



# Robot Design Summary

Team Number: 39374

Team Name: C.R.A.B

Robot's Name	Crabbot				
Favorite Mission	Mission 7 (Saving Gerhard)	Maximum Score	222	Typical Score	202
Favorite Robot Feature	Scorpion Tail 🦂	Most Innovative Robot Feature	Dog Gears 🐶		
How often does your robot or its attachments break?	Frequently	Fairly Often	Occasionally	Almost Never	
How often does your robot get stuck on the field and you have to retrieve it by hand?	Frequently	Fairly Often	Occasionally	Almost Never	
<div>Strategy</div> <div>We started with missions that wouldn't interfere with other missions. Then we chose the missions with the highest points-per-second (PPS).</div>					

How many Motors and Sensors are on your robot?					
<b>Large Motors</b>	<b>3</b>	<b>Medium Motors</b>	<b>1</b>	<b>Color / Light Sensor</b>	<b>2</b>
<b>Ultrasonic Sensor</b>	<b>0</b>	<b>Touch Sensor</b>	<b>0</b>	<b>Gyro / Angle Sensor</b>	<b>1</b>

## Design Process

Because this was our first year, we started with the simple Educator Robot. Then we modified it so that it could complete more than one mission. We used Dog Gears and attachments that we could easily switch out. We built attachments for each mission we wanted to attempt. Then we kept the best ones.

As we created programs that worked, we made them into MyBlocks so they could be reused in other programs.

We used the light sensor to detect the robots position on the board. Then we took reflectivity measurements using the Port View on the brick display. We used this data to calibrate the sensor thresholds.

After we completed the programming we tested them and took measurements on time, points, and consistency. We used this data to choose what mission we wanted to do, and in what order.



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## Program Summary

All programs begin with a control program called Uber, which waits for a button press to start a sub-program. Each button starts a different sub-program. The sub-programs use MyBlocks for reusable sequences. The sensors are used to find specific locations on the board, and keep the robot going in the right direction.

## Programming Language Used:

☐ LEGO MINDSTORMS EV3 ☐ OTHER \_\_\_\_\_

Program Name	Mission(s) Accomplished	Robot Actions	Attachments Used	Program Structure (Architecture)	Mechanical and/or Sensor Feedback Used	Mission Success Rate
Uber	None	Waits for a button press to start another program. Resets the Gyro sensor.	None	Loop Block, Switch Block, Gyro Reset, MyBlocks for each mission	It uses a switch with a case for each button on the brick.	N/A
M5_4	Mission 4 & 5	Drives to the top of the West T, turns, and uses the cage attachment to pull out the core samples.	Cage attachment, and Chameleon tongue attachment	GyroDrive MyBlock, Light Sensor Loop, Variables, Gyro Turn Loop	It uses the Gyro sensor to drive straight, and make turns. It uses the Light sensor to find the T.	95%
M10_11	Mission 10, 11, and 13	Hits Escape Velocity, then drives to the top of the East T, moves the Food Production to green, drops the water, and backs into the Observatory.	Claw attachment, Hammerhead arm	GyroDrive MyBlock, Light Sensor Loop, Variables, Gyro Turn Loop	It uses the Gyro sensor to drive straight, and make turns. It uses the Light sensor to find the T.	85%
M01	Mission 1 and 2	Drives forward until it pushes the solar panels, lifts the arm attachment to launch the cart, and drops the supply payload.	Giant arm attachment, Cradle attachment	GyroDrive MyBlock	It uses the Gyro sensor to drive straight.	90%
M6_7	Mission 3, 6, and 7	Drives to the edge of the base, turns and lines-up with the Space Station, saves Gerhard, inserts the tube module, backs up and whips the 3D printer	Slide attachment, Scorpion tail	GyroDrive MyBlock, Light Sensor Loop, Gyro Turn Loop.	It uses the Gyro sensor to drive straight, and make turns. It uses the Light sensor to find the edge of the base.	95%



