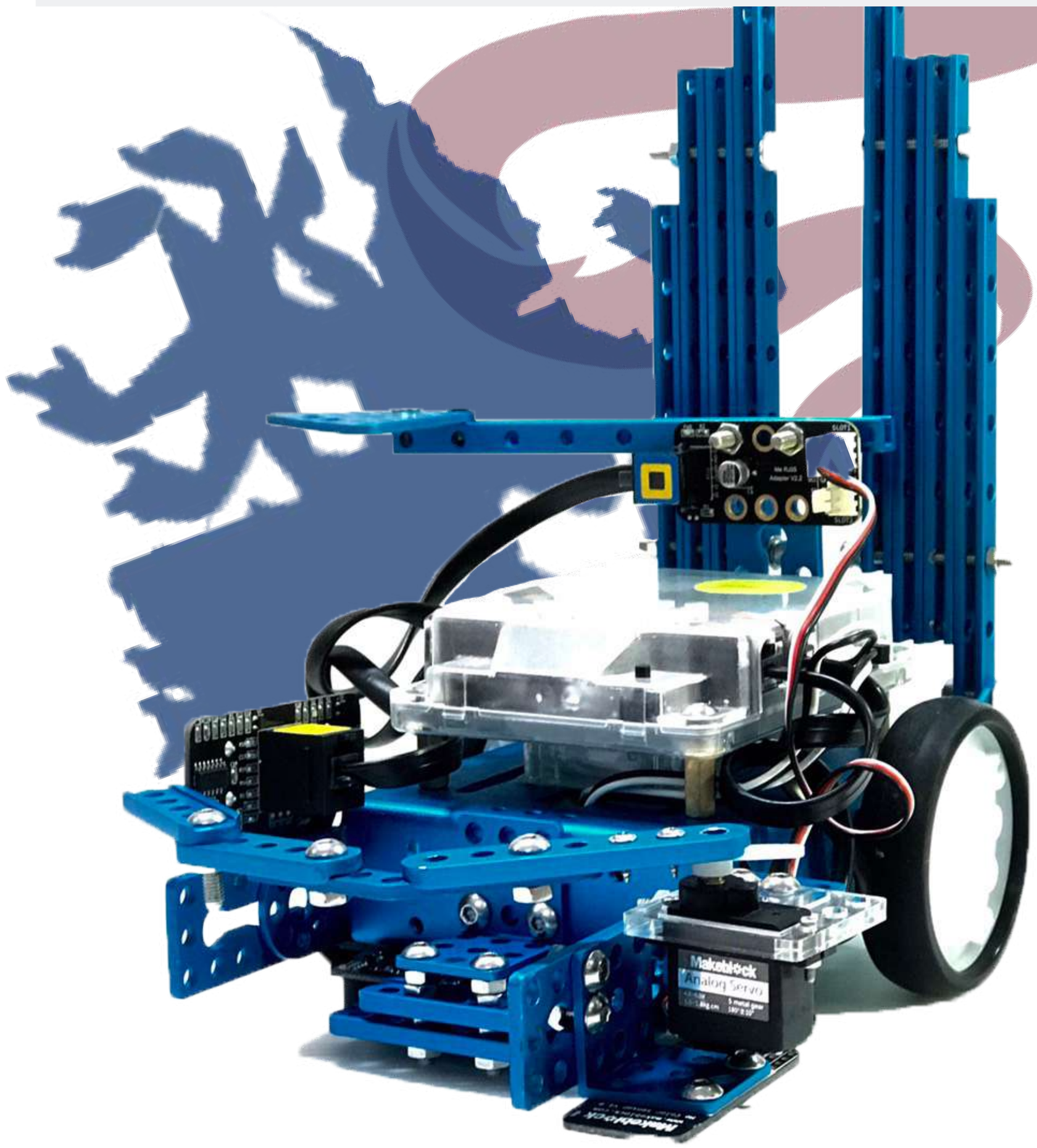
ACSP THAILAND

ENGINEERING BOOK

MAKE X STARTER CITY GUARDIAN
INTERMEDIATE GROUP
ACSPROBOT 03 # X236018



#Learning is a passport to the future

学习是未来的通行证

PREFACE

The MakeX World Championship will be held on the 28th of November until the 1st of December 2019 in Guangzhou, China. Assumption Samutprakarn School is very proud that "ACSP Robot03 Team" will represent Thailand in the Intermidiate level Category of this international competition.

Being part of the international competition is a big achievement in itself. Hence our students are working hard to duly represent our country and our school. This kind of event allows our student to see the advancement that different countries have made in the field of robotics and this is something that our students are looking forward to. Our students will gain new experiences and this knowledge and experience will be beneficial for their future. On top of that we should not take for granted the fact this kind of international event fosters friendship and relationship among different cultures and nationalities that we are fortunate enough to be part of. The learnings and experience that they will get from this competition is unparalleled to what our classroom teaching can offer.

As in any competition we are aiming to get the top award on the said event. Hence we allow our students to work on their robotics skill on order to solve critical problems and come up with a good solution. However, the school is more that grateful for the experience that our students will be getting from this. And words are not enough to express how proud we are of our students bringing pride to our Alma Mater. With that being said we would like to congratulate our ACSP Robot 03 Team, no matter the result will be.

Thank you and God Bless!

Sincerely Yours,
Coach – ACSP Robot03 Team

CONTENT

1. TEAM MEMBER 1

2. SKETCH PICTURE 2

3. HARDWARE PRINCIPLE 3

4. SOFTWARE PRINCIPLE 4

5. DAILY REPORT 5-6

6. PROBLEM & SOLVE 7

7. STEP BY STEP PRODUCTION 8-13

8. WORK PLAN 14-23

9. TEAM CULTURE 24

10. STORY SHARING 25

TEAM MEMBER

SOFTWARD

JAKTIKARN PUANGTABTIM

Nick Name : Punch

Have responsibility in Software

Slogan : every cloud has a silver lining

HARDWARD

PHAKAWAT PETSAWANG

Nick Name : Gato

Have responsibility in Hardware

Slogan : Where is the effort, the success is there.

MENTOR [COACH]

