COMPANY SPECS

1. **Team name：** BNDS
2. **School Name：** Beijing National Day School
3. **Country：** China
4. **Distance required to travel to the international competition：**
   The total distance from Beijing, China to Seattle, WA is 5,413 miles.

5. **History of MATE ROV competition participation：** This is our first year!
6. **Company photo and caption indicating members' names and roles:**

(From left to right) Chi Gao, Boer Deng, Ruixuan Li, Yixuan Zhang, Yuqian Zhang,

Chi Gao COO

My name is Chi Gao from Beijing National Day School. As an eleventh grader and the only student from the international department in this team, I am responsible for processing the information from English documents and plan the technical objectives for my teammates.

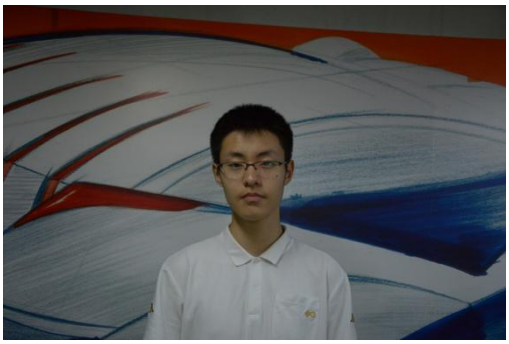
I join this competition through my instructor's invitation. I thought this competition is going to evaluate a creative design, as simple as many other competitions in China marked with words like "technology" and "machine". However, I understand the real "engineering" after I viewed the manual.

It's easy to craft a remotely-controlled machine (ROV), but difficult to operate a ROV, and this competition exactly asks us to precisely operate it. I see a variety of restrictions that rarely appear on the rules of normal technological competitions, such as ensuring the layout of wires is clear, having adequate strain relief, removing all spikes during the construction of ROV, and practicing the order of operation of machines. Rather than focusing on the final result carried out by the machine, MATE requires us to put our effort on everything, shifting the competition out of the background of competition but into the real-life scenario—because in real life, we can fail the performance of the task, but we can't cause casualty or grand economic loss.

My job is to watch my teammates vigorously work on the machine and to write documents for them. However, my parents, regarding me as a spectator, blame me for not learning anything from this competition. Indeed, I learn little principles of system integration or ways of operating tools. But in exchange, I dig information for my teammates to learn almost every aspect of "the code of conduct" for an engineer (or technician). I know how to maximize our productivity by scheduling in a correct order. I ruminate all the way through from the preparation before deploying ROV to the retrieval of each part after completing the task. I understand the "etiquette" of engineering.

Although my crude effort can't help the machine to accomplish tasks beautifully, it helps me to improve myself. MATE teaches me the spirit of engineering, and I shall distribute this idea to more of my fellows one day.

Yixuan Zhang CTO



My name is Zhang Yixuan, a senior student in Beijing National Day School. I was responsible for the production of elevator lift bags and OBS in the team. I like to accumulate knowledge of various structures, so I have friction self-locking device in OBS. I love electronics. I designed and debugged the sound release system in OBS.

Yuqian Zhang CFO

My name is Zhang Yuqian. I am a junior student from BNDS. I joined the underwater robot community from the beginning of the year. In the community, I mainly responsible for the design and production of robot frame, 3D printing and design of parts. For robots, I have many memories. I have participated in many competitions with my teammates, working together and having fun together. The

underwater robot, I think, is a more convenient thing to help us to live. We can use robot robots to swim in the deep sea. We can search and rescue the wreckage and carry goods. In short, I will do my best to make the underwater robot the best.

Boer Deng CEO
Grade: grade two of junior school
Length of Studying Robot: 5 years
Title for this Competition: Captain
Job Role:
1) team structure 2) design for robots framework 3) tongs design 4) final debugging
I have been interested in building LEGO basic models since childhood. With growing up, I realized that there was a common challenge for these models – they are all static. Once I had a chance to first attend one lecture on robot, I entered into the gate of robot and started the learning journey since then.
I have been interested and excited with new course of Underwater Robot since I joined Beijing National Day School. With studying this course, I realized underwater robot is much more useful and valuable than LEGO models. However, robots making has also applied some of mechanical principles of LEGO partially.
Immediately, I am very interested in this robot and established this underwater robot club this year. I am heading up this team served as captain for this competition.

Ruixuan Li CPO

My name is Ruixuan Li, or you can just call Rex. I'm a junior student from Beijing National Day School. I'll say I join underwater robot community for try the new things. There are so many new things that I have to learn. Now I'm taking a position of manipulator. For our control system, I did a lots of work. The main control box's faceplate was design and assemble by me. Also,I practiced very hard for our dream. I have got into this community for at least one year. Hope our team will be the best!

