AI SOFTWARE FOR MOBILE ROBOT

Fifth work package is the development of software and AI algorithms for Mobile Mobile Robot, which has the capabilities of smart object detection, face recognition, smart mapping, social navigation, smart voice dialogue, VR/MR based human-robot interaction, gesture recognition and predictive maintenance.

Within the scope of this work package:
- Anomaly Detection and Predictive Maintenance system was built to report potential malfunctions of the robots up to 150 days in advance.
- Context-based SLAM, Social Navigation, Frame-based Dialogue systems were integrated.

SYSTEM INTEGRATION, TEST, VALIDATION AND DEMONSTRATION

In the sixth work package, all the software and hardware components were integrated, system integration tests were conducted.

Within the scope of this work package:
- The integration of Cobot Arm with the Mobile Robot was ensured through the Cloud.
- Test Plan & Test Result Documents were prepared.

AI SOFTWARE FOR COBOT ARM

In the seventh work package, we obtain a technology for robotic manipulator and mobile robot control which is based on the human motion imitation. The conventional manipulator control requires many hand-crafted coding algorithms, but the imitation learning simplifies the generation of manipulator motion. This work package aims to enhance robots' autonomous learning capabilities under human supervision with successful grasp examples.

Within the scope of this work package
- Inverse Reinforcement Learning and Trajectory Learning algorithms analyse human movements to develop robot motion strategies.
- Using Gazebo simulation and VR/MR frameworks, robots perform patient sample handling tasks in a cloud-based system.
- Gesture recognition technologies optimise robot motions and improve user interfaces using human data.
- Voice recognition functionality supported by MR SDK was integrated into the project.

www.robonimbus.com

LinkedIn

Robo Nimbus

Smart Platform for Robot Management and Coordination with AI powered Cloud

PROJECT NAME
RoboNimbus (Smart Platform for Robot Management and Coordination with AI powered Cloud)

PROJECT DURATION
01.01.2021 – 01.07.2024

PARTNERS
BYSGRUP, GES, KIRO, POLONOM, SAMARATUG

NATIONAL CONTACT POINTS (NCPS)
KIAT (Korea Institute for Advancement of Technology), TÜBİTAK (Türkiye Bilimsel ve Teknolojik Araştırma Kurumu)

INTERNATIONAL PROGRAMME
ITEA (Information Technology for European Advancement)

PROJECT PURPOSE
RoboNimbus project envisions an AI-powered, cloud-based, all-in-one robot management platform that will allow the user to manage the robots via web and mobile applications. RoboNimbus will leverage state-of-the-art technologies including IoT, Cloud Computing, Virtual Reality, Augmented Reality and Predictive Maintenance to create a truly futuristic robot management platform.

PROJECT WORK PACKAGES

PROJECT MANAGEMENT AND COORDINATION, IPR

In the first work package of the project, we created an administrative, technical and financial framework within which the project team will operate throughout the project.

Within the scope of this work package
- Project Collaboration Agreement (PCA) was signed among the partners.
- Interim reports were prepared and submitted every 6 months both to ITEA and to the NCP.
- Bi-weekly meetings and ad-hoc meetings upon need were conducted with the participation of all partners.
- National and International Review Meetings were held.
- Project Management Plan, Gender Balance Report, Data Management Plan were prepared.

USE CASES AND REQUIREMENTS MANAGEMENT

The second work package aims to establish all the use cases and user requirements according to which the Robonimbus Platform will be designed and built.

Within the scope of this work package
- SRS Document, including the Interface Design and Use Cases, was prepared.
- Mock-up screens of the Cloud Management System were designed.

EXPLOITATION AND DISSEMINATION

The third work package is comprised of all the business-related activities of the end product. Throughout this work package, the Exploitation Plan and Dissemination & Communication Plan was created.

Within the scope of this work package
- A website for Robonimbus was developed. (https://www.robonimbus.com/)
- A LinkedIn page was launched. (https://www.linkedin.com/showcase/robonimbus/)
- Project brochure was prepared .
- Dissemination and Exploitation Plan was prepared
- RoboNimbus Project Manager Dr. O. Tolga KASKATI participated in the "Research Collaboration Workshop" in the fields of AI and Digitization held at the University of San Agustin in Iloilo City, Philippines on June 2, 2023 and presented the RoboNimbus project and the main features of the product developed.
- Polonom Teknoloji attended "The International Strategic Communication Summit" (Stratcom Summit) organized by the Presidential Directorate of Communications of Turkey on 24-25 November 2023. During the summit, the capabilities of the mobile robot were presented and demos were staged.
- Project Manager Dr. O. Tolga KASKATI attended the 1st Turkiye Artificial Intelligence Forum held on 19-20 April 2024 and talked about the Robonimbus project in his speech.

ROBONIMBUS CLOUD MANAGEMENT AND AI PLATFORM DEVELOPMENT

In the fourth work package, cloud architecture was defined and implemented, and AI platform was developed. This process include procurement of some hardware, which were not covered by project funding, and development of all the software components such as multi-tenant backend application, web applications, mobile applications etc.

Within the scope of this work package
- Cloud Management and AI Platform was developed both in Web and Mobile Application.
- Kubernetes Structure was built so that the services are automatically scaled and the resulting load is met even if the user load increases.
- Multi-tenancy structure was built so that multiple users could define their own robots and assign tasks to robots simultaneously.
- A task assignment line has been prepared where different types of tasks can be assigned to robots with different capabilities. When assigning tasks to robots, factors such as the location of the robots and their distance to the task points are taken into account, and the tasks are assigned in a way that will cause the least cost. The line always knows when the robots are available and when they are not.
- A communication layer has been developed between the mobile application and web services.
- User-related functions such as user login, user logout, user creation, user update and user deletion were developed for mobile and web.
- Task/command management functions were developed for mobile and web.
- New robots were defined to the system with robot abilities.