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## **mBot Robot kit Module: Scratch Coding for Special Needs Student**

**\*Wan Mohd Tarmizi Wan Mohd Yusuf, Mohd Muzammir Firdaus Abu Bakar**

<sup>1</sup>STEM Foundation Centre, Universiti Malaysia Terengganu, 21030 Kuala Terengganu, Terengganu, Malaysia

\*E-mail: [tarmizi@umt.edu.my](mailto:tarmizi@umt.edu.my)

### **ABSTRACT**

As the usage of high levels of technology usage in our daily life is becoming more common and keeps on advancing every day, it is important for the teaching and learning process to cater for special needs students to be included in this advancement. A teaching module for robotics is a structured program designed for special needs students on how to assemble basic robot, the concept of sensor function and their applications and program robots using scratch programming. The focus of this module is to approach the special needs student by focusing more on the visual observation for learning the programming. In conclusion, this module for robotics is a good introduction to the fascinating world of robotics and prepares the student for the advancement of technology in daily life.

**Keywords:** Teaching and learning 1; module 2; robotic 3; scratch programming 4

### **INTRODUCTION**

The usage of technology in our life has becoming more advance and has help to improve productivity in terms of saving time and resources as well as giving better outcome for daily activities [1]. As example, a smartphone can have all the functions that are necessary for human identification, banking, travel, communication, entertainment even for doing work. The mass digitalisation of information from physical paper to digital data that can be stored online has made all this possible.

Therefore, there is a need for everyone to adapt, apply and use the new technology so that no one will be left behind. That is why, the teaching and learning for technology is encourage at the early stage to trigger the interest and make children be able to adapt with the incoming new technology advancement [2,3,4].

However, for the special needs students (SNS) with hearing disability, proper and special guidelines are needed because they cannot hear to listen focus and listen for instruction. SNS have the capability to focus more on kinaesthetic learning approach as they use visual to interact with their surrounding during learning session [4,5].

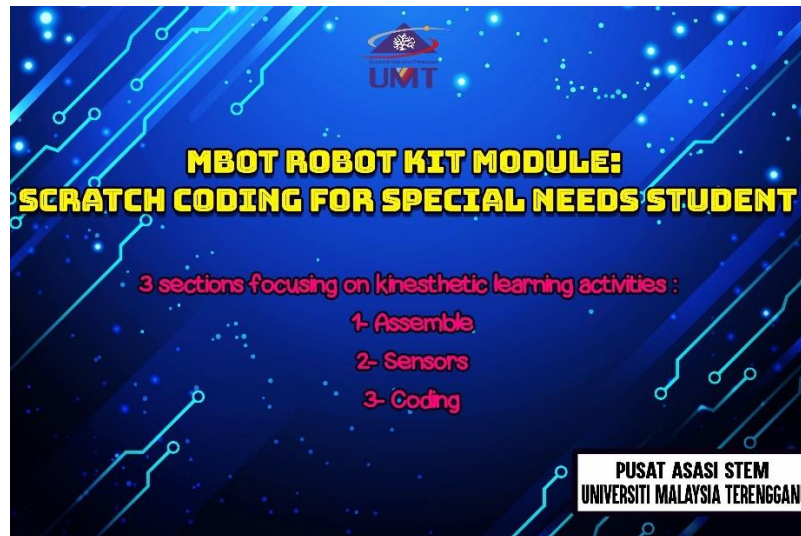
This module has been developed specifically for SNS at primary level school to develop their interest in robotic, coding and technology related activities [6]. There has been some research done on how robot can be used to help students with physical disability to perform better at tasks and help them in social skills [7,8]. Most of SNS has been exposed to smartphone in their daily life which make it easier for the learning process. However, teacher with capability to use sign language is still needed for interpreting instruction form instructor especially at the early stage of the session.



## INNOVATION DEVELOPMENT

mBot is a robotic kit that consist of a basic robot set that comes with two sensors. The first sensor is proximate sensor which works by transmitting and receiving infrared light. This sensor can detect any obstacle that blocking the pathway. The second sensor is line sensor that emits infrared light and measure how much infrared will be reflected that can be used to detect line for a pathway.

MBot is an educational robot that makes learning and teaching robot programming simpler and fun. SNS may start the leaning process with just a screwdriver and robot assembly manual. There are 3 main sections in this module.



