS WORKED ON ANIMATED FILMS SUCH AS KUNG FU PANDA, CAPTAIN UNDERPANTS AND HOW TO TRAIN YOUR DRAGON: HIDDEN WORLD.




SHE SAYS THAT COMPUTER ANIMATION...

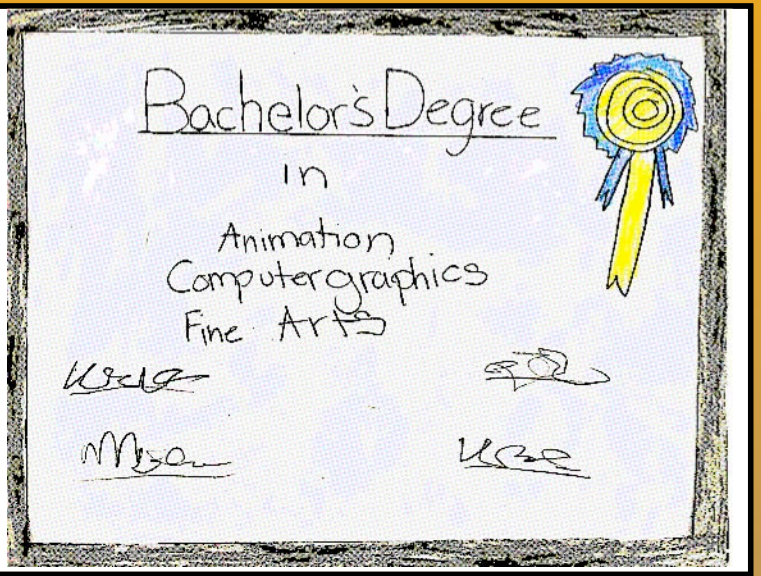
"..TRULY IS TECHNOLOGY AND ART WORKING TOGETHER TO PRODUCE CONTENT THAT PEOPLE WORLDWIDE CAN CONSUME AND ENJOY."

(M. Tanigawa, email communication, October 26, 2020)

# HOW DO YOU BECOME A SUCCESSFUL COMPUTER ANIMATOR?

## SCHOOL

SOME WEBSITES SAY YOU SHOULD HAVE A BACHELOR'S DEGREE IN ANIMATION, COMPUTER GRAPHICS, FINE ARTS, OR A RELATED SUBJECT TO BE A COMPUTER ANIMATOR.




DARIUSH DERAKHSHANI IS AN VFX AND CG SUPERVISOR AND AN AWARD-WINNING CG GENERALIST-LIGHTER WHO HAS WORKED ON COMMERCIALS, TELEVISION, AND FEATURE FILMS. HE IS ALSO THE COMPUTER ANIMATION COORDINATOR AT THE CALIFORNIA INSTITUTE OF THE ARTS. HE SAID SCHOOL BEST PREPARED HIM FOR HIS CAREER.

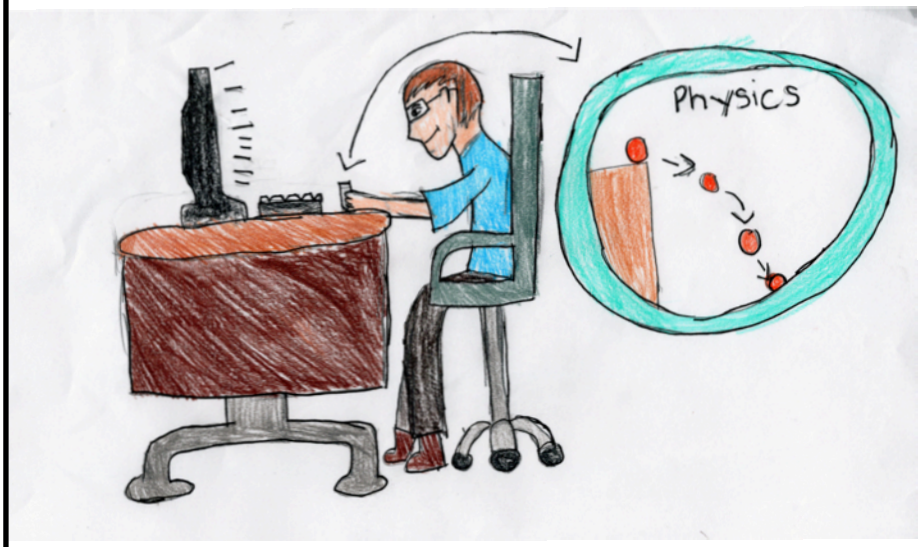
"I STARTED LEARNING ARCHITECTURE IN COLLEGE (UNDERGRADUATE) AND IT WAS A WONDERFUL EDUCATION. I LEARNED A LOT OF DESIGN AND SOME ENGINEERING, BUT MOSTLY I LEARNED HOW TO SOLVE PROBLEMS AND CREATE DESIGNS AND PLANS."

