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RUSE

The Ruse Branch of the Union of Scientists in Bulgaria was founded in 1956. Its first Chairman was Prof. Stoyan Petrov. He was followed by Prof. Trifon Georgiev, