目前，市面上的台灯大致可以分为两种：一种是不可以调光调色的传统台灯；另一种可以手动调节的台灯。当外界光环境发生变化时，前者难以提供恒定舒适的照明环境，后者手动调节全凭使用者的主管感受，很容易出现长时间使用强光或者是弱光的情况，对眼睛造成伤害，并且手动调节多有不便，与现代家电的智能化 人性化理念相违背

在硬件设计方面，为了能够获得光照的色温及亮度信息，可以采用多光谱传感器（例如：微雪 AS7341 可见光谱传感器）准确地采集当前环境光的信息，并通过采光通道响应的数值进行运算，即可以换算出对应的色温及亮度，然后 MCU（Micro Controller Unit）根据设定的调光策略以及多光谱传感器反馈的光谱信息，动态的调节台灯的亮度及色温。

在软件设计方面，可以将采集到的光谱信息记录并分析，然后根据用户的用眼环境及习惯智能地给出相应的建议，同时用户也可以自定义记录自己眼睛的视力情况等，以确保可以长期跟踪自己的视力变化，促使用户保护好自己的眼睛。

以上两个子系统设计到的技术有：光谱分析、嵌入式开发、物联网通信技术、软件应用开发技术、云端服务器技术等。该硬件系统可以脱离软件应用系统独立运行，也可以配合软件应用系统获得更好的使用体验。

如果近视防控不到位，眼睛的前后轴的长度会不断地变长，长到一定程度，眼内的组织结构就被越拉越薄，最后会导致病理性近视的眼部并发症。近视轻则影响正常生活，重则引起近视性黄斑病变、视力障碍、白内障、视网膜脱落等视觉疾病，是视力致盲的第一病因。在中国，2018 年 8 月 30 日，教育部牵头，联合国家卫健委等 8 部门联合印发了《综合防控儿童青少年近视实施方案》，该方案标志着近视防控上升为了中国的国家战略。

该项目不仅仅可以实现对眼睛的保护，改善平时用眼的环境，也能实现当今物联网时代的家电智能化、人性化的目标。随着人们日益增长的健康意识以及信息技术和物联网的发展，在未来，我们有理由相信会有越来越多的保护我们眼睛产品问世，我们也会一步一步脱离近视带来的烦恼。

УДК 005

基于深度学习算法的水下机器人自主识别与作业技术

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Summary. *Based on the depth learning algorithm, this paper conducts research on key technologies such as underwater image preprocessing, underwater target autonomous detection and recognition, and underwater single target tracking and detection, and builds a system prototype to verify the effectiveness of the algorithm in the real marine environment.*

On line target autonomous recognition and tracking is the premise of autonomous grasping operation for underwater vehicles. In the real marine environment, underwater visual images have problems such as low contrast, uneven illumination, image blur, color deviation, etc. The preprocessing technology of this turbid underwater image and the autonomous recognition technology of underwater visual image targets are the current research focus and difficulties in the field of underwater robots, and also a powerful breakthrough in the national underwater robot competition.

Underwater turbidity image pre-processing scattering model:

This project plans to design an underwater turbidity image processing method based on scattering model on the basis of dark channel defogging method (DCP), establish a forward scattering model, and obtain an enhanced underwater image by estimating the background light and transmis-

sivity of the underwater image, so as to solve the defects of traditional underwater image preprocessing technology such as low resolution, low contrast, overexposure, etc.

Underwater static target autonomous detection and recognition system:

In order to realize the rapid and accurate recognition of small objects in the water by robots, the project plans to use a single-stage YOLOv5 depth learning algorithm to construct a convolutional neural network suitable for the underwater environment.

Underwater dynamic target tracking technology:

Considering the interference of underwater noise and obstacles on moving single target tracking, the project plans to use the SiamRPN++algorithm based on the twin convolutional neural network to lightweight the SiamRPN backbone network to eliminate the interference to the greatest extent.

Motor unit control system based on external chamber:

On the basis of the original equipment, the project team can realize the stable control of multiple mechanical arms and double mechanical claws by loading additional bins on the underwater robot body, and achieve efficient and autonomous grasping.

Actual achievements:

1. Image processing: Based on the OpenCV model, the dark channel prior defogging algorithm (DCP) and automatic color scale adjustment algorithm are used to defogger underwater images. The DCP algorithm with better defogging effect is selected to realize the preprocessing of underwater blurred images.

2. Target detection: In the deep learning environment of pythoch and pad, based on the latest version of the but phase YOLOv5-6.1 algorithm, and according to the existing marine biological data sets (sea cucumber, shell, sea urchin, starfish, sea grass), a lightweight yolov5s neural network is built, and 70 rounds of training are conducted for the data sets, with precision indicators mAP@0.05 : 0.95 reaches 0.423, and the recognition speed is fast (about 0.016s for each picture), but the recognition accuracy still needs to be improved by improving epochs.

