

MARS

26 14

2021-2022

NON-TECHNICAL OVERVIEW

WE CAME TO BE

INSPIRED

WE STAY BECAUSE

WE ARE

WE WILL BECOME
THE INSPIRATION

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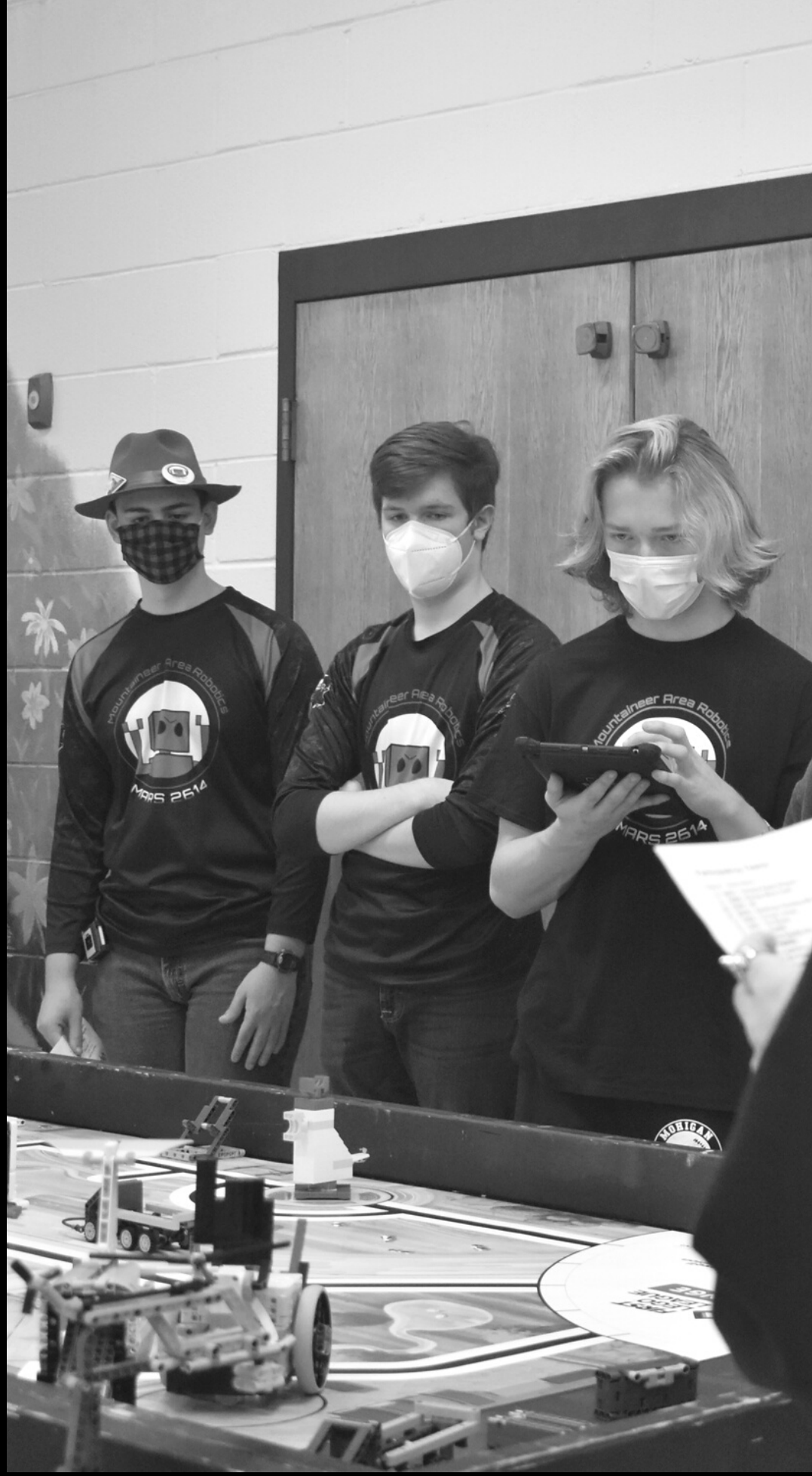
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WHO WE ARE

Executive Summary, Team Highlights, Student Leadership





We came to be INSPIRED.
We stay because WE ARE.
We will become the INSPIRATION.

MARS 2614

EXECUTIVE SUMMARY

MOUNTAINEER AREA ROBOTICS (MARS), FIRST® TEAM 2614, WAS FOUNDED IN 2008 BY FIVE MEMBERS OF A FORMER THREE-TIME WEST VIRGINIA STATE CHAMPION FIRST LEGO® LEAGUE TEAM TO CONTINUE THE EXPLORATION OF STEM EDUCATION DURING HIGH SCHOOL. MARS COMPETES IN FIRST ROBOTICS COMPETITION (FRC), WHICH SERVES STUDENTS IN GRADES 8–12 BETWEEN AGES 14–18. ADDITIONALLY, MARS SPONSORS AND MENTORS TEAMS IN FIRST TECH CHALLENGE (FTC), FOR GRADES 7–12; FIRST LEGO LEAGUE CHALLENGE (FLL-C), FOR GRADES 4–8; AND FIRST LEGO LEAGUE EXPLORE (FLL-E) FOR GRADES 2–4.