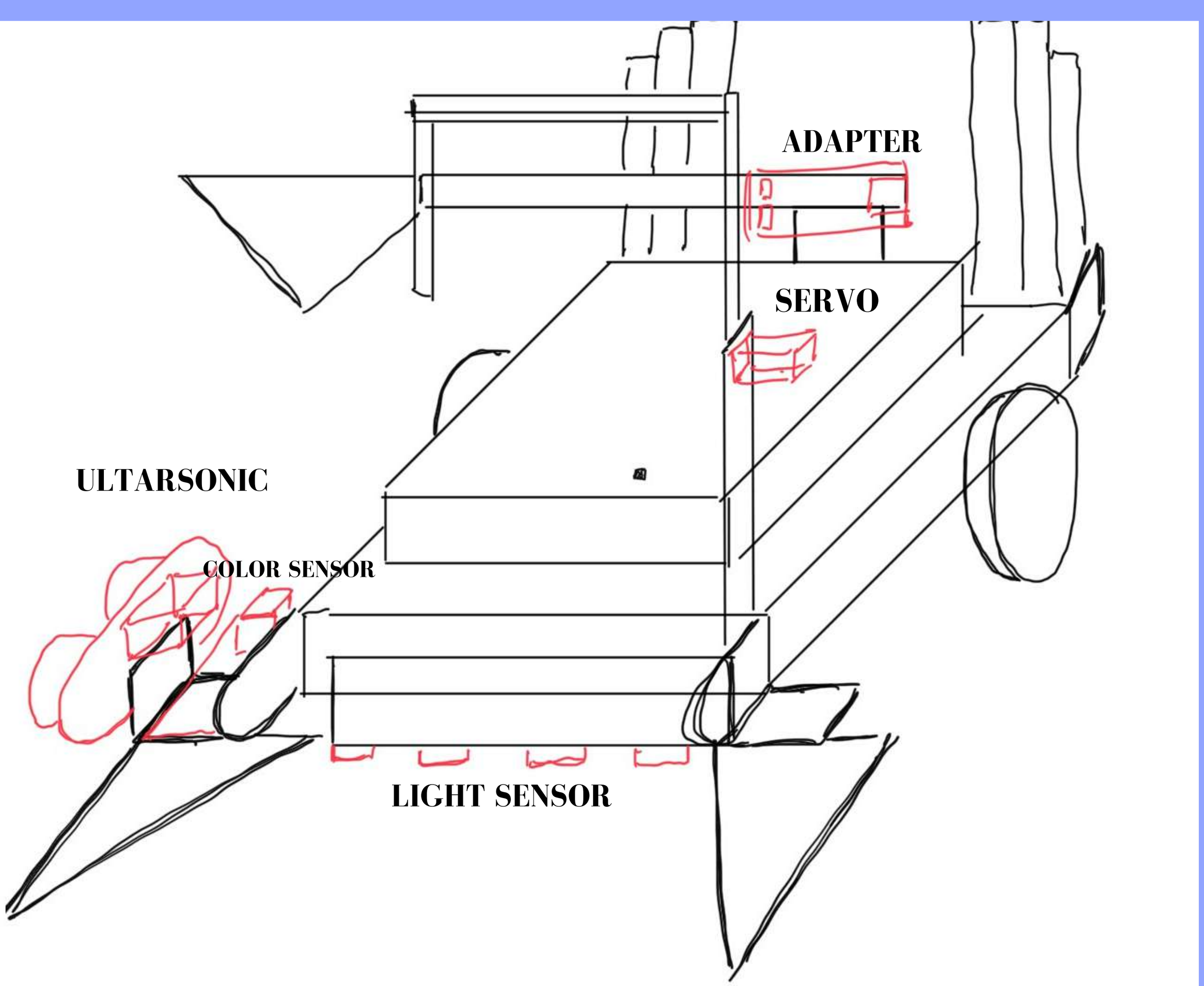
MR.KOOMPAN JANTAWAN

Head of Science and technology (computer)

29 years, Working in Assumption Samutprakarn School

Slogan : Never stop learning Never stop teaching

Sketch Picture



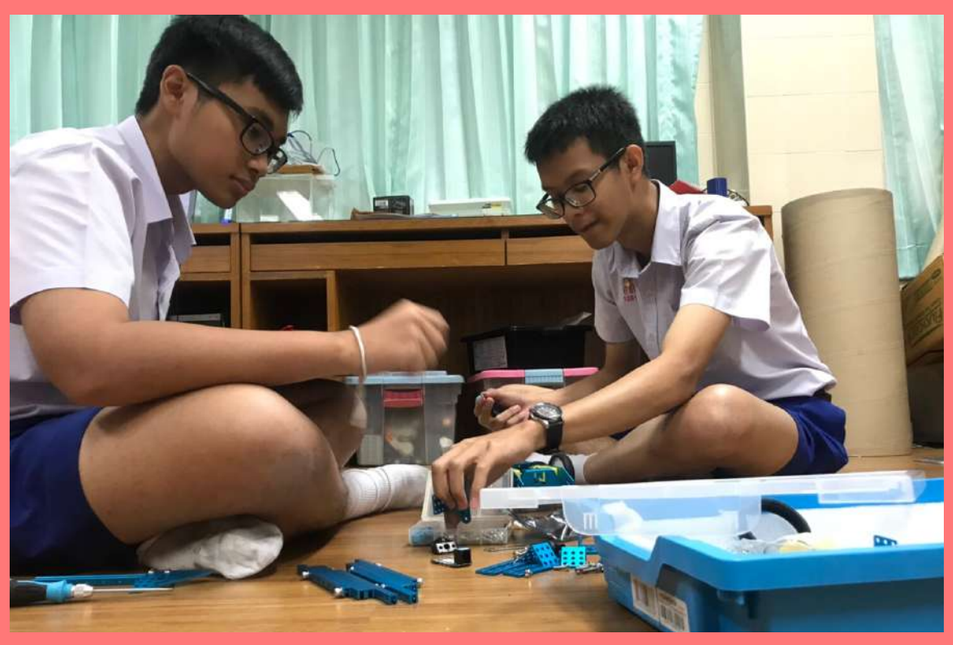
Hardware Principle

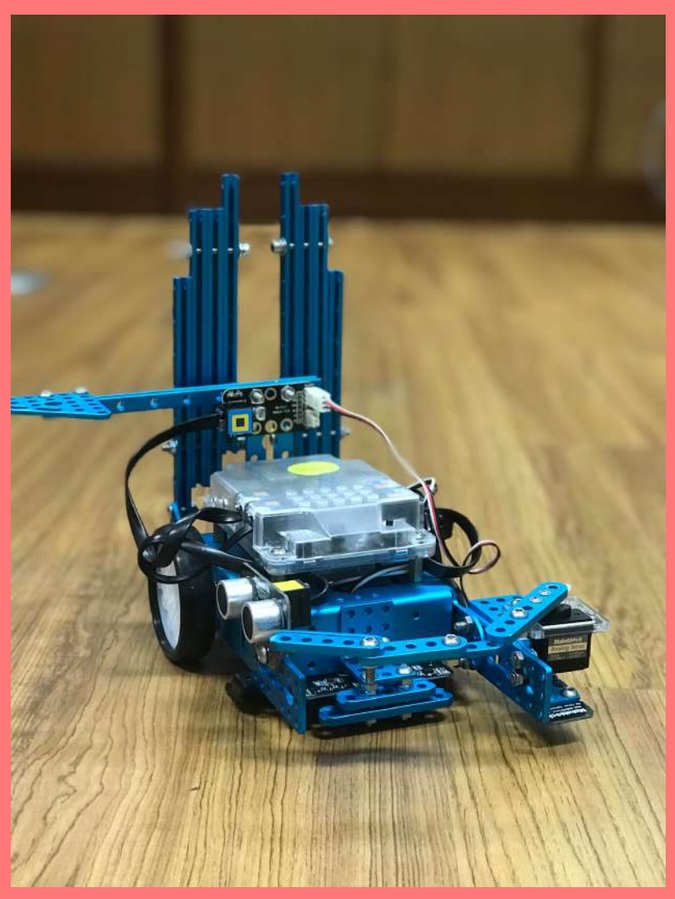
1.ANALYZE THE TURNING ANGLE OF THE ROBOT THAT IS FIT FOR BETTER TURNING

2. DESIGN A SMALL SIZE PUPPET SO THAT IT IS EASY TO MOVE TOWARDS THE MISSION.

3.USE THE LEAST PARTS OF THE ROBOT ASSEMBLY TO REDUCE ASSEMBLY TIME.

4.FOR THE DIVISION OF WORK AND DESIGN, THE ROBOT WITH THE SAME WEIGHT TO ACHIEVE THE BALANCE OF THE ROBOT WHILE MOVING.