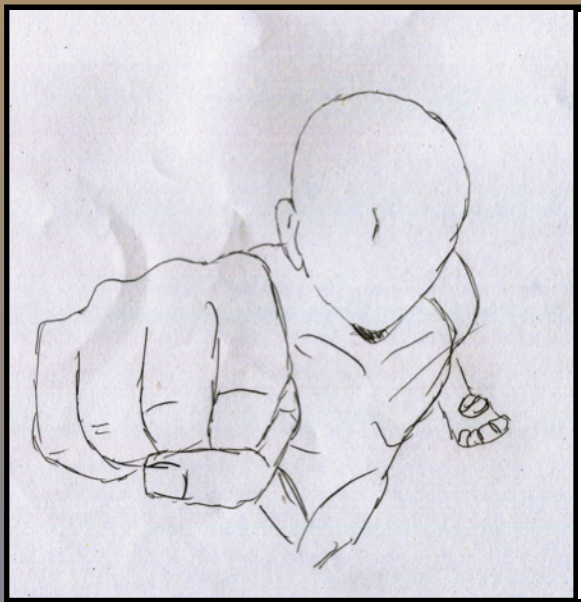
(D. Derakhshani, email communication, October 26, 2020)

TANIGAWA SAYS SOME PEOPLE ARE SELF-TAUGHT OR SUPPLEMENT THEIR KNOWLEDGE BY ENROLLING IN ONLINE ANIMATION SCHOOLS LIKE ANIMATION MENTOR, OR IANIMATE WHERE THEY CAN LEARN FROM WORKING PROFESSIONALS.


## WHAT TO STUDY

STEM CLASSES LIKE GEOMETRY, ALGEBRA, PHYSICS AND ANATOMY CAN BE HELPFUL. COMPUTER SCIENCE CAN ALSO BE HELPFUL DEPENDING ON WHAT PART OF THE ANIMATION PROCESS YOU WANT TO DO.

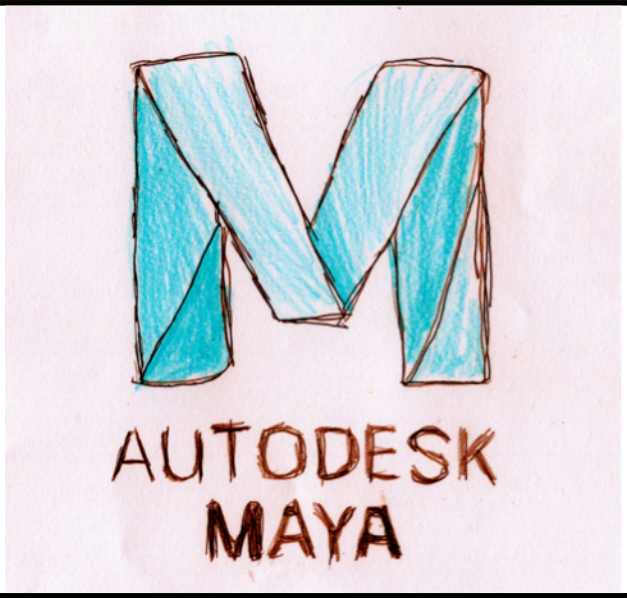


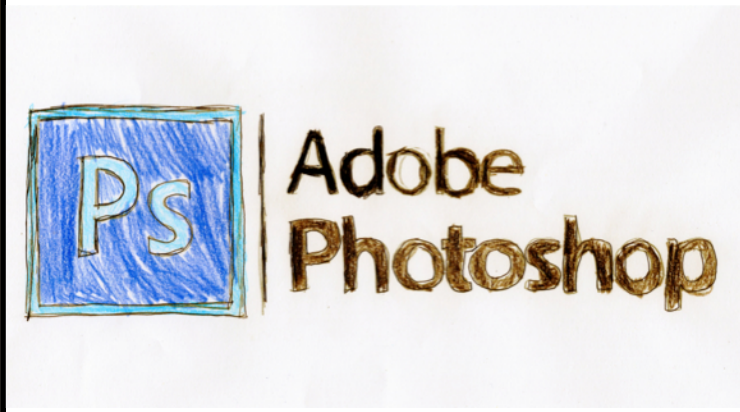
DERAKHSHANI SAYS, "ART AND DESIGN ARE VERY IMPORTANT FOR AN ANIMATOR. UNDERSTANDING HOW BODIES MOVE, AND HOW TO DRAW PEOPLE. BUT THERE ARE SO MANY DIFFERENT PARTS OF COMPUTER ANIMATION, IT DEPENDS ON THE EXACT KIND OF WORK YOU WANT TO DO IN IT. SOME ANIMATORS, LIKE TECHNICAL AND FX ANIMATORS ARE VERY TECHNICAL AND UNDERSTAND CODING AND MATHEMATICS."

# SOFTWARE

DERAKHSHANI RECOMMENDS GETTING EXPERIENCED WITH AUTODESK'S MAYA ANIMATION SOFTWARE. MAYA IS AN INDUSTRY STANDARD IN CG ANIMATION. HE SAYS GAME STUDIOS USE 3DS MAX. AUTODESK'S MOTIONBUILDER IS THE KEY SOFTWARE FOR MOTION CAPTURE ANIMATION.




BLENDER IS ANOTHER OPTION FOR STUDENTS JUST STARTING. HE ALSO SAYS LEARNING SCRIPTING LANGUAGES LIKE PYTHON WOULD BE HELPFUL IF YOU WANT TO BE A TECHNICAL ANIMATOR (OR RIGGER). THEY ARE THE ARTISTS WHO SET UP CHARACTERS AND DO SPECIAL EFFECTS ANIMATIONS LIKE FIRE AND WATER ANIMATIONS.