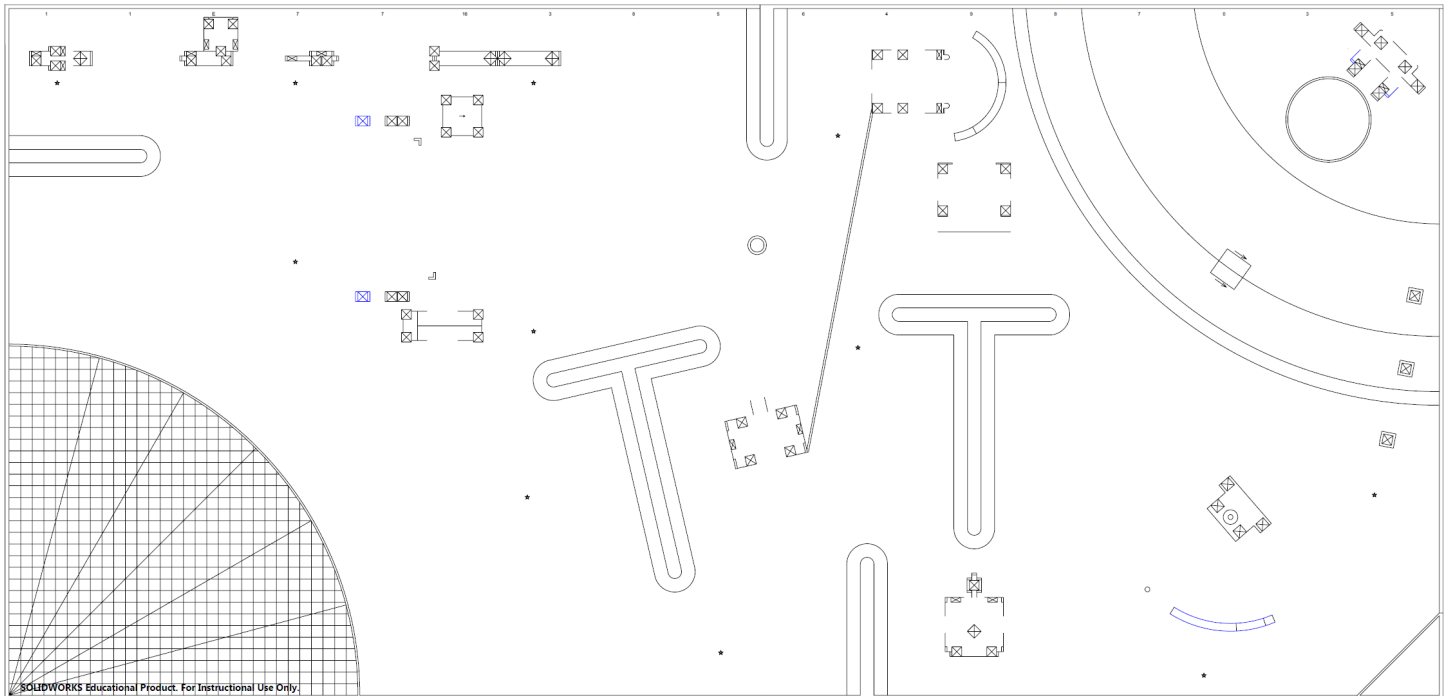
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Program Name M5\_4

## Robot Path Diagram



## Program Description

### TWest (MyBlock)

- Uses the Gyro to drive straight from the base to the bottom of the west T
- Inches forward until the left light sensor detects white
- Turns one wheel until the right color detects white
- Does two gyro turns and steers to reach the top of the west T
- The left motor stops when the left light sensor detects white, and the right motor continues until the right light sensor detects white.

### M5\_4 (MyBlock)

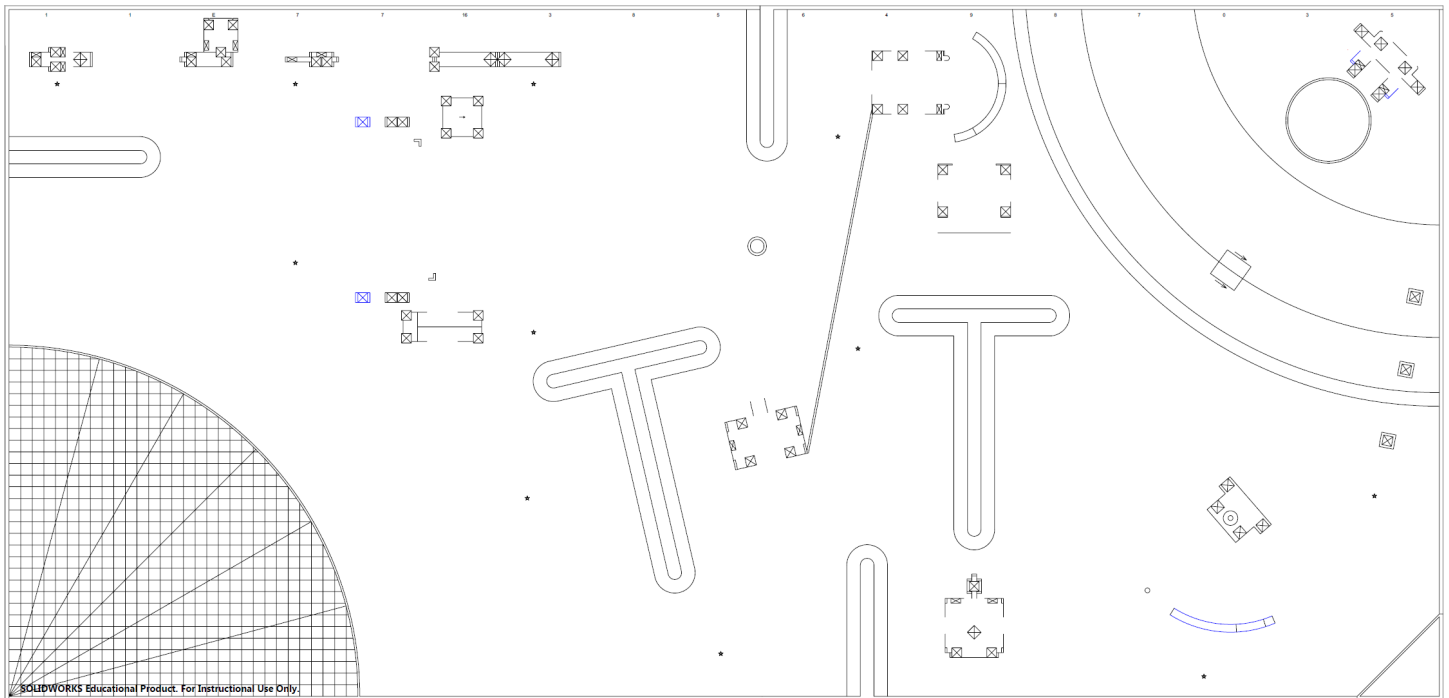
- Uses the gyro sensor to drive straight, then it turns into the axle holding the core samples
- It lowers the cage attachment
- Extending the Chameleon Tongue to cross the crater
- It slowly backs away from the axle
- It returns to base

