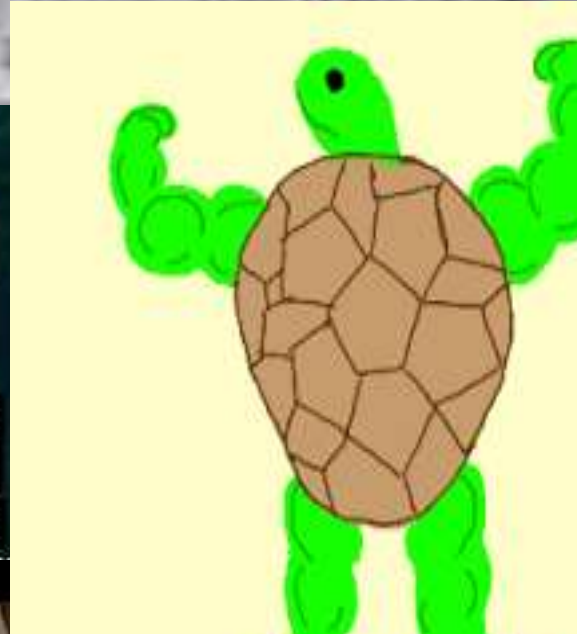


# **THE STORY OF JEROME**

***“THE CYBER-TURTLE DETERMINED  
TO END ALL TRASH”***

- **JEROME BEGIN LIFE AS A VERY SUAVE AND VAIN TURTLE, WHO ONLY CARED ABOUT HIMSELF AND HIS GOOD-LOOKS!**





- **ONE DAY A TERRIBLE ACCIDENT OCCURRED WHEN JEROME BECAME ENTANGLED IN SOME PLASTIC TRASH THAT SOMEONE DUMPED INTO THE OCEAN!**





- **DESPITE HIS VANITY, JEROME WAS VERY POPULAR AMONGST THE OTHER CREATURES, SO UPON HEARING THIS NEWS HE WAS RUSHED TO THE ER BUT IT WAS TOO LATE; HIS LEGS HAD TO BE AMPUTATED!**





- **JEROME WAS ALSO VERY RICH THOUGH, SO HE USED HIS MONEY TO HAVE A TEAM OF SCIENTISTS REBUILD HIS BODY, GIVING HIM WHEELS TO HELP HIM STILL MOVE AND CYBERNETIC IMPLANTS TO HELP HIM “PICK UP” STUFF!**





- **THIS ORDEAL OPENED UP JEROME'S EYES TO THE ERROR OF HIS WAYS, AND HE HAS THUS DEDICATED HIS LIFE TO PICKING UP TRASH TO PREVENT ANYONE ELSE FROM EVER HAVING WHAT HAPPENED TO HIM... HAPPEN TO THEM...!**





# **HOW WE ANSWERED THE CHALLENGE**

***“THE BUILDING OF JEROME THE  
CYBER-TURTLE”***



# **JANUARY 9<sup>TH</sup> 2019**

- **TEAM AUDITIONS CONCLUDED AND A TEAM OF FOUR STUDENTS WITH VERY ACTIVE SCIENTIFIC MINDS WAS ASSEMBLED...AND WE CALL OURSELVES THE “MINI-FLOYARDEES”!**





# JANUARY 16<sup>TH</sup> 2019

- **WE THEN BEGAN RESEARCHING WHAT THE CHALLENGE REQUIRED, WHILE ALSO EXPRESSING INTEREST IN USING SOLAR PANELS AND A TURTLE IN OUR DESIGN BY BUILDING A PROTOTYPE...**