MARS WELCOMES ALL PEOPLE WITHOUT REGARD TO RACE, ETHNICITY, COLOR, RELIGION, NATIONAL ORIGIN, SEX, GENDER, SEXUAL ORIENTATION, ANCESTRY, ABILITIES, ECONOMIC OR FAMILY STATUS, LIFE SITUATION, VETERAN STATUS, OR PHILOSOPHY. MARS STRIVES TO BE AN INCLUSIVE ENVIRONMENT FOR ALL INDIVIDUALS BY ADVOCATING FOR AND PROVIDING EQUAL TREATMENT TO ALL.

IN RESPONSE TO THE COVID-19 PANDEMIC, MARS DEVELOPED A HYBRID MODEL TO ENSURE SAFETY AND ACCESSIBILITY FOR ITS MEMBERS AND THE PEOPLE IT SERVES. MARS HOLDS OUTREACH ACTIVITIES, FIRST EVENTS, AND REGULAR MEETINGS BOTH VIRTUALLY AND IN-PERSON. USING NEW METHODS OF OUTREACH, MARS PROTECTS ITS COMMUNITY WHILE MAINTAINING ITS MISSION TO INCREASE STEM EDUCATION IN NORTH-CENTRAL WEST VIRGINIA.

TEAM HIGHLIGHTS

2008

ROOKIE ALL-STAR
REGIONAL WINNER

2011

STARTED NEW
FRC TEAM IN WV

2012

CHAMPIONSHIP
WOODIE FLOWERS
AWARD

2014

WVROX FOUNDED

2015

CHAMPIONSHIP
SUBDIVISION
FINALIST

2016

EXPANDED
OUTREACH WITH
STEM NIGHTS

2017

CHAMPIONSHIP
CHAIRMANS
AWARD

2018

CIVIL AIR PATROL
OUTREACH EVENT

2019

PLAY-DOH®
CIRCUITRY
INITIATIVE

2020

WWWVROX
DEVELOPED AND
HOSTED

2021

IMPLEMENTATED
HYBRID MODEL

2022

15TH
ANNIVERSARY

STUDENT LEADERSHIP

Student Leadership Council

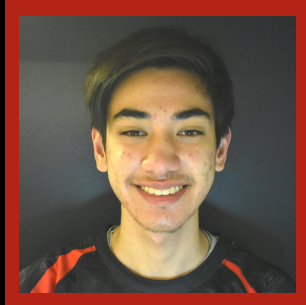
PRESIDENT



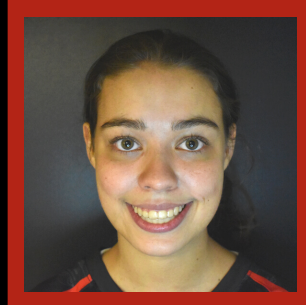
**DIRECTOR OF
TECHNICAL AFFAIRS**



ADMINISTRATOR



SECRETARY



**DIRECTOR OF NON-
TECHNICAL AFFAIRS**



MARS IS DIVIDED INTO TWO MAJOR SUBSETS: TECHNICAL AND NON-TECHNICAL. THE TECHNICAL HALF OF THE TEAM IS COMPRISED OF THE MECHANICAL, ELECTRICAL, AND PROGRAMMING SUB-TEAMS. THE OUTREACH AND PUBLIC RELATIONS SUB-TEAM AND TASK FORCES MAKE UP THE NON-TECHNICAL SIDE. MARS' STUDENT LEADERSHIP COUNCIL OVERSEES SUB-TEAMS, FACILITATES INTERNAL COMMUNICATIONS, ENSURES PRODUCTIVITY, ORGANIZES THE TEAM, AND DRAFTS TEAM GOALS.

STUDENT LEADERSHIP

Sub-Team Leads

SUB-TEAM LEADS ARE ELECTED EACH YEAR. THEY ORGANIZE STUDENTS, SET AGENDAS FOR EACH SUB-TEAM, AND REPORT STUDENT PROGRESS.

MECHANICAL



ELECTRICAL



PROGRAMMING



**OUTREACH AND
PUBLIC RELATIONS**



Task Force Leads

TASK FORCES SERVE STUDENTS IN ALL LEVELS OF FIRST BY MENTORING TEAMS IN OTHER ROBOTICS PROGRAMS AND BY HOSTING EVENTS AND COMPETITIONS.