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Program Name   M10\_11  

## Robot Path Diagram



## Program Description

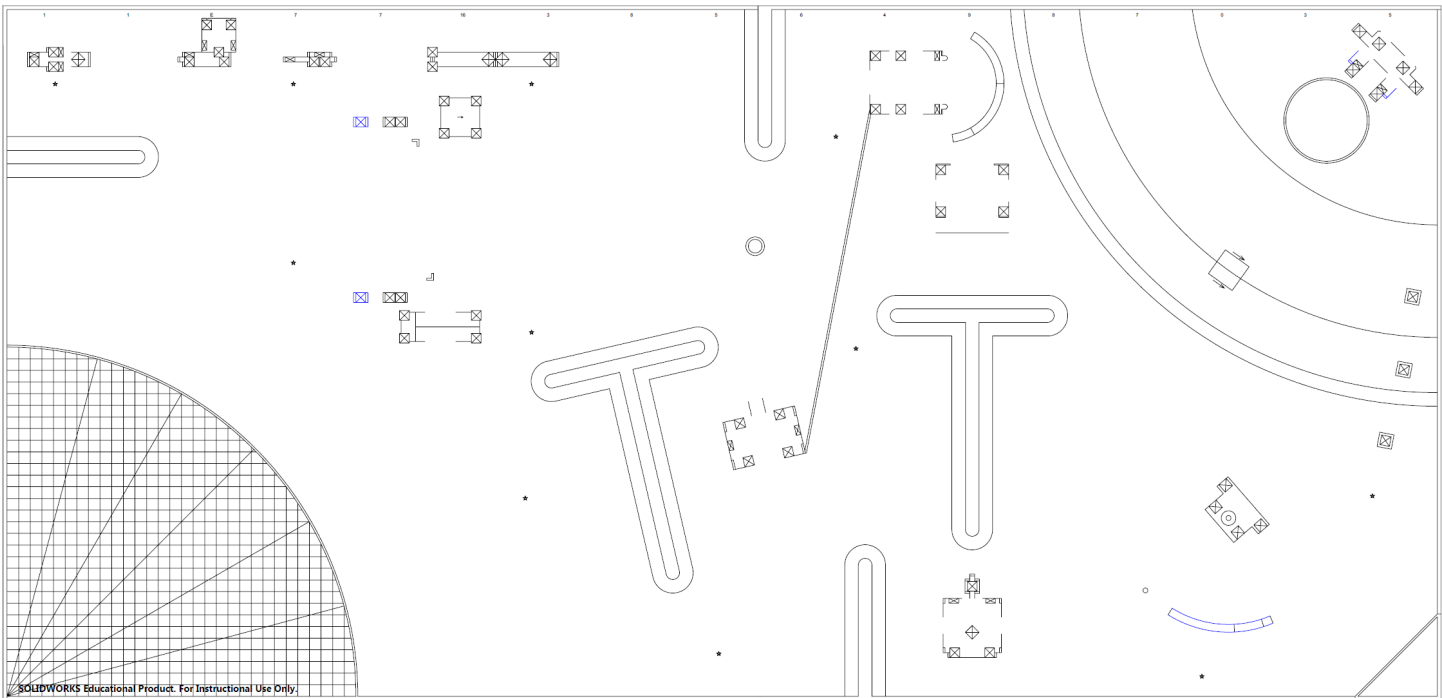
- Uses the gyro to drive straight toward the east side of the board
- It stops when the left light sensor detects white
- Rotates the Hammer arm attachment to hit Escape Velocity
- It makes a gyro turn
- It drives toward the east T until the left light sensor detects black
- It makes a gyro turn
- It drives straight until the left sensor detects black. The left motor stops and the right motor keeps going until the right light sensor detects black.
- Drives forward very slowly (to push the Food Processing bar)
- Opens the claw to drop the water sample
- It backs away from the Food Processor
- It closes the claw
- It drives backwards and turns into the Observatory
- It returns to base



