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Supporting Career Guidance and Vocational Training in Fishery and Maritime Professions with Virtual Reality

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Abstract. This demo paper presents VR4VET Blue Sector, a virtual reality application for exploring workplaces and professions within the blue economy sectors, focusing on fishery and aquaculture, fish processing and other maritime professions. The application is a part of a bigger project VR4VET. The goal of the project is to inspire and empower young Europeans seeking employment, guiding them in discovering various work environments, professions, and career paths and providing a risk-free environment for job exploration. We explore how the app can be integrated into the current counseling practices to allow the users to train for real-life situations, gaining confidence, sense of mastery and skills in their journey towards education or employment.

Keywords: Virtual Reality, Open-source, Vocational Training, Career Guidance, Fishery, Maritime Professions.

1 Introduction: VR4VET Project and Software Infrastructure

Our previous research on the use of Virtual Reality (VR) in career guidance for young job seekers showed significant support among job seekers and welfare professionals for utilizing VR applications to provide an immersive experience of different workplaces [1, 2]. We introduced the 'Immersive Job Taste' concept – an interactive VR showcase or 'taste' of a typical workday in a specific profession, including elements of training [1,2]. This research has been done in the framework of the Virtual Internship project [3] funded by the Norwegian Labour and Welfare Administration. The Virtual Internship resulted in more than 12 prototypes of VR apps or 'immersive job tastes', including aquaculture and fish factory worker, electrician at a windmill, car mechanic, carpenter, tinsmith, warehouse worker, pharmacy technician, drone operator and many other. In our current Virtual Reality for Vocational Education and Training – VR4VET project, we further develop the 'Immersive job taste methodology' and our software framework.

VR4VET software infrastructure consists of two main components: core functionality and workplace-specific applications. The software is developed using the Unity engine [4] and the VR Interaction Framework [5].

The core elements of the software are developed as a separate entity, encompassing all components required across various workplace-specific applications, to enhance the reusability of these fundamental assets and minimize the need for extensive maintenance. The core functionality is available under an open-source license, making the creation of new workplace-centric applications easier and more cost-effective. The core of the system is a Unity project, which includes a standard template scene (featuring a generic virtual workspace) and a collection of prefabs, that can be duplicated.

The prefabricated assets [6] are released and integrated into the different workplace apps as packages. This approach ensures standardization in several key aspects. Elements such as the user interface, user interaction, and navigation within the VR environment are consistent across different virtual workplaces. The information provided to the user about the workplace environment, the tasks involved, and the skills required follows a uniform format. In addition, we incorporate certain standardized gaming elements, such as feedback and progression systems. A complex prefabricated asset non-player character has also been developed as a standardized solution for representing co-workers, supervisors, or career counselors. These assets have been developed in 2023 but are also continuously improved.

An international team of the VR4VET project uses the core infrastructure to develop workplace-specific application for three major industrial sectors in collaboration with industry and vocational training partners: blue economy in Norway, construction in Germany and cloud engineering in Netherlands. We will here focus on the VR4VET Blue Sector app representing blue economy sector.

2 VR4VET Blue Sector app

VR4VET Blue Sector is a VR app for exploring workplaces and professions within the blue economy sectors, i.e. fishery and aquaculture, fish processing, seaport infrastructure, shipyard and other maritime professions that are traditionally of high importance in Norway [7]. The app is free to use and available at the Meta's App Lab Store through an open Beta [8].

The tasks in the current version of VR4VET Blue Sector app focus on aquaculture and fish health. The first part of the app contains a typical scene with a fjord, fish cages and a fish feeding control station (Fig. 1), modelled after existing aquaculture companies in Frøya region (Norway). The user can learn about typical workplaces and tasks in the aquaculture industry, for example, inspecting the fish cages and operating fish feeding machines. The user can play a game that poses a realistic challenge of observing fish behavior via underwater cameras in three cages and adjusting the feeding intensity correspondingly. The fish behaves realistically to represent the main principles of the workplace task. If the fish is not getting enough food, they will not thrive and grow enough, while overfeeding leads to wasting food and money (Fig. 1). At the same time, the number of fish in the VR cage is much smaller than in reality to keep the performance at an acceptable level, and the changes in fish appetite in VR happen much more frequently to keep the user engaged.

Fig. 1. VR4VET Blue Sector app: Simulated fish feeding control station.

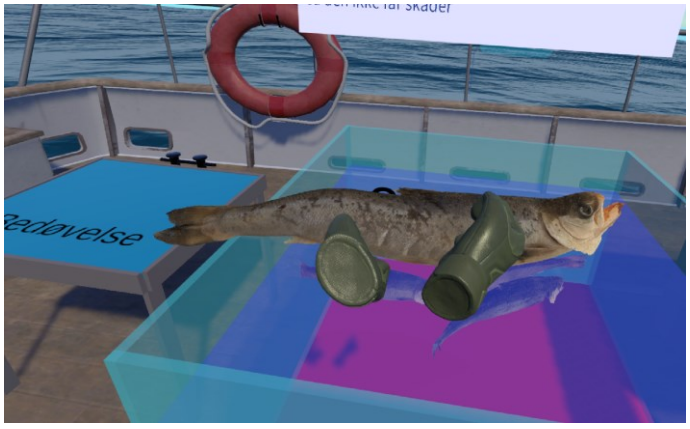

Fig. 2. VR4VET Blue Sector app: Fish welfare and health examination [9].

The second part of the app focuses on tasks related to fish health inspection on a fish farm, including not only the procedural aspects of the job but also ethical ones, such as caring for the fish and treating it as respectfully as possible [9]. The inspection tasks take place on a boat where fish to be inspected needs first to be anaesthetized so that it does not feel any pain during the procedure. Prior to the examination, the user needs to prepare anesthetic solution in a tank according to a specified formula, place the fish there and wait until the fish is fully anesthetized (Fig. 2). Then, the user might proceed with the examination itself, take the fish out, counting salmon lice on the

fish, looking for gill sickness, while handling the fish carefully. The results of the examination (the number of lice found and status of the gills on a scale from 1 to 5) are submitted though designated input panels. The user will then get feedback on the correctness of the answer and on whether the fish is handled in accordance with the guidelines [9].

The app has been through preliminary rounds of evaluations with aquaculture professionals and students, career counselors and job seekers. The detailed presentation of the results is outside the scope of this short paper and will be systemized and published later. Most of the testers agreed that the app provides an engaging and informative 'sneak peek' into the aquaculture profession. Feedback from the professionals on the realism of some of the aspects of the app, as well as identified usability issues informed subsequent revisions and improvements. At the same time there is a need for balancing the realism of the VR experience, simplicity of use, and technological limitations. Inputs from the young job seekers and career counselors motivated the exploration of ways to increase motivation and sense of mastery by providing continuous feedback. Currently, there are several new tasks and modules of the app under development, primarily resulting from student projects: a fish processing facility; examination of fish cages with extra focus on formative feedback to users; industrial painter (relevant for shipyard activities). Some of these modules will be included in the subsequent versions of the VR4VET Blue Sector app. We are also continuously working on the VR4VET methodology and software infrastructure, as well as on integrating generative artificial intelligence solutions to serve as career counselors and vocational trainers in VR4VET workplaces.

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