FLL-E



FLL-C



FTC/VEX



FRC



SUSTAINABILITY

In the Past Year, www.vrox.com, Tucker Teams, Vital Stats





IN THE PAST YEAR

Online Meetings

MARS HELD ONLINE MEETINGS AND SKILLS TRAINING DURING 2020 TO KEEP THE TEAM INVOLVED AND ACTIVE WHILE OUTSIDE OF OUR MAIN WORKSPACE. IN JANUARY 2021, WE ENACTED THE FIRST VERSION OF OUR HYBRID MODEL OF OPERATION TO ALLOW US TO WORK IN AN IN-PERSON SETTING WHILE CONTINUING ONLINE MEETINGS. WE MET IN SMALL GROUPS AT OUR SECONDARY WORKSPACE TO FINISH MARVIN XIV AND RENOVATE AN ORIGINAL MODEL OF THE WVU PERSONAL RAPID TRANSIT (PRT) CAR.

In-Person Meetings

MARS RESUMED FULL IN-PERSON MEETINGS IN THE SUMMER OF 2021 WHILE EMPLOYING SAFETY MEASURES TO PROTECT OUR TEAM AND COMMUNITY. WE BEGAN TRAINING NEW STUDENTS, PREPARING FOR OFFSEASON EVENTS AND EXPERIMENTING WITH A NEW ROBOT DRIVETRAIN.

SURVIVING THE COVID-19 PANDEMIC ENCOURAGED MARS TO FIND NEW WAYS TO INCREASE AND MAINTAIN STEM EDUCATION AND ENGAGEMENT WITHIN OUR COMMUNITY.

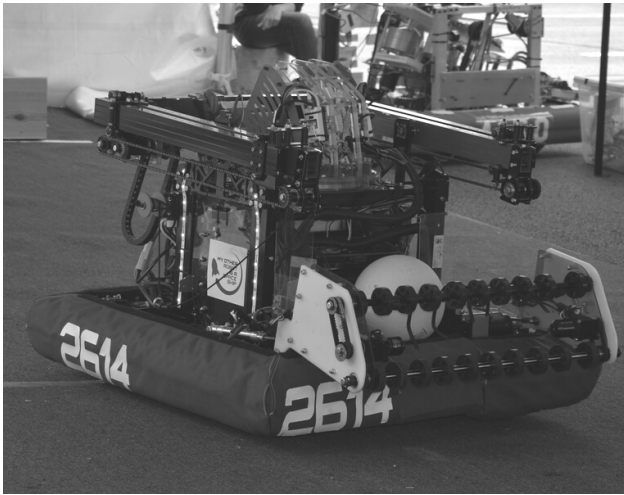
IN THE PAST YEAR

Hybrid Outreach

MARS STRIVES TO AMPLIFY THE ACCESSIBILITY OF ITS OUTREACH BY FULLY TRANSITIONING TO A HYBRID MODEL, USING BOTH TRADITIONAL AND ONLINE APPROACHES TO STEM EDUCATION. MARS PARTICIPATES IN REGIONAL STEM FAIRS, FESTIVALS, SCHOOL STEM NIGHTS AND OTHER IN-PERSON EVENTS, AND RECENTLY DEVELOPED STEM CRAFT KITS TO BE DISTRIBUTED AT EVENTS MARS IS UNABLE TO ATTEND. THE KITS CONTAIN ALL NECESSARY MATERIALS FOR EACH ACTIVITY AND ARE ACCOMPANIED BY YOUTUBE VIDEOS DEMONSTRATING THE STEM CRAFTS AND EXPLAINING THE RELEVANCE OF EACH CRAFT TO ITS REAL-WORLD COUNTERPART.

FLL-C Revitalization

MARS IS DEDICATED TO REBUILDING FIRST TEAMS IN NORTH-CENTRAL WEST VIRGINIA. AT THE CENTER OF OUR PLAN IS FLL-C. WE RECEIVED A GRANT TO FUND THREE FLL-C TEAMS THIS SEASON AND ARE REINTRODUCING SUPPORT PROGRAMS FOR ALL FLL-C TEAMS IN THE AREA. WE BELIEVE IT TAKES MORE THAN JUST SEEDING THESE TEAMS TO REBUILD FLL-C WITHIN WEST VIRGINIA, SO WE IMPLEMENTED SEVERAL INITIATIVES TO FACILITATE GROWTH AND SUSTAINABILITY OF THESE PROGRAMS. EACH TEAM WILL BE PROVIDED STUDENT MENTORS FROM MARS AND INVITATIONS TO MARS-HOSTED SCRIMMAGES AND FIRST EVENTS. THIS PROVIDES FLL-C STUDENTS NEW OPPORTUNITIES TO LEARN.





