

# I-KID(KidSize)

Zhang Chongyang<sup>1</sup>, Ban Yubo<sup>1</sup>, Wang Jun<sup>1</sup>

<sup>1</sup> Beijing Information Science & Technology University, 12 Xiaoying East Road, Qinghe,  
Haidian District, Beijing, China  
zcy@mail.bistu.edu.cn

**Abstract:** This paper introduces the situation of our humanoid robots. Through the previous competition, we learned from the experience and lessons. We solved the existing problems on the basis of the original robot, carried out a series of transformations, and launched a new robot on the basis of the original robot. These modifications include the hardware and software aspects of the robot.

**Keywords:** lessons, Improvement.

## Introduction:

*In the Sydney RoboCup 2020, we were frustrated with our performance. We did not participate well in the 4v4 competitions. From then, we did hard effort to improve our ability from various aspects. During the improvement process, we carefully analyzed the situation of other teams and also checked a lot of data. At the same time, we studied hardware related courses such as Engineering Drawing and Electrical and Electronic Technology. As well as we also studied software related courses such as Machine Vision, Stochastic Processes, Numerical Analysis, Data Structures and Python. At the same time, we learned how to use ROS to develop robots, and further studied the Robot's Operating Principles and communication methods under this framework.*

*During the period of the competition, Robot cannot be accurately positioned on the field. The lack of mutual cooperation among robots cannot achieve some functions such as passing information to each other. Now we are making positive changes.*

*In order to improve our robot's ability to a higher level in the competition, we have made major changes to the robots' core processing unit, control unit, steering gear and software. There are almost the new robots. The specific changes are listed as follows:*

- 1. We replaced some joint steering gear of the robots. For example, we replaced the original MX64 joint steering gear with MX106 joint steering gear in key parts.*
- 2. The core board and control board have been upgraded. The previous generation used the Raspberry Pi as the core board, but now the Nvidia-tx2 makes robots more powerful in computing modules such as image processing, positioning and navigation and decision-making.*
- 3. We use a more professional camera to improve the vision.*
- 4. We have made some minor adjustments to the robots' body structure to make them lighter. Besides that, we added convenient handles and made some changes to the legs so that the robots could be more*

*convenient than the previous generation when kicking the ball and turning around.*

*5. We replaced old framework with ROS framework to improve ability and to upgrade space. In this case more team members could participate in the project.*

*6. Most importantly, we changed the emergency switch position of the robots so that we can take effective measures to prevent accidents in emergency situations.*

*7. We use the new ROS framework to make robots to communicate and cooperate with others on the field.*

*8. After learning lessons from the Sydney Competition, we will design the special software for drop in and technical challenge. It will be more convenient for robots to participate in competition and it can improve our communication with other teams.*

*9. The feet of the robot is equipped with sensors to make the robots' walking process more accurate, and they can perform offline tracking and positioning for the robots.*