**Diagram 1:** Poster for the mBot Robot Kit Module

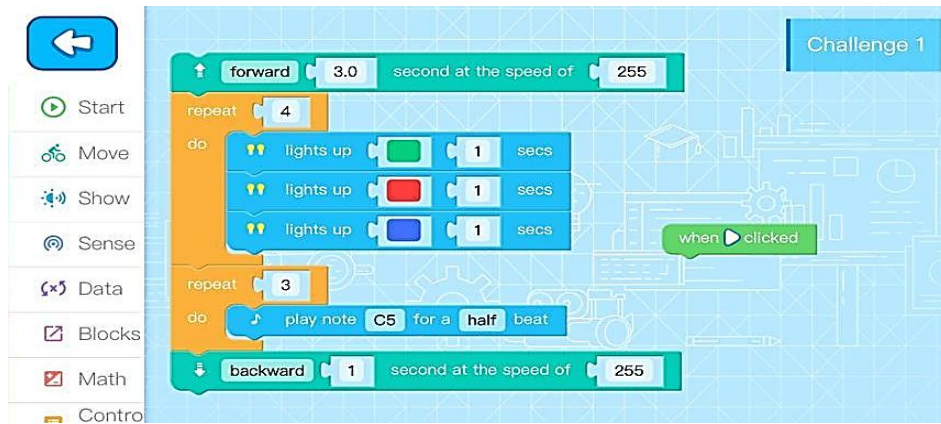
### Section 1 (Assemble the robot activity)

The instructions for assembling the robot are given in step-by-step instructions with diagram for each step. SNS can explore this process on their own with minimum help from instructor. They can play around the screws, as example the correct size and the effect for the movement or mechanics of robot if wrong screw is chosen to attach different parts of mBot together.



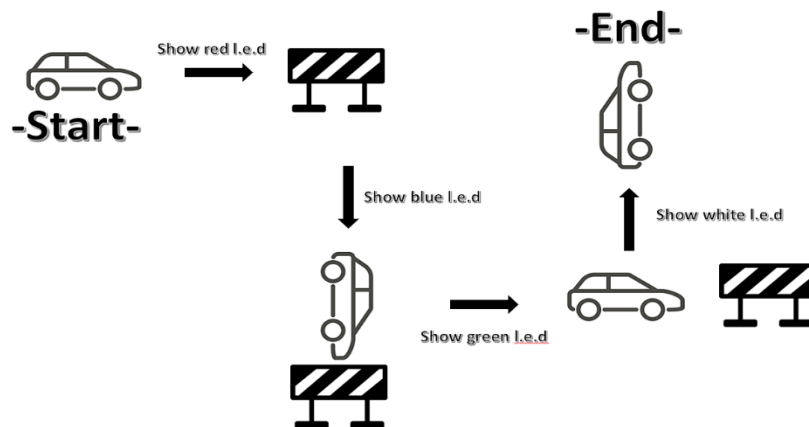
**Picture 1 and 2:** SNS were guided by instructor and the teacher helped for translation





**Diagram 3:** Lists of commands that can be compiled together to complete given task

As SNS get better understanding on how each command works and how to use it properly, the instructor may proceed by giving task that required SNS using multiple command to solve it. As example, by arranging 3 obstacles at different place, instructor will show what is the required outcome. SNS may use their own creativity doing scratch coding.



**Diagram 4:** Example of task for SNS to complete by Scratch coding

## COMMERCIAL POTENTIAL

Introduction to technology related activities are important to SNS but not much have been introduced in class due to several limitation. This module can be used to enhance more participation from school to help SNS in the learning process.

## CONCLUSION

Based on the sessions with SNS, the teachers have been interviewed to get the feedback on how these modules affecting SNS learning progress. Teachers mostly are overwhelmed with the robotic module because SNS has shown huge interest during and after the sessions. SNS showed increase participation and solving skills during the process. This session encourage teamwork and discussion among team member in order to solve the given task. The only problem with this robotic programme module is the cost for each mBot kit and a tablet are expensive for the school to acquire. Hopefully, the price for the mbot kit and tablet will be reduced in the future.

## ACKNOWLEDGEMENT

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