WWWVROX

World Wide West Virginia Robotics Extreme

MARS HAS HELD WEST VIRGINIA ROBOTICS EXTREME (WVROX), THE BIENNIAL 26-HOUR AND 14-MINUTE OFFSEASON COMPETITION, SINCE 2014. THE MOST RECENT EVENT WAS SCHEDULED TO TAKE PLACE IN 2020, BUT DUE TO ONGOING COVID-19 COMPLICATIONS, WE WERE UNABLE TO SAFELY HOLD IT IN PERSON. INSTEAD, IN AUGUST OF 2020, WE CREATED WWWVROX: WORLD WIDE WEST VIRGINIA ROBOTICS EXTREME, AN OVERNIGHT AND ONLINE VERSION OF OUR EVENT, WITH A TRADITIONAL WVROX PLANNED FOR AUGUST 2022.

"You Slept Last Year"

22

HOURS

20

SEGMENTS

8

FRC TEAMS

7

STATES REPRESENTED

WE HELD THE 22-HOUR EVENT THROUGH TWITCH IN CONJUNCTION WITH FIRST UPDATES NOW (FUN) AND FEATURED 20 HOUR-LONG PRESENTATIONS FROM MARS AND SEVEN OTHER FRC TEAMS ACROSS SEVEN STATES, ALONG WITH INTRODUCTORY AND CLOSING STATEMENTS FROM OUR COACH. THE ACTIVITIES RANGED FROM AN EXPLANATION OF THE BASICS OF COMPUTER-AIDED DESIGN (CAD) TO A FIRST-THEMED MINECRAFT® BUILDING COMPETITION.

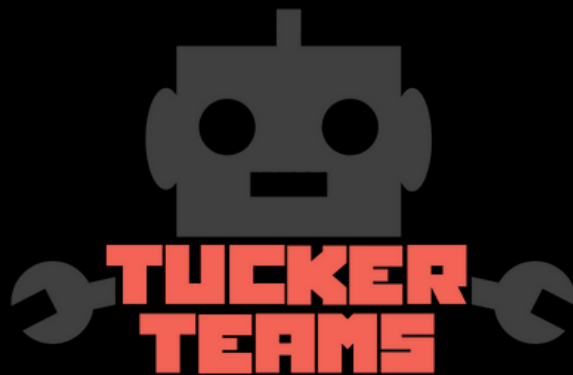
TUCKER TEAMS

Hybrid Tucker Teams

MARS' TUCKER TEAMS OFFER MECHANICAL, ELECTRICAL, AND PROGRAMMING ASSISTANCE TO TEAMS IN NEED DURING COMPETITION TO HELP THEM THROUGH INSPECTION AND ONTO THE FIELD. THEY ALSO PROVIDE SPARE PARTS AND MATERIALS AS NEEDED.

THIS YEAR, MARS IS EXPANDING OUR TUCKER TEAMS INITIATIVE TO INCLUDE A DIGITAL APPROACH BY CREATING AN ONLINE TUCKER TEAM THROUGH OUR WEBSITE THAT OTHER FRC TEAMS CAN USE TO CONTACT US. IN THE FUTURE, WE HOPE TO PROVIDE ONLINE VIDEOS EXPLAINING BOTH TECHNICAL AND NON-TECHNICAL CONCEPTS.

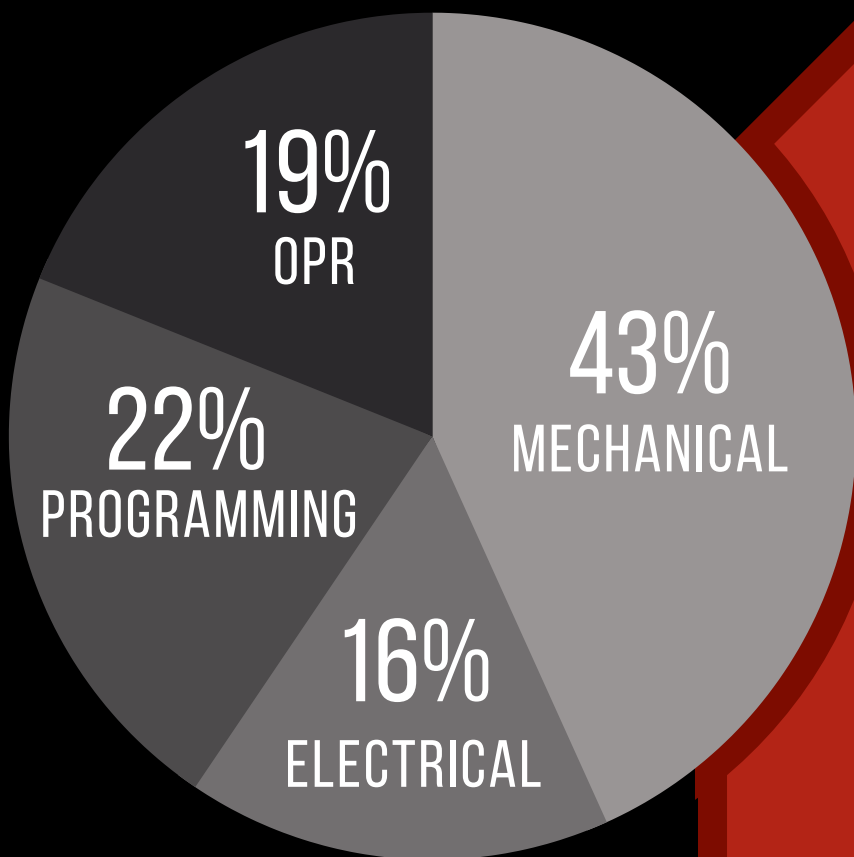
"No Robot Left Behind"