TANIGAWA AGREES THAT YOU SHOULD KNOW THE INDUSTRY-STANDARD SOFTWARE. AT DREAMWORKS ANIMATION, SHE USES DIGIMATTE (AKA MATTE PAINTING) TO CREATE DIGITAL ENVIRONMENTS AND LANDSCAPES.

SHE ALSO MENTIONS MAYA AS WELL AS HOUDINI TO CREATE 3D MODELS, TO LIGHT SCENES, AND TO LAYOUT SET PIECES. THEY USE PHOTOSHOP FOR THEIR 2D SCENES FOR SKIES, MOUNTAINS, BUILDINGS, AND PLANETS.

# THE COMPETITIVE ROBOTICS CONNECTION

## TEAMWORK

A COMPUTER ANIMATOR SHOULD BE ABLE TO WORK WITH A TEAM, LISTEN TO OTHER PEOPLE'S IDEAS, BE ABLE TO FINISH PROJECTS ON TIME, AND THEY SHOULD ALSO HAVE CREATIVITY.


IN ROBOTICS, WE LEARN TO WORK AS A TEAM. WE LISTEN TO EACH OTHER'S SUGGESTIONS TO IMPROVE OUR ROBOTS. WE HAVE TO MEET DEADLINES AND WE ALWAYS HAVE TO THINK OF CREATIVE WAY TO IMPROVE OUR ROBOT.

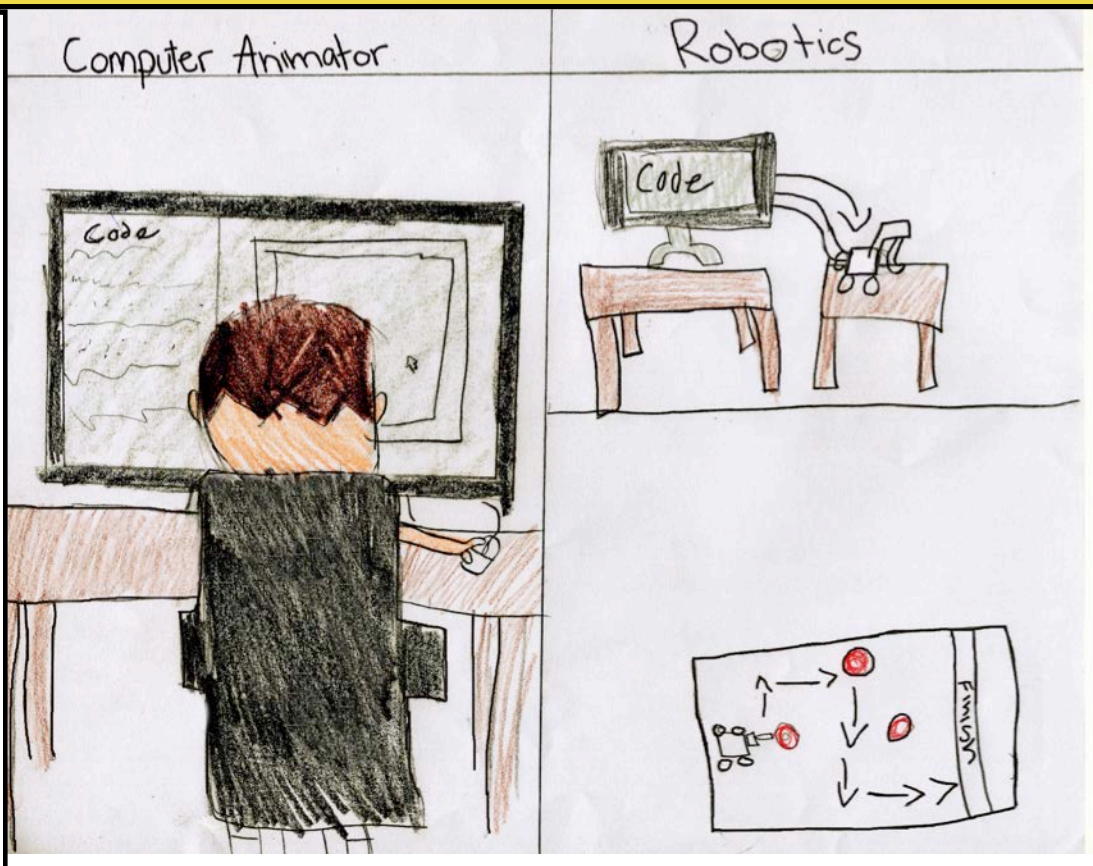
IN ROBOTICS, YOU NEED TO KNOW HOW TO WORK WITH DIFFERENT TEAMS. FOR COMPETITION, WE HAVE ALLIANCES AND WE NEED TO QUICKLY LEARN TO WORK TOGETHER.

AT YOUR OWN SCHOOL, EVEN THOUGH YOU MIGHT HAVE WORKED REALLY WELL WITH A TEAM LAST YEAR, YOU MIGHT GET PUT INTO A NEW TEAM AND HAVE TO LEARN NEW WAYS OF WORKING WITH NEW PEOPLE.