7. Range of grade/college levels represented by the members of your company：

Junior students from Institute of Technology

ROV SPECS

1. ROV name：HUJIAO

This name comes from the "Shan Hai Jing • Nan Shan Jing," it means auspicious animal in the sea.

2. Total cost:

1) ROV

date	type	name	remarks	quantity	price
ROV	ROV				total:¥3023.5
2018.1.12	consumables	vaseline	¥48*16	16*500ml	¥768
2018.1.12	consumables	heat shrinkable tube	¥32*1	1	¥32
2018.1.12	consumables	PVC tube(straight)	¥3.5*60	60	¥210
2018.1.12	consumables	PVC tube(3 passes)	¥1.1*100	100	¥110
2018.1.12	consumables	PVC tube(3 plane passes)	¥1.15*100	100	¥115
2018.1.12	consumables	PVC tube(4 passes)	¥1.1*100	100	¥110
2018.1.12	consumables	PVC tube(angle head)	¥1.09*100	100	¥109
2018.1.18	consumables	hot melt adhesive	¥7.2*3	3	¥21.60
2018.1.18	consumables	bandage	¥9.9*1	1*100*150mm	¥10
2018.1.18	consumables	solder wire	¥22*3	3*55g*0.8mm	¥66
2018.1.18	consumables	buoyant rod	¥18*1	1*150cm*6cm	¥18
2018.2.24	consumables	3D print converter	¥3*1	1*5g	¥3
2018.2.24	consumables	3D print fairing	¥10*6	6*35g	¥60
2018.2.24	consumables	bobbin winder	¥19.9*2	2*15m	¥40
2018.3.2	electronics	wide-angle camera	¥108*3	3	¥324
2018.3.2	electronics	marine pump	¥70*6	6	¥420
2018.3.2	electronics	385 motor	¥5*1	1	¥5
2018.3.2	electronics	cable	¥199*3	3*25m	¥597

2018.3.2	electronics	S terminal	¥2.4*2	2	¥4.80

2) Control box

date	type	name	remarks	quantity	price
control box	control box				total:¥1514
2018.4.4	electronics	desktop display	¥50*2	2	¥100
2018.4.4	electronics	mocrobit expansion board	¥33*5	5	¥165
2018.4.4	electronics	GPIO expansion board	¥3.8*10	10	¥38
2018.4.4	electronics	badUSB expansion board	¥146*2	2	¥292
2018.4.4	electronics	power transformer	¥569*1	1	¥569
2018.4.4	electronics	Button	¥19.6*9	9	¥176
2018.4.4	consumables	Anderson plug	¥5*20	20	¥100
2018.4.4	consumables	foamed plastic plate	¥14.4*1	1*300mm*400mm*8mm	¥14
2018.4.4	consumables	gaffer tape	¥3*10	10*0.03kg	¥30
2018.4.4	consumables	dupont line	¥10*3	3*20	¥30

3) Tools

date	type	name	remarks	quantity	price
tools					total:¥3121
2018.4.24	tools	bolt driver	¥9.9*5	5	¥50
2018.4.24	tools	hot melt glue gun	¥19.8*5	5	¥99
2018.4.24	tools	heat sealing gun	¥99.9*1	1	¥100
2018.4.24	tools	soldering iron	¥39.9*3	3	¥120
2018.4.24	tools	swimming pool	¥2549*1	1	¥2,549
2018.4.24	tools	tyre pump	¥34*1	1	¥34
2018.4.24	tools	hammer	¥14*5	5	¥70
2018.4.24	tools	pliers	¥19.8*5	5	¥99

3. Size and weight measurements：

- Size: the length, width and height of the underwater vehicle are respectively 38*37*37cm
- Weight Measurements： The weight of the robot is 5.103kg; The weight of cable is 8.335kg

4. Total student-hours to design and build

Total student-hours to design and build							
2017.12.04-2018.6.18				Training time 16:30-18:00			
	2017.12	**2018.1**	**2018.2**	**2018.3**	**2018.4**	**2018.5**	**2018.6**
Boer Deng							
Chi Gao							
Ruixuan Li							
Yuxuan Zhang							
Yixuan Zhang							
Lingxiao Yan							
Zishu Yi							
Fangshi Du							

5. Safety features

Beijing National Day School places personal safety in the first place. In order to avoid potential hazards during the ROV operation, our company carefully selects materials for construction, organizes the layout of wires and tethers precisely, calculates all data related to security, and offers code of conduct to our employees. All employees are well exposed to the training of order of operation and they acknowledge the solution to different emergencies by checking our Job Safety Analysis (JSA). Our company dedicates every effort to safely and successfully accomplish MATE tasks.

See the details in company safety review.

6. Photo of the vehicle