MARS WILL NOW BE ABLE TO ASSIST TEAMS DURING BUILD SEASON WITH THE ADDITION OF OUR FRC VIRTUAL HELP DESK. TEAMS CAN SCHEDULE VIRTUAL CONFERENCES WITH MARS DURING BUILD AND COMPETITION SEASON.

VITAL STATISTICS

98
MARS
Alumni



37 Team
Members

23 Team
Sponsors

7 Virtual
Events
Hosted

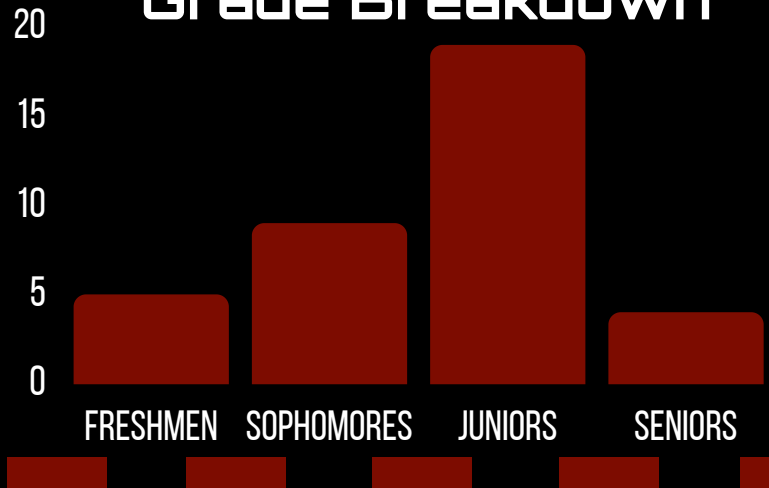
1223 Outreach
Volunteer
Hours

100% Post-Secondary
Education Rate

2017

CHAMPIONSHIP
CHAIRMAN'S
AWARD
WINNER

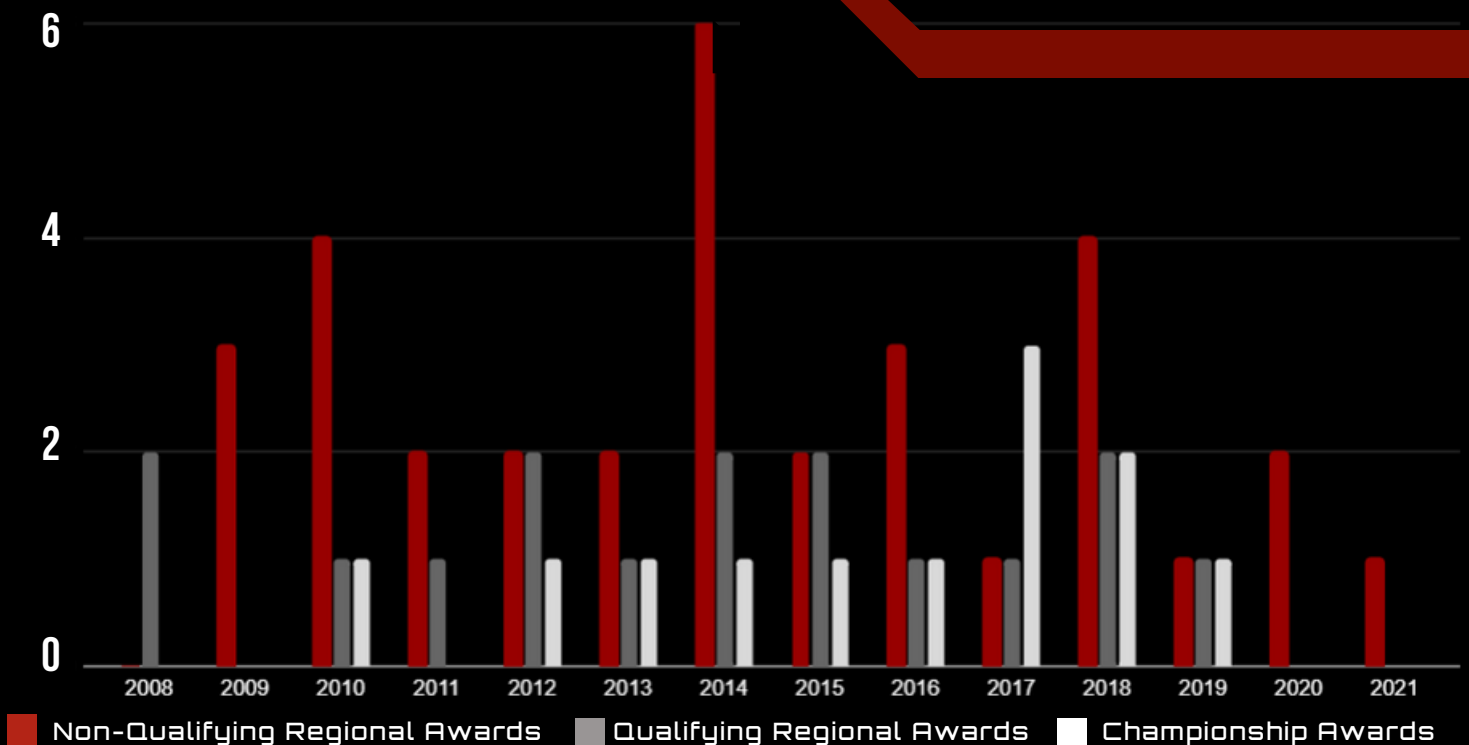
Grade Breakdown



100%

Of Students Involved
in Outreach

MARS Competition Award History



OUTREACH

STEMcrafts, Products, Leaders & Innovators





STEMCRAFTS

STEMcrafts

IN 2015, MARS BEGAN USING STEMCRAFTS TO TEACH MECHANICAL AND ELECTRICAL CONCEPTS TO YOUNGER STUDENTS TO SPARK AN INTEREST IN STEM AS PART OF THE MARS PLAN. STEMCRAFTS ARE EDUCATIONAL AND ENGAGING ACTIVITIES THAT TEACH PRACTICAL SCIENTIFIC KNOWLEDGE. THEY ARE DEMONSTRATED DURING OUTREACH EVENTS AND DISTRIBUTED WITH STEP-BY-STEP INSTRUCTIONS AS PART OF OUR HYBRID MODEL.