TANIGAWA SAYS ONE OF THE THINGS THAT HELPED HER BE SUCCESSFUL WAS THE ABILITY TO WORK WITH MANY DIFFERENT PERSONALITY TYPES. A MOVIE IS ONE LARGE TEAM AND YOU HAVE TO WORK WITH A LOT OF DIFFERENT DEPARTMENTS BUT YOU'RE ALL WORKING TOWARDS MAKING A GREAT END PRODUCT.

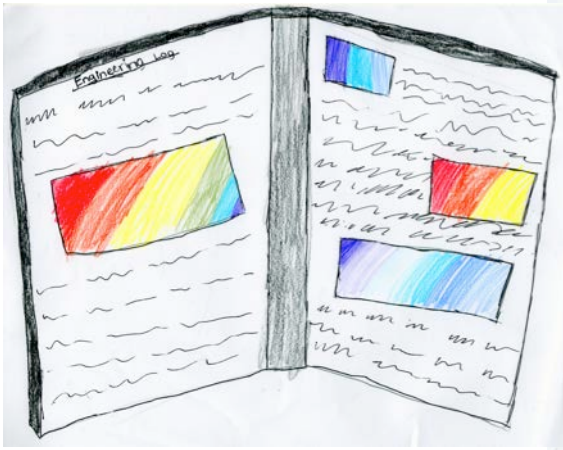
## CODING

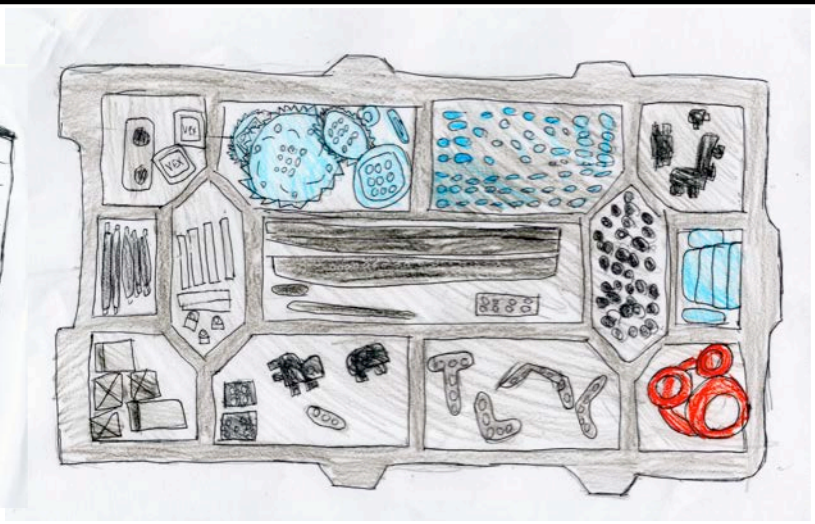
AS TANIGAWA AND DERAKHSHANI HAVE SAID, THERE ARE COMPUTER ANIMATORS WHO HAVE TO DO PROGRAMMING. WE LEARN PROGRAMMING IN ROBOTICS.



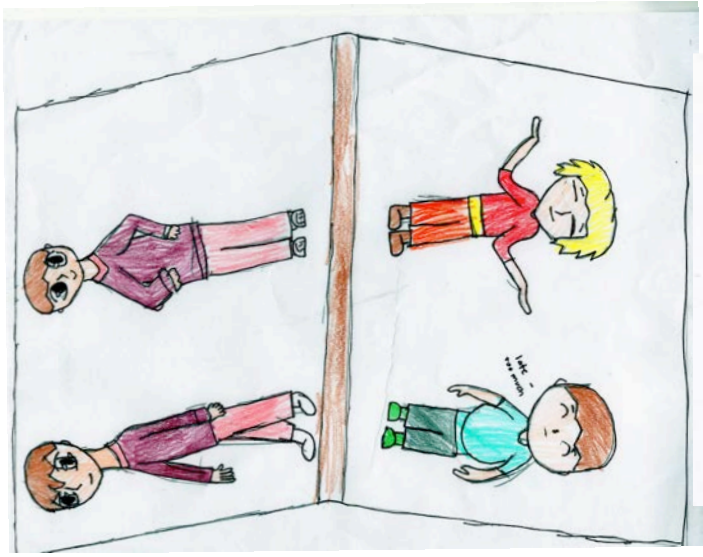
# ORGANIZATION

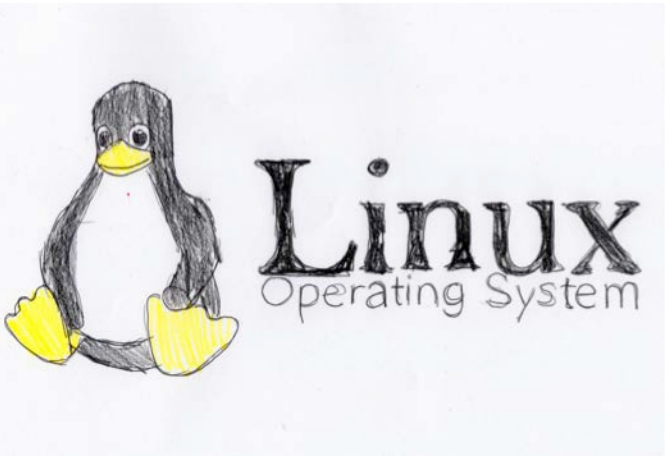
YOU NEED TO BE ORGANIZED IN ROBOTICS AND AS A COMPUTER ANIMATOR. IN ROBOTICS, WE KEEP AN ENGINEERING LOG AND WE HAVE TO MAKE SURE OUR KITS ARE ORGANIZED SO WE CAN FIND PARTS.