## The Challenge

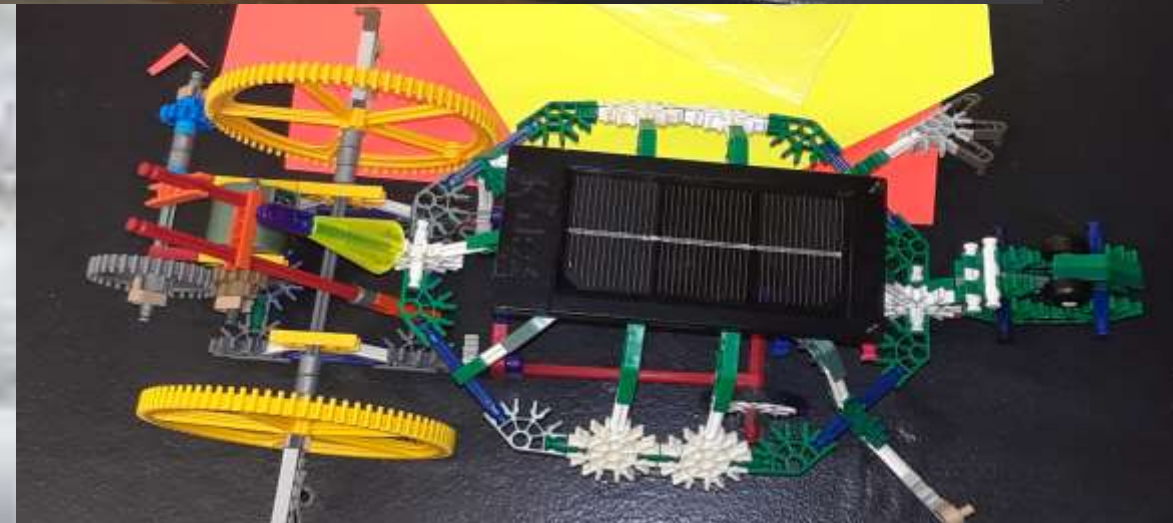
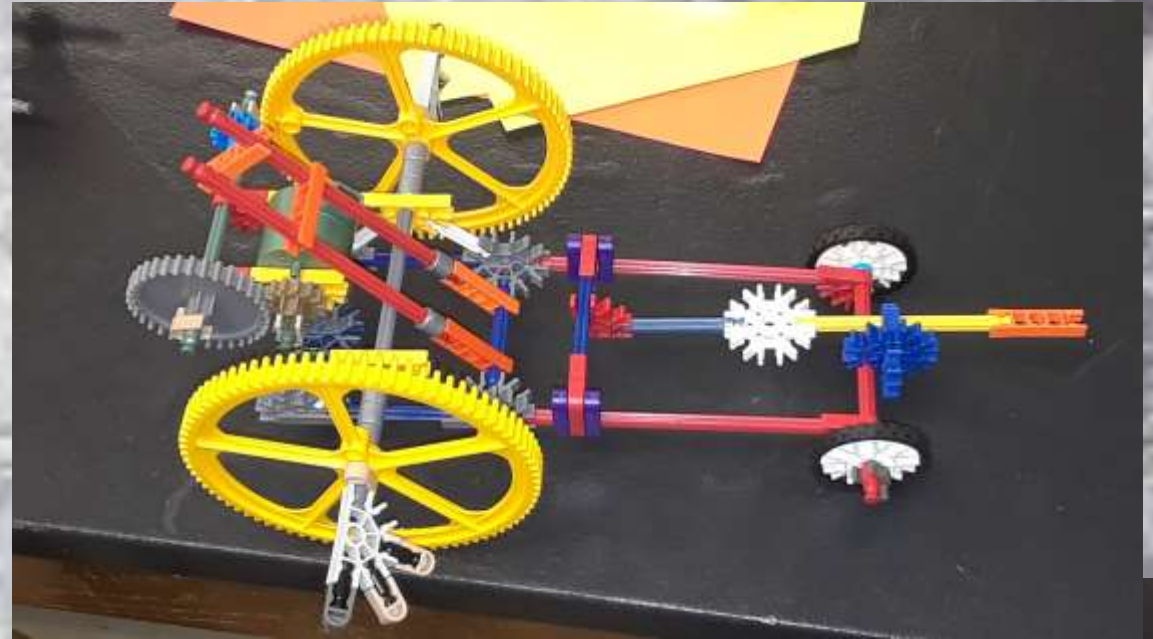
Teams across Pennsylvania are being tasked with creating a machine that will move 3 objects at least 6 inches across a table. The "crane" must pick up the object, move it at least 6 inches and set it back down. Your team can choose the objects that need to be moved. Please consider how environmentally friendly your machine is while presenting about your project. Be creative!