**Team Name: C.R.A.B**

Program Name M01

## Robot Path Diagram



## Program Description

## M01 (MyBlock)

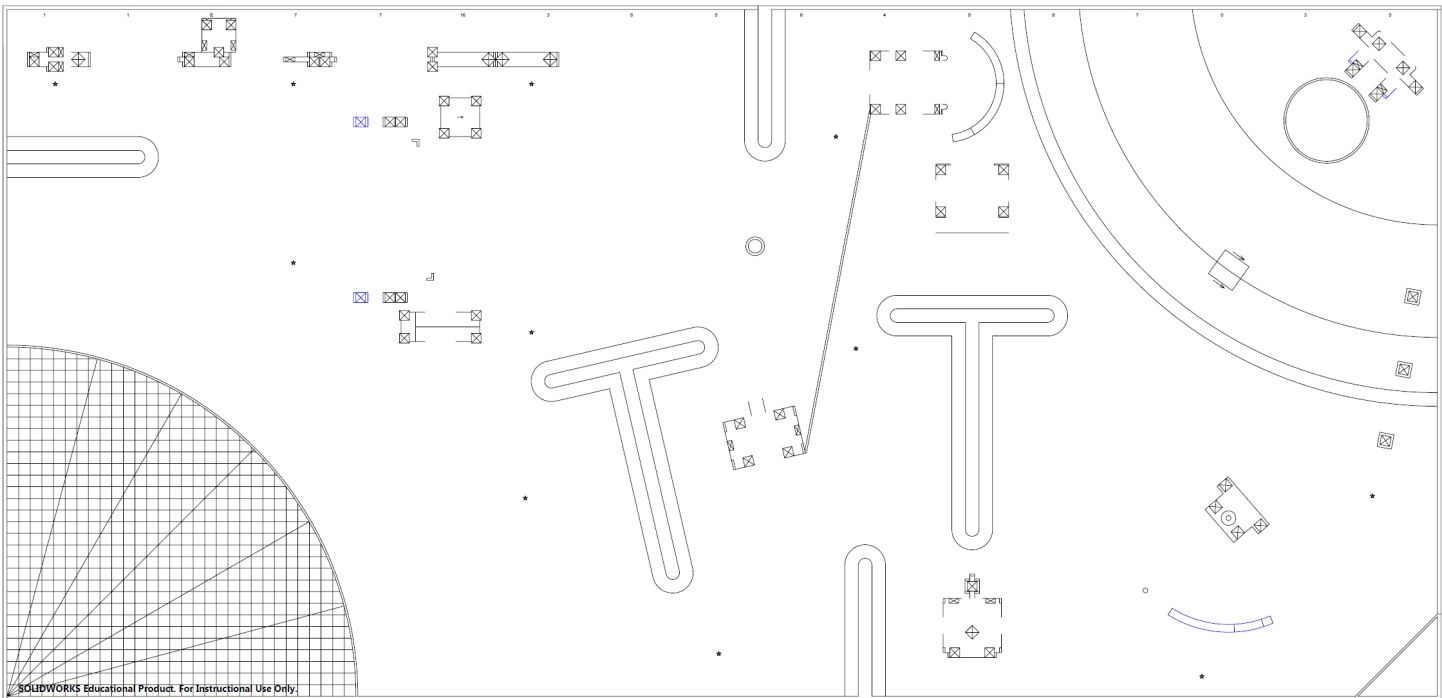
- Uses the gyro to drive straight from the base toward the solar panel array
- It lifts the giant arm for 1 second
- It releases the giant arm
- Lowers the Cradle attachment to drop the supply payload
- It returns to base



**Team Name: C.R.A.B**

**Program Name** M6\_7

## Robot Path Diagram



## Program Description

## M6\_7 (MyBlock)

- Uses the gyro to drive straight toward the edge of the base
- Uses the light sensor to detect the edge of the base
- Uses the gyro to turn and line up with the Space Station
- Drives straight toward the Space Station
- Inserts the tube module
- Lifts Gerhard up the Slide and into the Station
- Backs away from the Space Station
- It whips the Scorpion Tail attachment with the Regolith into the 3D printer