FOR COMPUTER ANIMATORS, THEY KEEP A PORTFOLIO OR A REEL OF THEIR PERSONAL WORK WHEN THEY ARE APPLYING FOR A JOB. WHEN THEY ARE WORKING IN TEAMS, TANIGAWA SAYS, THEY USE LINUX TO KEEP TRACK OF ALL THE DIFFERENT PARTS OF THEIR PROJECT.





# COMMUNICATION

ANIMATORS NEED TO BE ABLE TO COMMUNICATE THEIR IDEAS IN WRITING AND SPEAKING.


IN ROBOTICS, WE COMMUNICATE WITH OUR ENGINEERING LOG AND INTERVIEWS.

# BEING COMPETITIVE

TANIGAWA SAYS, "AS AN ARTIST, TO REMAIN COMPETITIVE AND SKILLED, YOU HAVE TO BE OPEN TO CONTINUOUS LEARNING, IT TRULY NEVER STOPS." IN ROBOTICS, WE'RE CONSTANTLY LEARNING AND TESTING TO SEE HOW WE CAN IMPROVE OUR ROBOT FOR COMPETITION.

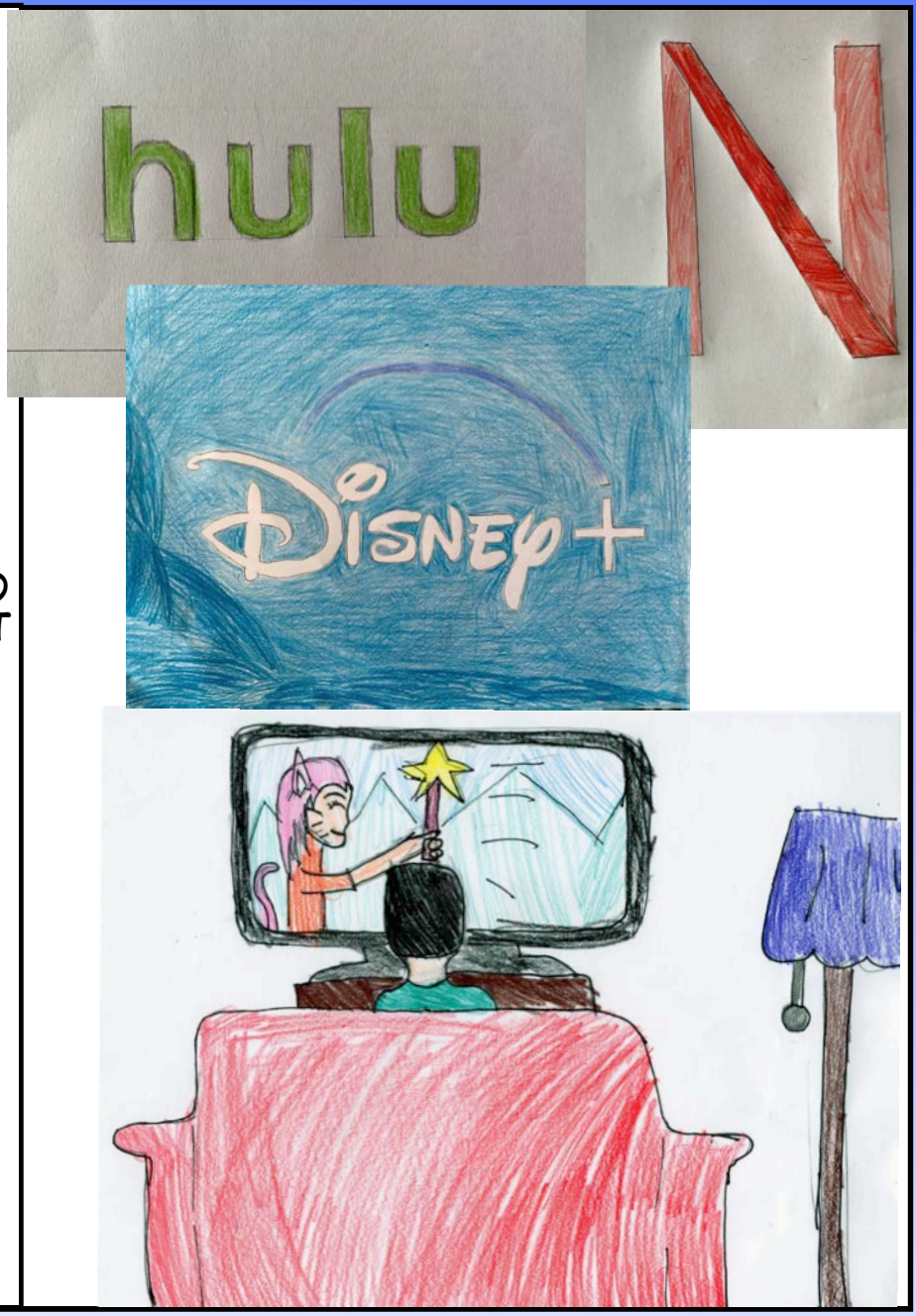
# THE FUTURE OF COMPUTER ANIMATION

ACCORDING TO THE U.S. BUREAU OF LABOR STATISTICS, THE NUMBER OF PEOPLE WHO WILL HAVE A JOB AS A MULTIMEDIA ARTIST OR ANIMATOR IS PROJECTED TO GROW 4 PERCENT FROM 2019 TO 2029. THINGS THAT ARE HAPPENING TODAY ARE PROBABLY THE REASON WHY THERE WILL BE A NEED FOR MORE ANIMATORS IN THE FUTURE.