# JANUARY 23<sup>RD</sup> 2019

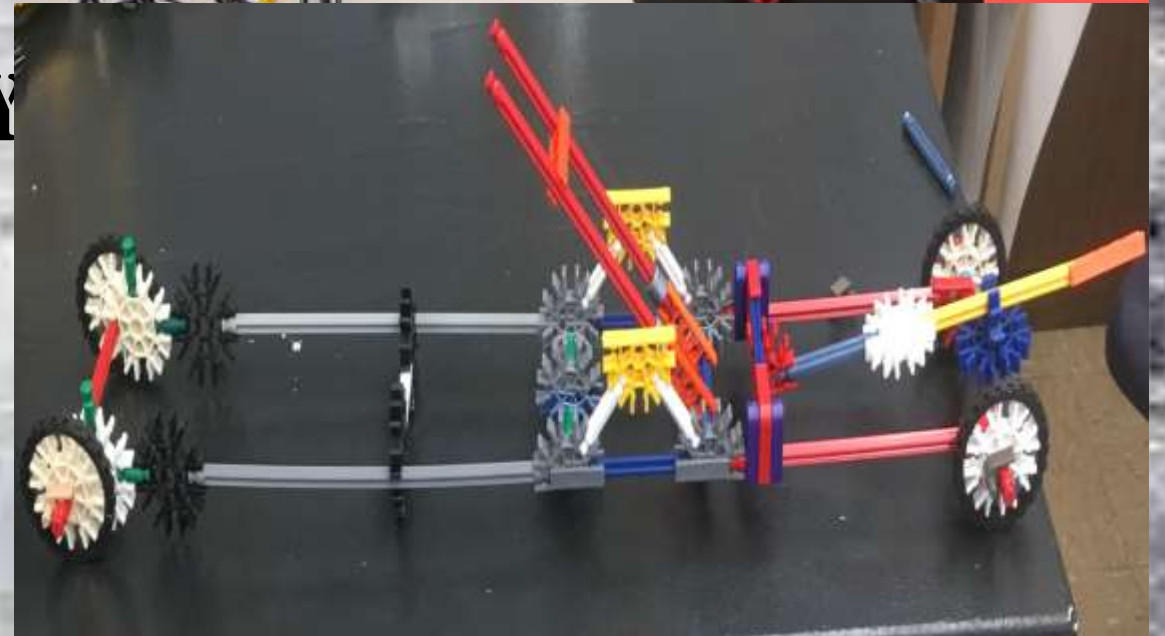
- **WE THEN BUILT A MOTORIZED WHEEL APPARATUS AND ATTACHED IT TO THE TURTLE TO ALLOW IT TO MOVE, GETTING ONE STEP CLOSER TO ANSWERING THE CHALLENGE...**





# **JANUARY 30<sup>TH</sup> 2019**

- **WE FOLLOWED THIS UP BY BUILDING A “TRAILER” PORTION THAT CONNECTED TO THE WHEEL BASE OF THE TURTLE WITH A “HELICOPTOR” LIKE APPARATUS DESIGNED TO PICK THINGS UP...**



# **FEBRUARY 6<sup>TH</sup> 2019**

- **OUR DESIGN WASN'T WORKING RIGHT, SO WE CHANGED THE PICKING APPARTUS INTO A "FORKLIFT" LIKE SYSTEM, BUT WE STILL HAD TROUBLE FIGURING OUT HOW TO MAKE IT PUT THE OBJECTS BACK DOWN...**



# FEBRUARY 13<sup>TH</sup> 2019

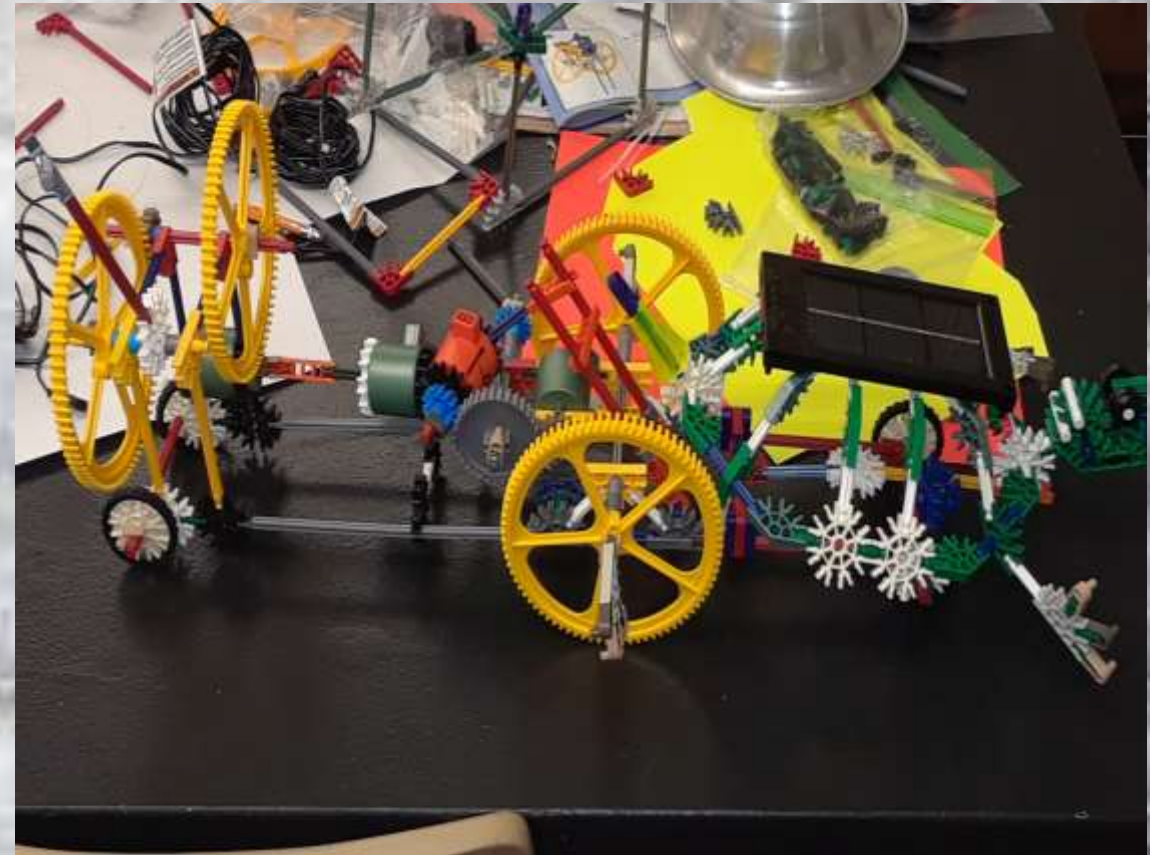
- **AFTER ANOTHER FAILED CHANGE TO THE “FORKLIFT” LIKE SYSTEM, WE HAD AN EPIPHANY WHEN WE REALIZED THAT USING TWO MOTORS WAS THE KEY TO BUILDING AN APPARATUS THAT COULD LIFT AND PLACE AN OBJECT BACK DOWN...**