BrushBots

BRUSHBOTS WERE CREATED IN 2017 AND MODELED AFTER OUR FIRST STEM CRAFT: DOODLE BOTS. BRUSHBOTS TEACH HOW CIRCUITS WORK IN RELATION TO MOTORS BY CREATING A CIRCUIT THE BOT CAN USE TO MOVE. THE CRAFT IS MADE FROM A TOOTHBRUSH HEAD WITH A BATTERY AND MOTOR ATTACHED TO SHAKE THE TOOTHBRUSH AND CAUSE IT TO MOVE.



STEMCRAFTS



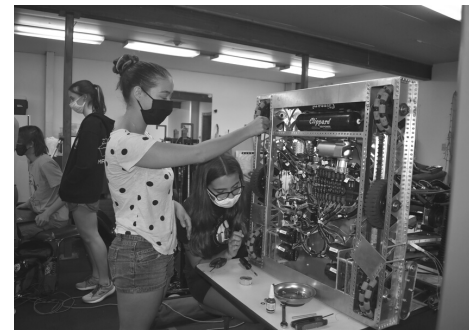
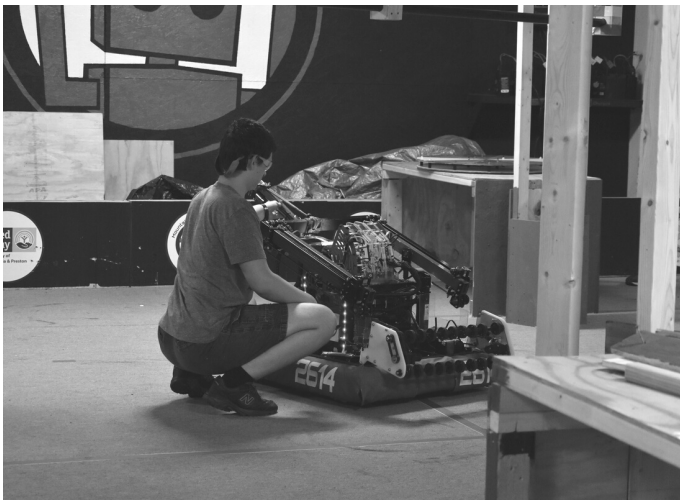
LightSicles

OUR NEWEST STEM CRAFT, LIGHTSICLES, TEACHES THE RELATIONSHIP BETWEEN ELECTRICITY AND LIGHT. WITH THE LIGHTSICLE STEM CRAFT, KIDS BUILD FLASHLIGHTS OUT OF: POPSICLE STICKS, BINDER CLIPS, COPPER TAPE, A BATTERY, AND AN LED. THE BINDER CLIP MAY COMPLETE OR BREAK THE CIRCUIT DEPENDING ON ITS POSITION, TURNING THE LIGHT ON OR OFF LIKE A LIGHTSWITCH. THIS ACTIVITY SERVED AS A TRIAL FOR MARS' HYBRID OUTREACH MODEL.