TANIGAWA SAYS THAT ENTERTAINMENT HAS EXPANDED TO ON-DEMAND SITES LIKE NETFLIX, DISNEY+ AND HULU. THE POPULAR GENRES ARE FAMILY AND KIDS SHOWS WHICH ARE USUALLY DONE WITH COMPUTER ANIMATION.

SHE ALSO SAYS COMPUTER ANIMATION DOESN'T NEED TO BE FILMED ON AN ACTUAL SET SO ANIMATORS HAVE BEEN ABLE TO EASILY WORK FROM HOME DURING THIS PANDEMIC.

TECHNOLOGY IS ALSO ADVANCING SO QUICKLY THAT IT'S HELPING COMPUTER ANIMATION BECOME BETTER FASTER.



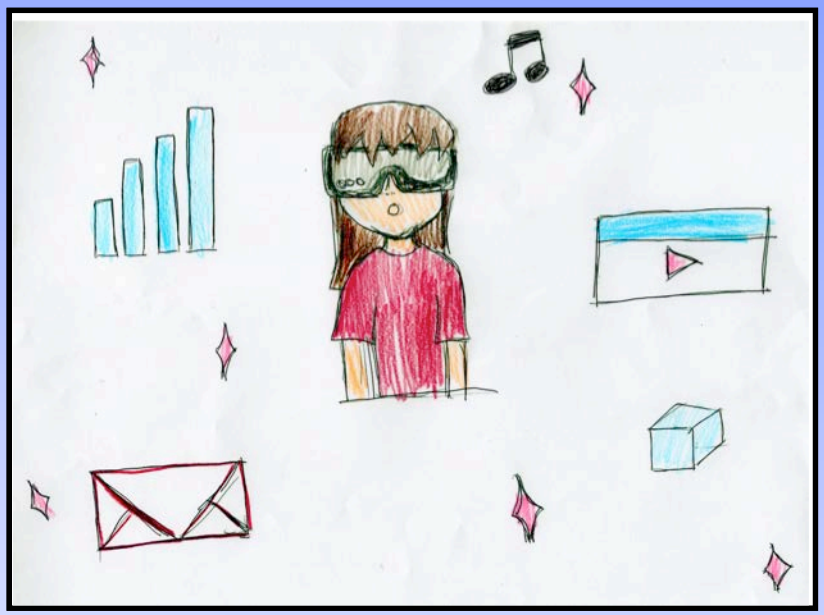
# SO WHAT WILL ANIMATION BE LIKE IN THE FUTURE?

AMY BUNSZEL, SENIOR VICE PRESIDENT OF DESIGN AND CREATION PRODUCTS AT AUTODESK BELIEVES MORE BUSINESSES WILL BE USING COMPUTER ANIMATION IN THE FUTURE.

"I THINK ANYONE DOING DESIGN (OF BUILDINGS, ROADS, BRIDGES, MACHINERY, CARS, CONSUMER PRODUCTS, ROBOTS) WILL START DOING IT IN THE CONTEXT OF THE REAL WORLD AND THIS WILL BE ENABLED BY WHAT FEELS LIKE A MASSIVE MULTI-PLAYER GAME. KIND OF LIKE WHAT EXISTS IN *READY PLAYER ONE*."

(A. Bunszel, email communication, October 28, 2020)