Software principle

1.DESIGN LOGIC TO BE SIMPLE AND MINIMAL AS POSSIBLE. SO THAT IT IS EASY TO REMEMBER.

2.WRITE PROGRAMS FOR THE MOST ACCURATE AND ORDERLY MISSION.

3.WRITE THE PROGRAM ACCORDING TO THE MISSION AS MUCH AS POSSIBLE.

4.WRITE PROGRAMS SO THE ROBOT CAN PERFORM TASKS QUICKLY IN A LIMITED TIME.

Daily Report

DAY 1:

: PLAN AND DIVIDE THE WORK INTO PROPORTIONS WITHIN THE TEAM.

DAY2:

:DESIGN ROBOTS AND PROGRAMS ACCORDING TO THE MISSION RECEIVED FROM MAKE X.

DAY3:

: START PROGRAMMING AND CONNECT THE ROBOTS.

DAY4:

: THERE WAS A PROBLEM WITH THE MOTOR OF THE ROBOT, WE WILL CHANGE IT TO A NEW MOTOR.

DAY5:

:THERE WAS A PROBLEM IN THE UNSTABLE TONGS WHICH CAUSED PROBLEMS IN THE MISSION.

DAY6:

: THERE WAS A PROBLEM WITH THE PROGRAM THAT FAILED TO UPLOAD, THEN WE WILL FIND THE ERROR AND FIX IT SUCCESSFULLY.

Daily Report

DAY7:

: THE TEAM BEGAN TO AGREE TO CREATE ANOTHER ROBOTO TO USE IN PRACTICE AND IMPROVE THE ORIGINAL PUPPET TO BE MORE EFFICIENT.

75%

DAY8:

: PRACTICE ROBOT AND COUNT TIME

90%

DAY9:

: ROBOT RAN THE PROGRAM 100%.

100%

Problem & solve

AFTER THE MAKE X THAILAND COMPETITION WHICH HELD ON NOVEMBER 9-10,2019.WE FOUND THERE WERE A FEW PROBLEMS:

1.THE STRUCTURE OF THE ROBOT WAS IMBALANCED SO IT LEADS TO POOR PERFORMANCE.

2.THE GRIPPER WAS LOOSENED SO IT WEAKENS THE GRIPPER'S PERFORMANCE

3.THE GRIP THAT WAS CONNECTED TO THE SERVO WAS NOT PERFECTLY EXECUTED WHEN PLACING THE TREE TO THE DESIGNATED AREA. SOME PART OF THE TREE WAS STUCK ON THE ROBOT'S GRIP.

4.THE FIELD'S SURFACES WERE VERY TOUGH TO MANAGE THEREFOR THE ROBOT WAS MISTAKENLY TOOK THE WRONG ROUTE/MOVEMENT.

5.THE MOTOR/S WAS MALFUNCTIONED SO THE MOTOR WAS UNEQUAL AND THE PROGRAMMED VALUES OF THE MOTORS ARE NOT EQUAL AS WELL.

6.THE ROBOT COLLIDES DURING THE MISSION WHICH LEAD TO AN ERROR.

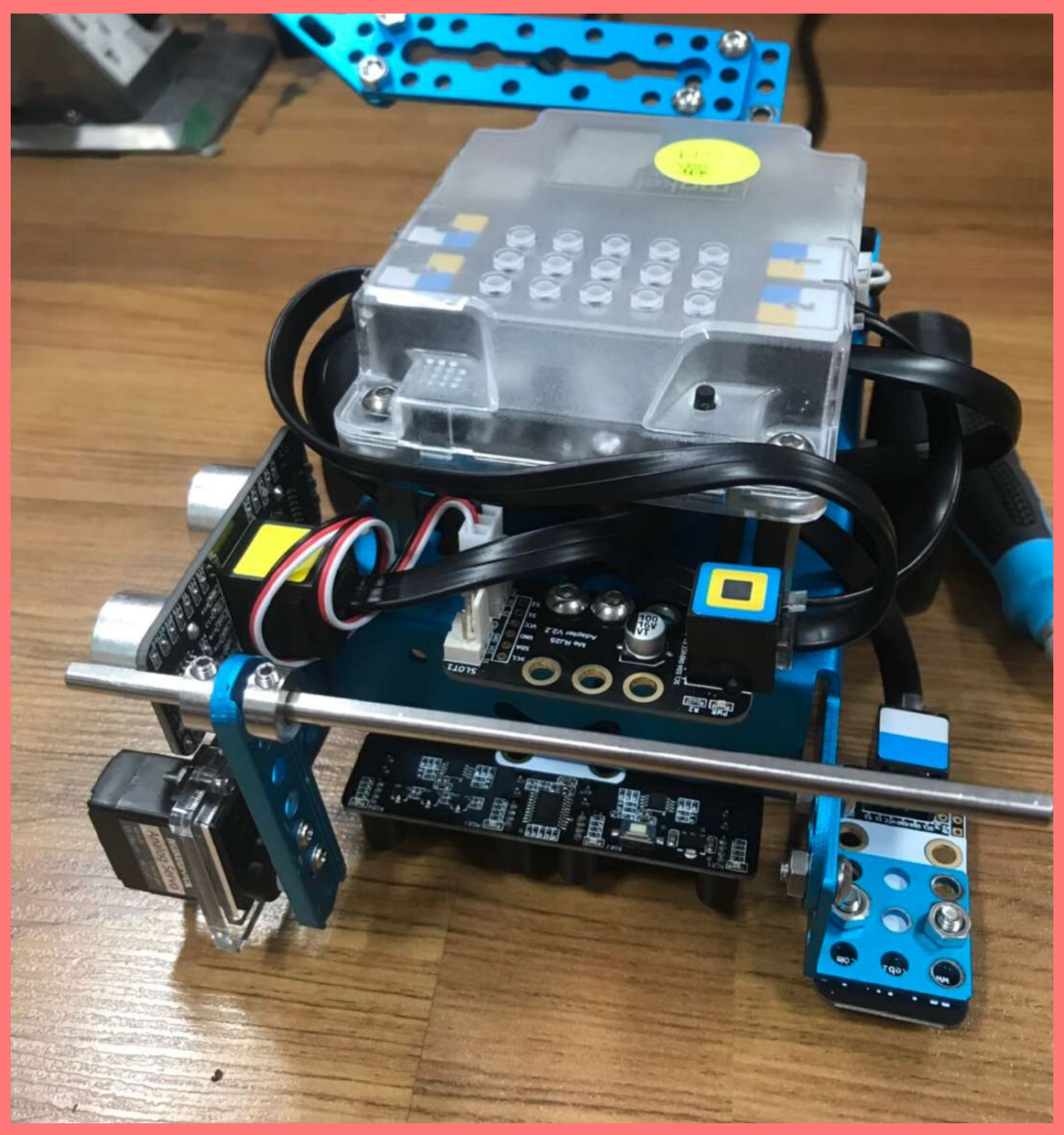
7.THE EFFECT OF REVERSED-WIRING MAKES THE MOTOR VALUE CHANGED.

8.THE UNSTABLE ROBOT'S MAINBOARD MAKES THE MISSION UNACCOMPLISHED.