# FEBRUARY 20<sup>TH</sup> 2019

- **WITH A FEW MORE SIMPLE MODIFICATIONS TO THE LIFTING ARM, ALONG WITH THE ADDITION OF A MOTOR TO MOVE JEROME IN REVERSE AND A “TRASH CAN” TO TOSS TRASH INTO, OUR DESIGN WAS FINALIZED...!**





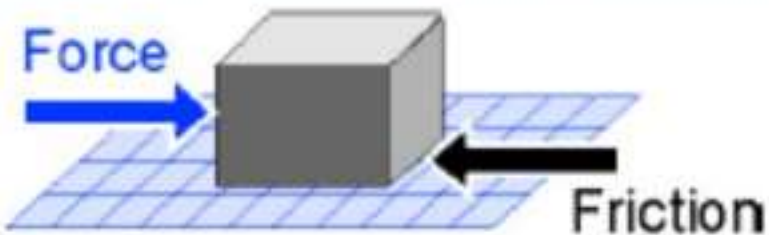
# **FEBRUARY 27<sup>TH</sup> 2019**

- **WE THEN BEGAN PRACTICING OUR BUILDING AND PRESENTATION SKILLS, WHILE ALSO LEARNING ABOUT THE NUANCES OF FRICTION!**

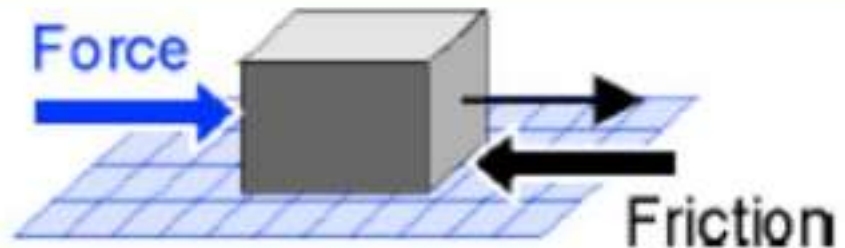
# TWO TYPES OF FRICTION

- **STATIC FRICTION**
  - **EQUALS THE FORCE REQUIRED TO GET A STATIONARY OBJECT MOVING**
  - **MUCH GREATER THAN KINETIC FRICTION**
- **KINETIC FRICTION**
  - **EQUALS THE FORCE REQUIRED TO KEEP A MOVING OBJECT...MOVING!**
  - **MUCH LOWER THAN STATIC FRICTION**

No  
motion



Sliding  
motion





# TWO TYPES OF FRICTION

Friction Equation

$$F_{\text{Friction}} = \mu F_N$$

- Static Friction ( $F_s$ )

$$F_s = \mu_s F_N$$

- Kinetic Friction ( $F_k$ )

$$F_k = \mu_k F_N$$

What is the **Coefficient of Friction?**

$\mu \equiv$  the measure of the amount of interaction between 2 surfaces

$$\mu_s > \mu_k$$