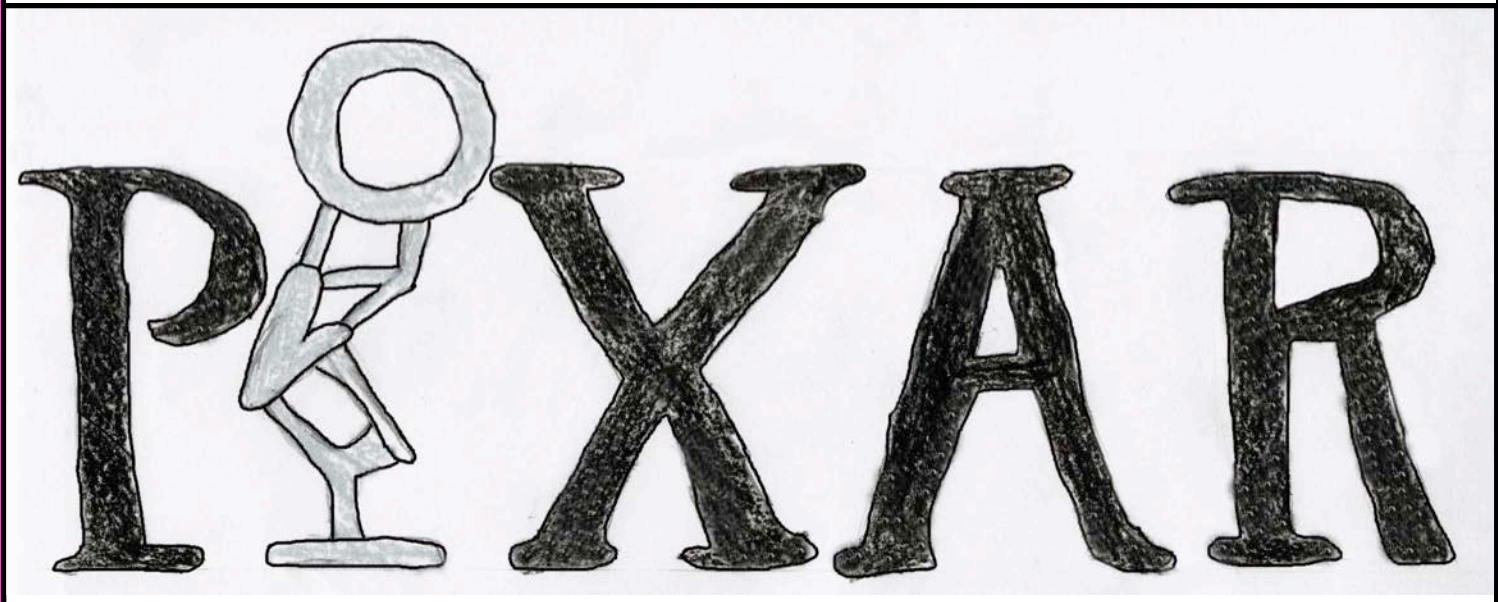
TANIGAWA MENTIONS A SIMILAR IDEA. SHE THINKS COMPUTER ANIMATION CONTENT WILL BE MORE INTERACTIVE "AS A RESULT OF THE GROWTH OF APPLICATIONS THAT SUPPORT REAL-TIME RENDERING, AUGMENTED REALITY, AND VIRTUAL REALITY." REAL-TIME RENDERING IS ALREADY MAKING VIDEO GAMES FEEL MORE IMMERSIVE AND LIFELIKE.



BUNSZEL, DERAKHSHANI AND TANIGAWA ALL BELIEVE THINGS WILL BE MORE AUTOMATED. COMPUTERS WILL DO MORE OF THE ROUTINE AND MANUAL TASKS, WHICH WILL HELP CUT DOWN ON TIME AND COST. IT WILL ALSO GIVE ARTISTS MORE TIME TO BE CREATIVE.

# OUR INSPIRATON

EDWIN CATMULL MIGHT NOT BE A NAME THAT EVERYBODY KNOWS BUT THE COMPANY HE HELPED CREATE, PIXAR, IS. HIS BIOGRAPHY SAYS THAT HE LOVED DISNEY MOVIES LIKE PETER PAN AND PINOCCHIO AS A KID. HE WANTED TO BECOME AN ANIMATOR SO HE DREW FLIPBOOKS.




HE DIDN'T THINK HE WAS VERY GOOD SO HE DECIDED TO BECOME A COMPUTER PROGRAMMER. THAT'S WHERE HE DISCOVERED COMPUTER GRAPHICS AND FOUND HE COULD COMBINE HIS LOVE FOR TECHNOLOGY AND ANIMATION.

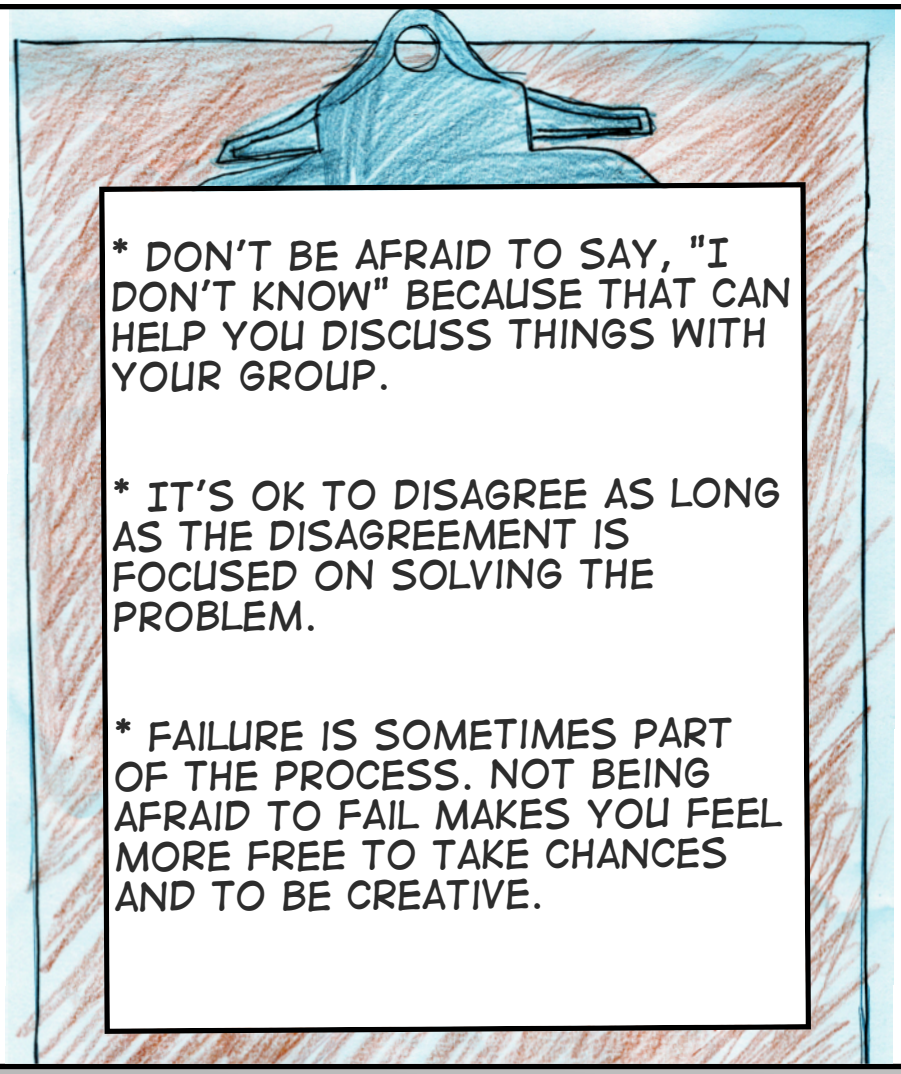
A Computer Animated Hand
by Edwin Catmull and Fred Parke
1972