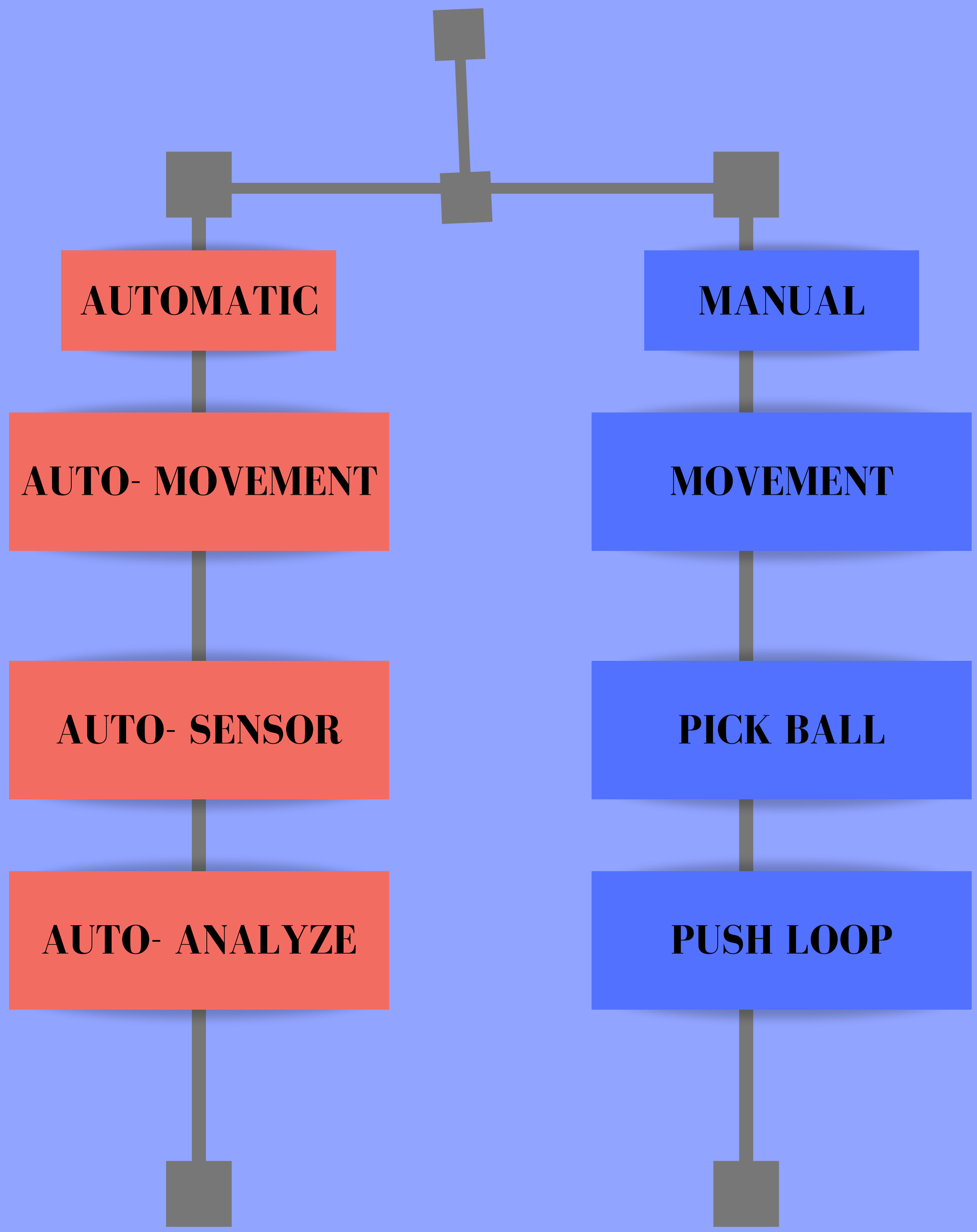
FROM ALL OF THE PROBLEMS THAT WE'VE FOUND OUT,WE HAVE PLANNED A PLAN FOR AVOIDING THEM AND DESIGNED A NEW ROBOT FOR PARTICIPATING IN MAKEX WORLD COMPETITION AS FOLLOWS:

