人工智能导论项目报告

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（装订线内不要答题）

Diver Helper® Smart Diving Assistance System

(An Artificial Intelligence Expert System)

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ABSTRACT

Amateurs usually encounter significant amount of problems when learning diving. Hand gesture is one of the most confusing part when communicating in water. Fatally, they might lose their life if they cannot handle emergency events correctly, especially when staying 20 meters below the surface. An artificial intelligence expert system is needed to assist amateur learners and help them handle situations down under water.

[Figure1.1: Diving into the beautiful ocean]

INTRODUCTION

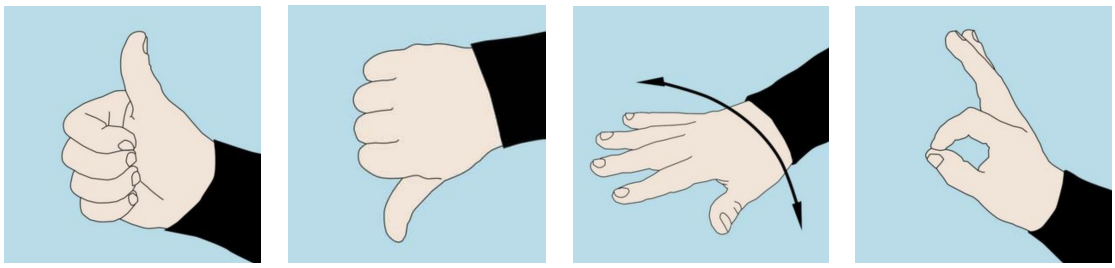
Recently, ocean exploration and protection has became an important issue. Many, not only those from maritime disciplines but also tourists and fishers, are willing to learn diving so that they might go deeper into the (maybe not) beautiful ocean.

However, fatal events happen from time to time, mostly because of misunderstanding when communicating. Gestures used in diving activities may differ completely compared to usual daily gestures used in our daily life (see Figure 2.1), plus effects of different gestures used in different countries/regions, “dis-communication” forms.

[Figure 2.1: This means “Ascend”, not “All good”!]

To cope with this situation, we used logic to developed an expert system which guides amateur (usually scuba divers) to learn and cope with emergencies.

“Diver Helper®” EXPERT SYSTEM

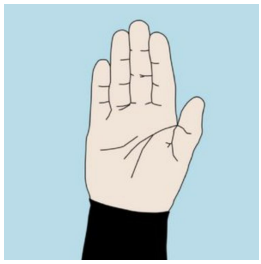
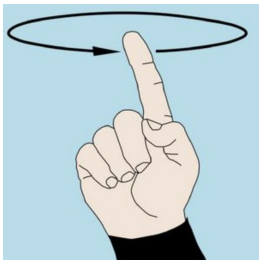
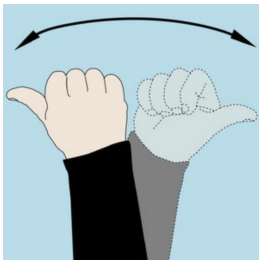
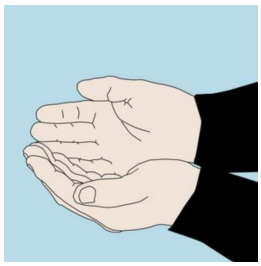


If teammate thumb up
Then ascent (by leaning up and swing legs)

If teammate thumb down
Then descent (by leaning down and swing legs)

If teammate hand open and shaking left and right
Then you know something is wrong

If thumb and forefinger are touched and others relaxed
Then you know everything is okay

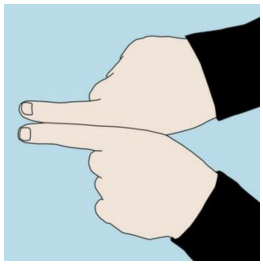





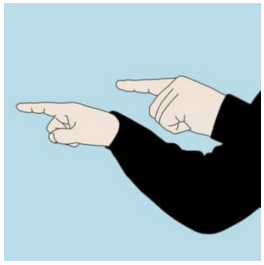
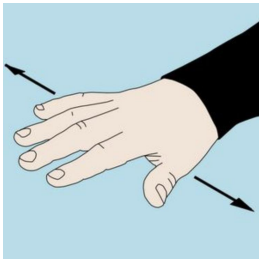
If hand raised
Then stop

If forefinger is drawing circles
Then turn around

If thumb is shaking towards particular direction
Then turn to that direction

If two hands cupped together
Then you know there is a boat nearby



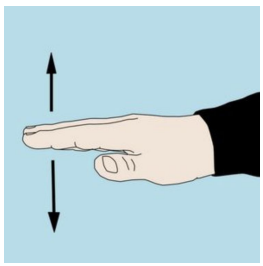



If fist clenched and forefingers are closely extended
Then buddy up (look for a buddy and dive together)

If mitten grasped
Then hold on with buddy

If two forefingers pointer together with one in the front and one at back
Then follow the lead

If hand shaking flat with palm facing downward
Them go to particular level




If hand flat and palm down, patting the water
Then slow down

If hand closed and shaking towards mouth
Then give air to him/her

If hand flat and slashing left and right
Then you know he/she has no more air

If hand raised and shaking dramatically
Then you know there is emergency




If hands lifted and shoulder shrugging
Then you know he/she does not know

If fist clenched and point to certain direction
Then you know there are danger in that direction

If arms crossed over chest
Then you know he/she is cold

If fingers pointed toward ones eyes
Then look at hem/her

All of above instructions may be given by voice since myopia divers might not see clearly if instructions are shown on the scuba protection gears, therefore a special earphone that can be used beneath the water is needed. For gesture detection, deep neural network is needed for classifying the gesture and thus give further instructions.

CONCLUSION

Diver Helper AI expert system indeed improved scuba divers experience when diving for the first couple of times since it can reduce probability of misunderstanding and ensured that people may receive clear instructions to avoid emergency situations.

REFERENCE

- Scubaco. (2017). *Scuba Diving Hand Signals You Should Know*. South Africa.