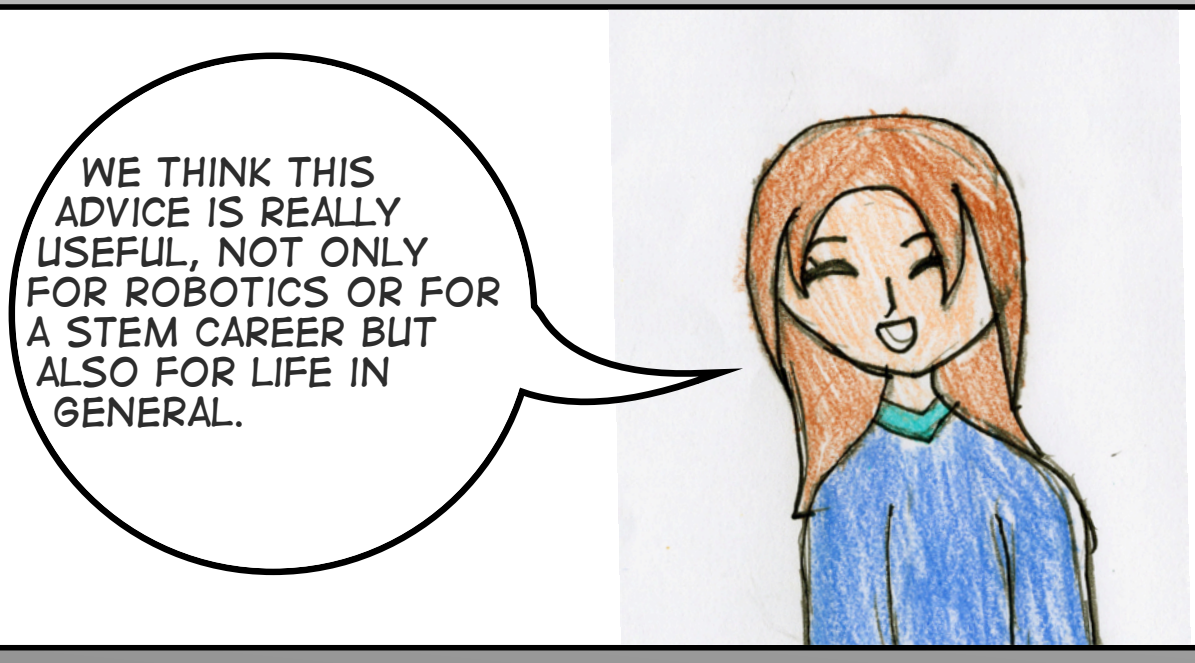
IN A QUESTION AND ANSWER SESSION PRESENTED BY JOHNS HOPKINS WHITING SCHOOL OF ENGINEERING, CATMULL SAID TECHNOLOGY IS ALWAYS GOING TO BE CHANGING

BUT WHAT'S IMPORTANT IS WHAT WE BRING TO IT AND WHAT WE ADD TO IT. HOW CAN WE WORK TOGETHER TO MAKE A REAL IMPACT ON THE WORLD. COMPUTER ANIMATION IS ABOUT HUMAN INTERACTION AND STORYTELLING. STORYTELLING IS ONE OF THE MOST IMPORTANT WAYS WE LEARN.

(E. Catmull, webinar, October 27, 2020)

IN HIS BOOK *CREATIVITY, INC.*, HE SAYS SOME OF THE THINGS THAT HELPED PIXAR BECOME SUCCESSFUL ARE:



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ESSAY AND DRAWINGS BY
MANOA ELEMENTARY SCHOOL
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ELLA CORDOVA
BRAELYNN HASHIMOTO
JETT IKEDA
PAIGE KAWANA
JEFFREY KONO


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***SPECIAL THANKS TO:***

AMY BUNSZEL, SENIOR VICE PRESIDENT OF DESIGN AND CREATION PRODUCTS AT AUTODESK

DARIUSH DERAKHSHANI, COMPUTER ANIMATION COORDINATOR AT THE CALIFORNIA INSTITUTE OF THE ARTS

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