STEP BY STEP
PRODUCTION

HARDWARE

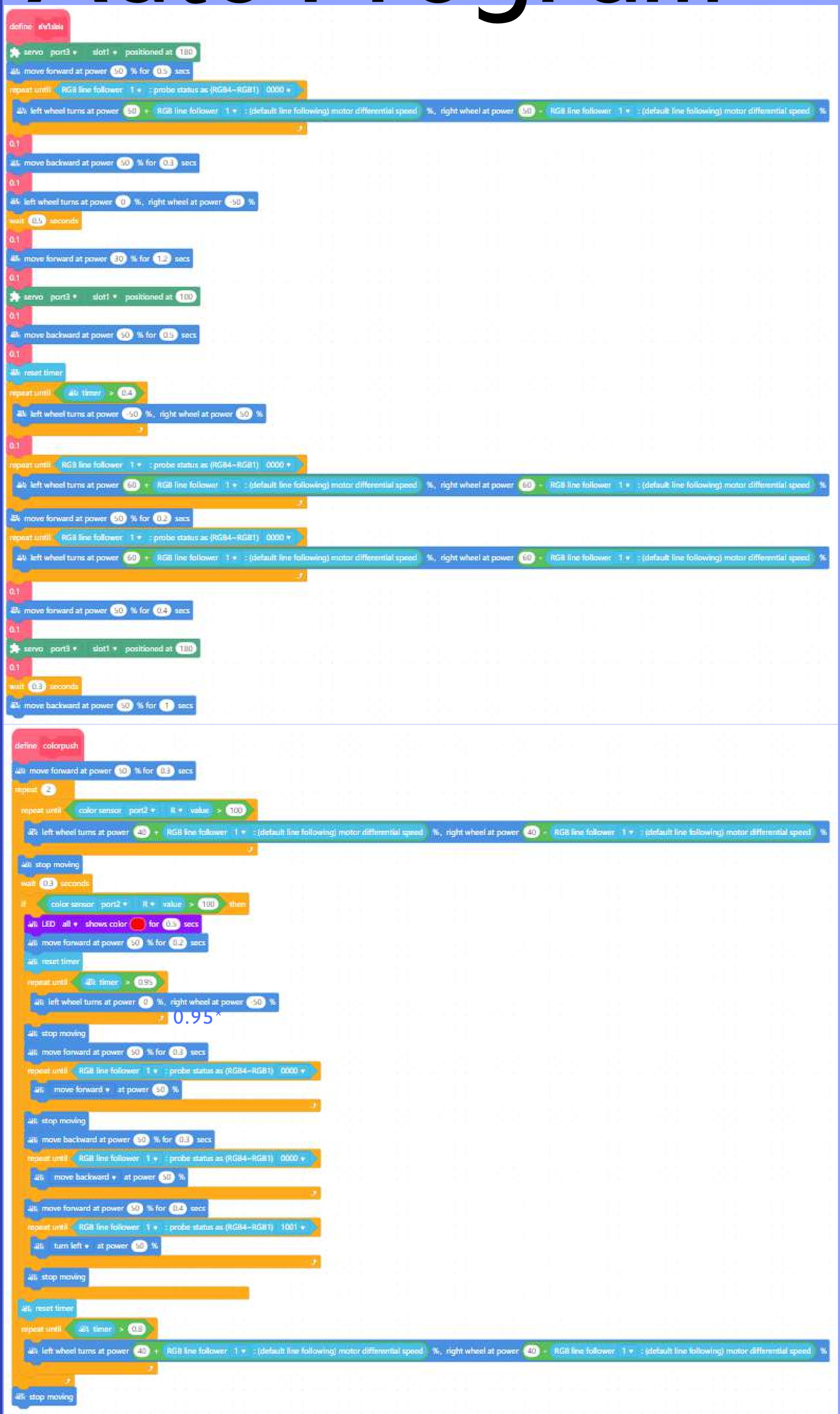


Software


AUTOMATIC
AUTO- MOVEMENT
AUTO- SENSOR
AUTO- ANALYZE
MANUAL
MOVEMENT
PICK BALL
PUSH LOOP

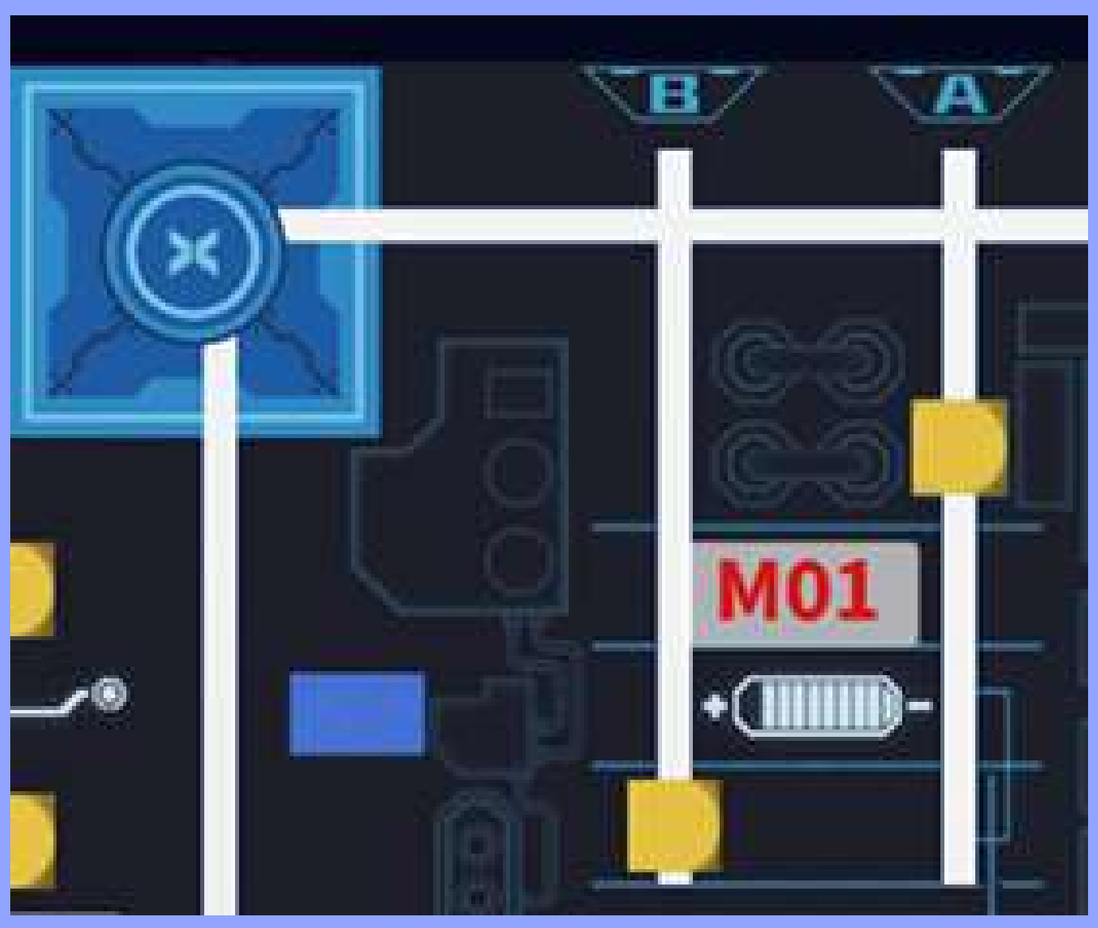
Auto Program

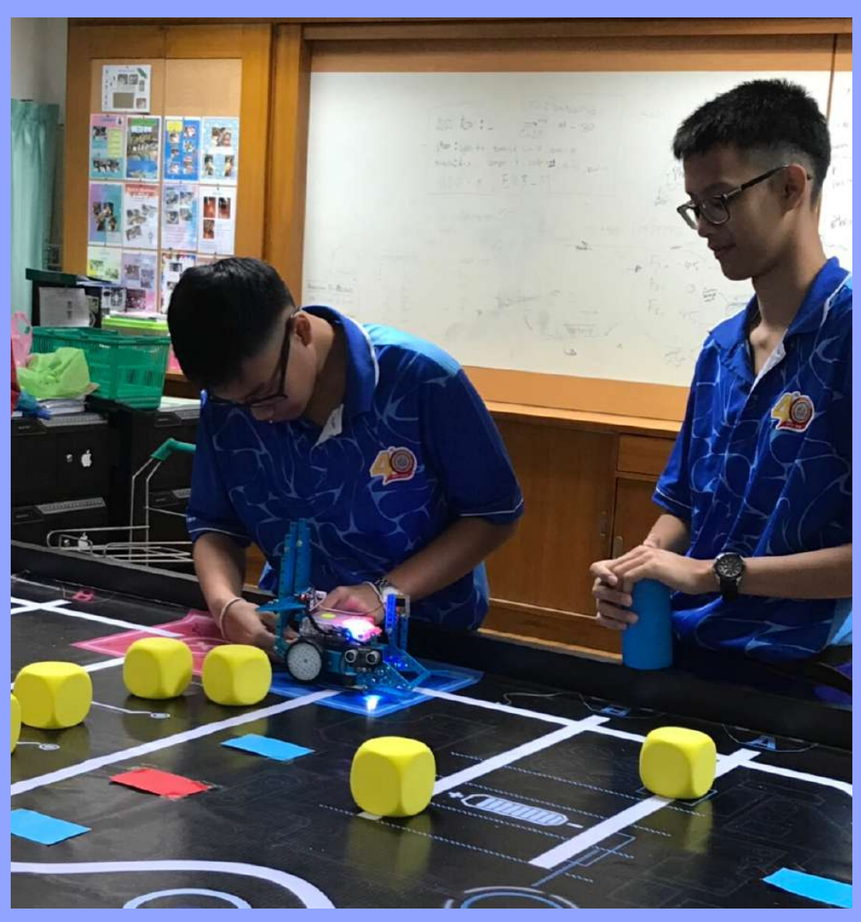
Auto Program



Manual Program

WORK PLAN





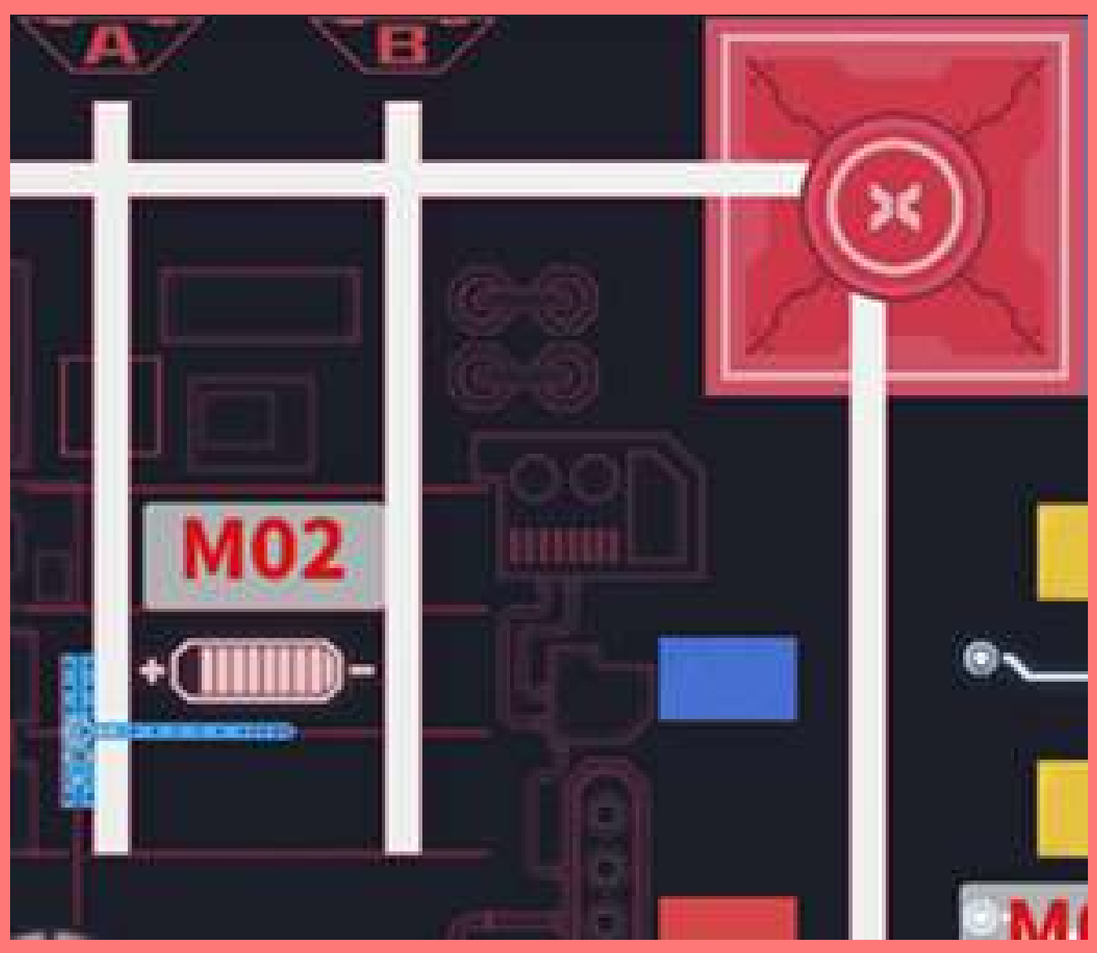
Mission 1

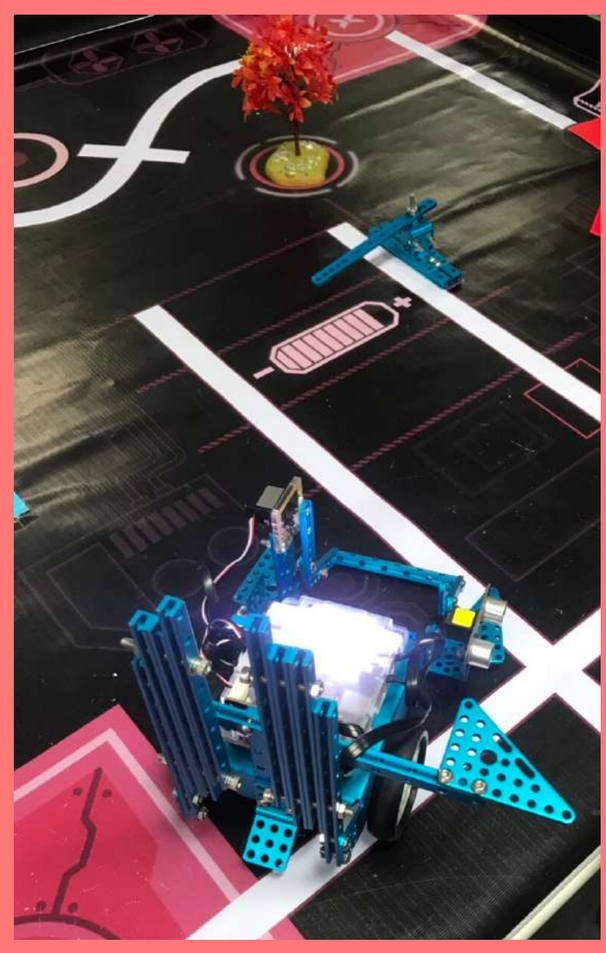
Instructions:
The robot needs to move the yellow block A to the same area as yellow block B which means switch on the energy-saving switch. The team scores 60 points for successful moving, the full point is 60.

Notes:
Check the first line at point B and measure the first block distance and keep the value. After that, check the second line at point A. And then compare the obtained distance values with the values that we specify, with ranges less than 20 to be the case 1,20-30 as the case 2 and 30 and up to be the case 3. Each case will set the PID (Proportional, Integral, Derivative) timer (seconds) that will be different.

Problems:
When running the robot, it appeared that the yellow blocks were too far above the line, so we will not get points in this section.

Solutions:
We found that the motor values of the PID program are too strong, so we try to reduce the motor values so the blocks can stay in the specified area.





Mission 2

Instructions:
The robot needs to enter the charging station and rotate the switch in the specified direction for more than 90 degrees. The team scores 60 points for successful switching on, the full point is 60.

Notes:
Begin to let the robot walk to check the line, find line B, make the robot turn left and then tilt to bump to switch, it has more than 90 degrees

Problems:
An error occurred by walking to hit the base of the mission causing no points.

Solutions:
Corrected by changing the turning angle to be farther away from the base.

Mission 3

Instructions:
The robot needs to move the 3 generators to another direction representing successfully dismantling of the power plant. The team scores 20 points for each successful generator dismantling, the full point is 60.

Notes:
Start by letting the robot tag the line to sweep the switch by connecting the robot to have a place.

Problems:
The robot could not put the the switch down.

Solution:
We found that the motor values of the PID program are too strong, so we try to reduce the motor values so the blocks can stay in the specified area.