Play-Doh Circuitry

PLAY-DOH® CIRCUITRY TEACHES STUDENTS ABOUT ELECTRICITY AND HOW IT TRAVELS THROUGH DIFFERENT MATERIALS. THIS STEM CRAFT BEGAN IN 2018 WITH THE "PLAY-DOH CIRCUITRY" INITIATIVE BOX CONTAINING: BATTERIES, WIRE CONNECTORS, LEDS, PAPERS DESCRIBING THE ACTIVITY, A BATTERY SAFETY CARD, AND OTHER MARS DOCUMENTATION SUCH AS OUR STORYBOOK. WE DONATED THE BOXES TO ELEMENTARY SCHOOLS, LIBRARIES, THE LOCAL CHILDREN'S HOSPITAL AND OTHER ORGANIZATIONS, SIMILAR TO HOW WE APPROACH HYBRID STEM CRAFTS WITH OUR CURRENT HYBRID MODEL.





PRODUCTS

MARS' PRODUCTS AND INITIATIVES ACT WITHIN THE MARS PLAN TO INCREASE UNIVERSAL YOUTH INVOLVEMENT IN STEM PROGRAMS. GAINING INTEREST THROUGH OUR PRODUCTS IS KEY FOR MARS TO ACHIEVE THE FIRST THREE STEPS OF THE MARS PLAN: ENGAGE, INSPIRE, AND SUSTAIN.

What's in a Robot?

Robots can be a lot like humans. Can you find all of these mechanical body parts in MARS' robots?

Camera Sensor: Sometimes a camera "eye" is attached to the robot. If the human driver does not have a clear view, a camera sensor helps the driver "see" from the perspective of the robot.

Robo RIO (Robot Reconfigurable Input/Output): This part functions as the main controller of the robot. It has all of the programming code and sends signals to all parts of the robot. It acts like the brain in a human body.

Power Distribution Board: This part sends power to all of the components of the robot like: motor controllers, the RIO, the voltage regulator and the pneumatics control module (PCM). This part acts like the heart in a person.

Compressor: The compressor takes in air and pumps it into a smaller space so that the air has more pressure. It's like breathing air into human lungs and holding it. Then, the air can be used to push on a pneumatic cylinder and create mechanical motion just like you would if you blew on a pinwheel.

Battery: This is a 12-volt battery which is the same kind used to start motorcycles. It supplies all of the electrical power for our robot. It's similar to how food is transformed by your digestive system into energy.

Arms: Some robots are built with appendage like arms. These arms are programmed to pick up objects and place them where the operator wishes.

Motors: These turn electrical energy into mechanical energy. Motors are like the muscles in a human body.

Motor Controllers: These regulate the power from the Power Distribution Board to the motors, based on the signal from the Robo RIO. These parts are like the neurons which tell muscles what to do.

Drive Train: This is a combination of parts which work together to move the robot. This drive train is called a Sweeney Drive. It works well for moving easily in all directions. In your body, this would be like your legs and feet.

MARS HAS RECENTLY DEVELOPED A SERIES OF NEW PRODUCTS TO HELP THE SPREAD OF STEM, SUCH AS YOUTUBE VIDEOS, CAD DRAWINGS, AND PROGRAMMING RESOURCES.



MARS
Story
Books



MARS
Coloring
Books



We came to be
Inspired
We stay because
We are
We will become the
Inspiration

www.marsfirst.org

LEADERS & INNOVATORS

Ibrahim Rahmin

IBRAHIM WAS AN INDISPENSABLE MEMBER OF THE TEAM AS THE PROGRAMMING AND SCOUTING LEAD. AS A RECIPIENT OF THE VICTOR'S SCHOLARSHIP AWARD, HE NOW STUDIES ENGINEERING AND COMPUTER SCIENCE AT THE UNIVERSITY OF MICHIGAN. HE IS AN ACTIVE MEMBER OF THE U-M COMMUNITY AND IS A MEMBER OF THE COMPETITIVE CHESS TEAM AND THE FENCING TEAM.



Dan McDonald

AS MECHANICAL SUB-TEAM LEAD, ADMINISTRATOR, AND TEAM PRESIDENT, DAN WAS A VALUABLE MEMBER OF THE TEAM. NOW HE STUDIES MECHANICAL ENGINEERING AND PLANS TO BUILD HIS CAREER AROUND ROBOTICS. HE WORKS WITH THE BIOMEDICAL ENGINEERING SOCIETY TO 3D-PRINT PROSTHETIC HANDS FOR CHILDREN WITH DISABILITIES.