3. Target tracking: Under the Pytorch deep learning framework, target recognition is carried out based on the latest version of YOLOv5-6.1 algorithm. The Github open-source dataset is trained and recognized in depth using the mainstream target tracking algorithm, deepsort. Through 40 rounds of training, the maximum target extraction accuracy is 97 %, and the average accuracy is 82 %. The feature extraction network of the dataset has been constructed, and the dynamic video can be counted by scribing.

4. Mechanical control: The body control adopts fuzzy PID algorithm instead of traditional PID algorithm to keep the depth error at (−0.1, 0.1 m) shaking and improve the control accuracy; Multi thread and single thread rotation control are used to speed up the processing of visual information; The PCA9685 control board is used to control the motor of the mechanical arm and the mechanical claw. At the same time, the external chamber of the motor is introduced to realize the cooperative use of multiple motors and complete the application of double claw and multiple degrees of freedom. Mechanical double claw replaces single claw, greatly improving efficiency; Install a collection frame at the bottom of the robot to place the collected objects; Install a collection frame at the bottom of the robot to place objects; The idea of bionics is adopted to design a fishing type mechanical claw to rough the interior, so as to achieve stable grasping of objects with different widths and minimize the damage to marine products.

Article summary

This project innovatively provides a new solution for autonomous recognition and operation of underwater vehicles. This technology can achieve good autonomous recognition and operation capability under the normal operation conditions of underwater vehicles.

The project team plans to use the self-developed autonomous identification technology of underwater robots and the cooperative operation technology of underwater robots, fully combine various underwater waterproof technologies, underwater robot anti shake stabilization technology, unmanned remote diving system, simulation technology and intelligent control technology, and integrate all kinds of technologies to act on the autonomous identification and operation of underwater robots optimized by the team. At the same time, the team will maintain its scientific research investment in robots, constantly update relevant technologies, and maintain its technical advantages, so as

to constantly update and maintain its core competitiveness.

In recent years, the concept of marine ranching has gradually come into being, while the price of the existing autonomous grabbing robot products in the market remains high. The user groups of its products are mainly large enterprises in the aquaculture industry, while most of the small and medium-sized enterprises and individual businesses still maintain the fishing mode of manual fishing, which also corresponds to high labor costs.

Compared with the market, the price of autonomous recognition and operation robots designed by our team is significantly lower than the average price of autonomous grasping robots in the market; Moreover, the autonomous identification and operation robots are highly functional and inexpensive, mainly for small and medium-sized enterprises in aquaculture industry. Considering the huge scale of China's fishery and the abundance of small and medium-sized aquaculture enterprises, autonomous identification and operation robots have broad market space and good application prospects.

Team members have published two papers based on underwater vehicle identification and control, and one patent is being submitted; In the next step, it is expected to further optimize the overall scheme of the underwater robot prototype, apply for invention patents, promote the application of the self-developed underwater robot, and help to improve economic benefits.

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电子墓地——留下你的故事

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Summary. *Everyone faces death. We all need to choose a way to end our lives. This article introduces an electronic graveyard to bury ourselves.*

墓地是埋葬或埋葬死者遗体的地方。每个人都面临死亡。我们都需要选择一种方式来结束我们的生命。本文介绍一个埋葬自己的电子墓地。

中国是一个以汉族为主体的多民族国家，由于各民族所居地理环境、宗教信仰、传统文化等各不相同，从而使丧葬在形式上表现为多样性。其中，土葬和火葬是比较普遍的形式，除此之外，还有水葬、树葬、天葬等形式。在中国，土葬已被火葬逐步取代。国家划定范围作为火葬区，禁止土葬。禁止土葬的主要原因是因为土葬浪费土地资源。火葬虽然更加环保但是也会占用土地。在如今的时代，或许我们可以选择一个更好的方式来埋葬自己。

电子墓地在我的想法中是一个网站。这个网站会有下面几点功能。

第一，进行注册。注册时使用国家提供的唯一标识进行注册。这样保证注册账号具有唯一性。

第二，书写自己的故事。学习历史，没有人会去了解一个普通人的生活。我们了解历史时也是了解主要人物。学习主要事件。好像没人在意一个普通人的一生如何。网站提供了书写自己故事的功能。将自己一生如同书写日记一样保存在这里。同时也可以将自己的一些照片，作品等保存在这里一同保留。发布的时间自己设定。或者死后多少年由系统发布。让我们每一个人原因分享自己故事的人等待一个读自己故事的人。

第三，了解他人的故事。在这里，我们不再是只了解一个个的名人。不再是走过一座座的墓碑。而是真正与一个个逝去的人进行对话。了解他愿意分享的一些。或许我们可以在这里找到所有一切的答案。数据也可以通过分析让我们看到一个个时代的面貌。历史不再是由成功者书写。而是由每一个人用自己的一砖一瓦搭建一个真正的历史高楼。