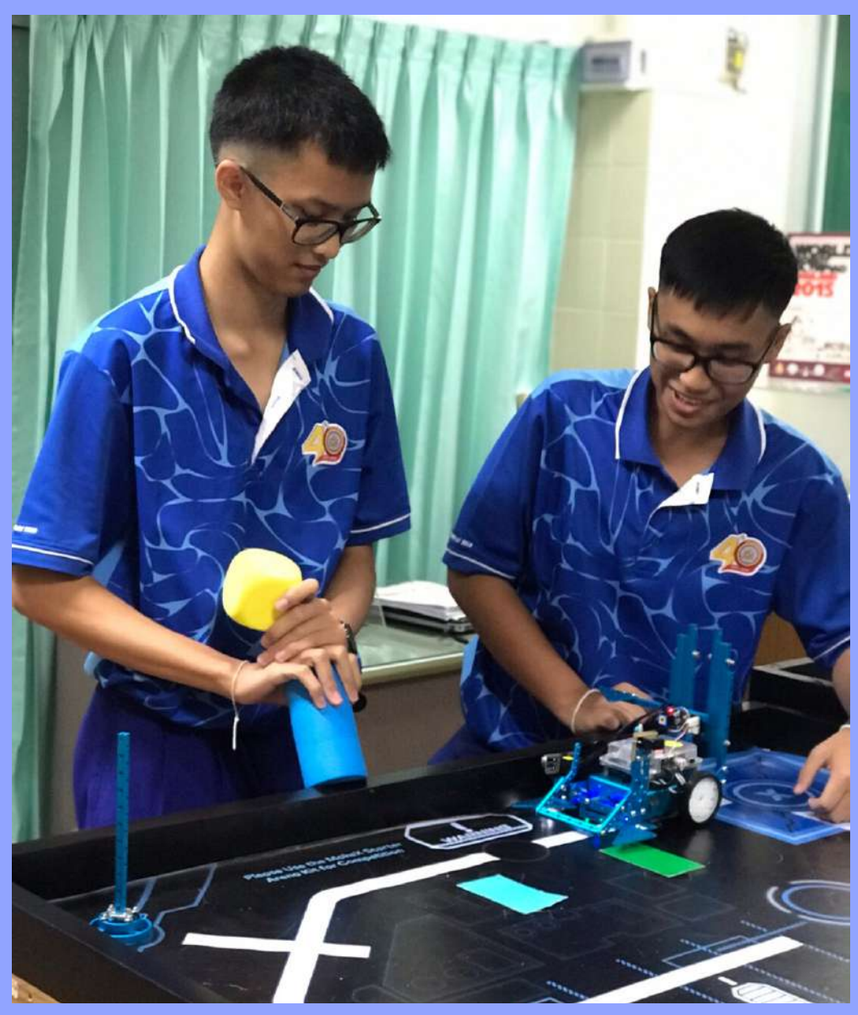
Mission 4

Instructions:
The robot needs to push down the chimney standing in the arena. The team scores 60 points for successful dismantling, the full point is 60.

Notes:
Have the tag line walking to find the third cut line Turn a little then spin to swipe

Problems:
At some times the robot has the opportunity to stick to the edge of the field and sometimes unable to ward off the pole.

Solutions:
We redesigned the robot's travel style so that the poles fit properly and precisely without having to bump or install the edges.



Mission 5

Instructions:
When the robot encounters a color card, it needs to complete color recognition and correctly report the color information in a visual form. After completing the report of the first color card, 20 points will be scored. The robot continues to complete the recognition and report for the second color card. After completing the report of the second color card, another 30 points will be scored. The full point is 50.

Notes:
Track the lines until it found the colored-paper, stop and read the color values then display it for 2 seconds and repeat it again in the second colored-paper.

Problems:
When the Color values checking was error the robot might pass through the colored-paper without checking color values.

Solutions:
Add “wait” to the program before checking the color values and change the motor values.

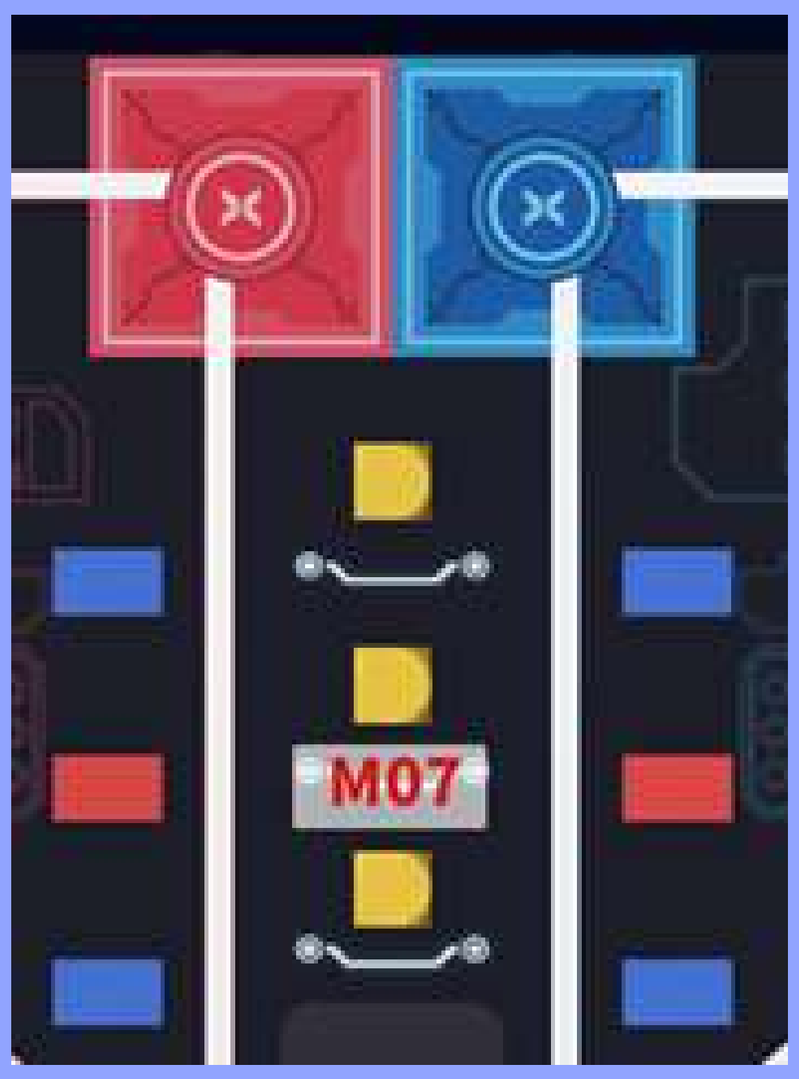
Mission 6

Instructions:
The robots need to move to the obstacle on the road and affects urban traffic and normal life.

Notes:
Track the lines then grip the chimney and move for doing the M03 or M04 mission. After that, release the gripper.

Problems:
When the chimney stuck with the robot and sometimes the robot can’t swipe chimney out of the field which the robot has tomove.

Solutions:
Use gripping then continue to move and place in another position.



Mission 7

Instructions:
The robot need to distinguish the construction waste type by recognizing the corresponded color cards (red or blue). Then, the robot needs to move to the construction waste to the corresponding (red or blue) treatment areas according to the waste categories (red or blue). To identify the treatment areas. The alliance teams will score 20 points for each successful sorting of construction waste, the highest point is 60.

Notes:
Track the lines and check the color values. If the color is the same as our team's color, continue moving. If not, push the block to the opposite side. Repeat 3 times.

Problems:
When pushing the block, it doesn't pass the given line. And when the robot rotates back, it often passes through the line.

Solutions:
Change the program to push the block until it found the white line and reduce the rotation when it rotates back.

Mission 8

Instructions:

Each sapling corresponds to two stages of the missions. For example, in the first stage, the red team's sapling needs to be moved to transit area by red team's robot, so the alliance team score 20 points. The blue team's robot continues the second stage by moving the red team's sapling from the transit area to the blue team's desert area, so the alliance teams will score extra 10 points. Similar for blue team's sapling, the blue team's robot needs to move their sapling to transit area and score 20 points for alliance. The red team's robot continuous to the next stage by moving blue team's sapling from transit area to the red team's desert area and will scores for extra 10 points for the alliance. The full score is 60 points. The sequence of moving blue of red team's sapling does not affect the scoring.

Notes:

There are 2 conditions; 1. sending: Track the lines until it found the intersection, make a turn to grip the tree. After that, continue tracking until it found the 2nd intersection, make the robot place the tree in the box. 2. Receiving; Track the lines until it found the first intersection and continue tracking until it found the 2nd intersection, make the robot pick up the tree then rotate and track the line back to place of the tree in the given point.

Problems:

The tree branch has stuck with the robot make the mistaken placing and incomplete.

Solutions:

Improve the robot. For example, by making the gripper wider than before.