Emza Shackelford

EMZA GREATLY CONTRIBUTED TO MARS AS BOTH THE ELECTRICAL SUB-TEAM LEAD AND DIRECTOR OF TECHNICAL AFFAIRS. CURRENTLY, SHE STUDIES BIOLOGY, ENVIRONMENTAL SCIENCE, AND CHEMISTRY AT WARREN WILSON COLLEGE. SHE WORKS IN THE COLLEGE'S 3D PRINTING LAB AND PLANS TO PURSUE ENVIRONMENTAL RESEARCH AFTER GRADUATION.





PRESENTED BY  **BOEING**



CELEBRATING FIFTEEN YEARS
2008-2022



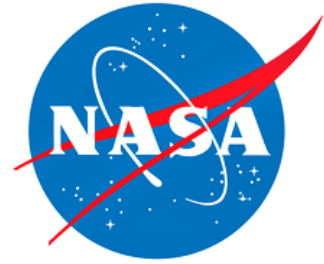
WVU DEPARTMENT OF PHYSICS AND
ASTRONOMY

WVU DEPARTMENT OF MATHEMATICS

BENJAMIN M. STATLER COLLEGE OF
ENGINEERING AND MINERAL SCIENCES



UNITED WAY OF MONONGALIA
AND PRESTON COUNTIES



KATHERINE JOHNSON IV&V
ROBOTICS ALLIANCE PROJECT

APPLIED PHYSICS LABORATORY

BEITZEL CORPORATION

COMPTON METALS

DAN HILL

DASSAULT SYSTEMES

M&S CONSULTING

MONONGALIA COUNTY COMMISSION

NOVELIS

MONONGALIA COUNTY BOARD OF EDUCATION

EQT

LEIDOS

ROTARY CLUB OF CHEAT LAKE

WV SPACE GRANT CONSORTIUM

ADVANCED RESEARCH CORPORATION

WOMEN'S GIVING CIRCLE OF NORTH CENTRAL WEST VIRGINIA

PHILLIP M. TUCKER MEMORIAL FUND

APPLE

IN MEMORY OF



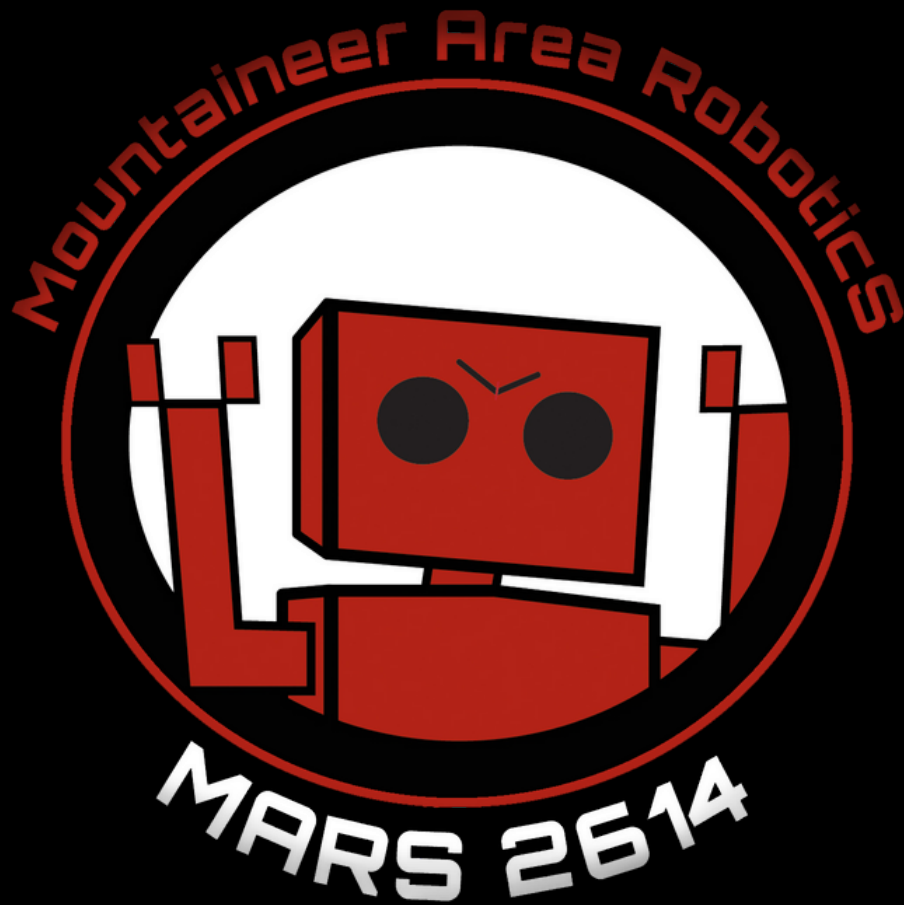
PHIL TUCKER

1962 - 2015

DR. WOODIE
FLOWERS

1943 - 2019





WE ARE
MARS



MARSFIRST.ORG