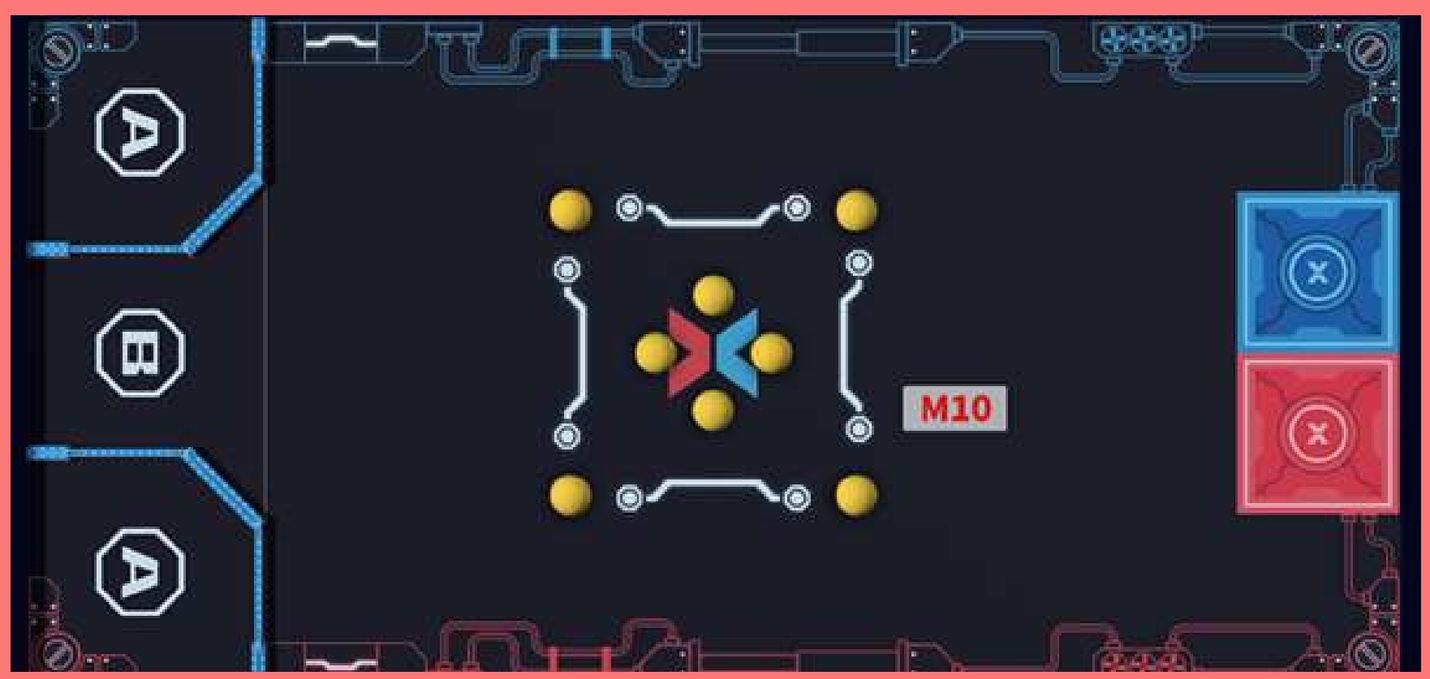
Mission 9

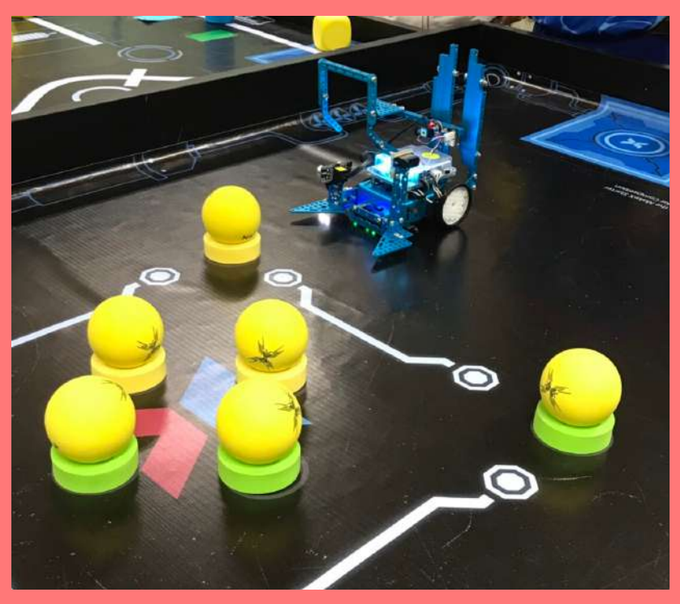
Instructions:
First the robots form alliance team return to their own stage area. After that, one robot starts to play music, and the other robot starts to dance (repeated swing, rotation or forward-backward). The action of two robots must last for at least three seconds. The team will score 10 points for a successful party, the highest point is 10.

Notes:
Run the robot to make it move out from the channel then rotate left and right in the dancing condition by 3 seconds. In part of the singing condition, make the robot sounds for 3 seconds.

Problems: **-**

Solutions: **-**





Mission 10

Instructions:
Robots from the alliance team need to move the circular garbage on the arena to the designated garbage station A. The alliance teams score 5 points for each successful placing of the circular of the circular garbage. Robots from the alliance team need to move the spherical garbage on the arena to the designated station B. The alliance teams score 5 points for each successful placing of the spherical garbage. During the competition, the alliance team's observer can stack the garbage which has been moved into station by robots to score extra points. The observer needs to take the spherical garbage from station B to station A and stack the garbage to save the space of the garbage station. The alliance will score extra 5 points for each successful garbage stack in station A.

Notes:
Using joystick in manual program. Control by using up and down arrows as it moves forward, backward and left, and right arrows as it turns left and turn right L1 as the gripper opener and R1 as the closing. The number 3 for accelerating the speed of the robot.

Problems:
A mistaken of gripper made the shackle gets inside B channel then the point was deducted.

Solutions:
Fix the gripper to make it appropriate and practice controlling it.

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PAGE:24 ACSPROBOT03

Team Culture

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ASSUMPTION SAMUTPRAKAN

TEAM ACSPROBOT03

THAILAND!

THIS IS THE FIRST TIME OF US IN THE MAKE X COMPETITION AND WE ARE FORM ASSUMPTION SAMUTPRAKARN SCHOOL WHICH IS IN THAILAND

PHAKAWAT PETSAWANG
HARDWARE DESIGN

JAKTIKARN PUANGTABTIM
PROGRAM DESIGN

MR.KOOMPAN JANTAWAN
COACH

Story Sharing

COMPETITION EXPERIENCE

We, the ACSP Robot03 Team, would like to express our full thanks to MakeX Thailand and MakeX International for the opportunity to be part of this event. For letting us to experince this wonderful competition not only in the local but also in the incoming international competition.

Our jouney going to the international competition is not easy for us. We only knew this event a month before the local competition and by then we only have one month to prepare and unfortunately, we don't have any available robot starter kits at our hand. Becuase of the willingness of our coach he makes things happen and borrow a starter robot kits from th Imagineering Education Thailand for us to be part of the said event. Moving forward, we did it and we are so happy because we represent our country (Thailand) for this incoming international competition.

Joining this event is not only about winning the prize, Hence, our team also aiming to make friends, to adapt the culture and to gain more knowledge and experince that cannot be seen inside the four-walled classroom. The knowledge and experience that we can get from this event are for sure we can use it in the future and most especially to our studies.

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ASSUMPTION SAMUTPRAKAN

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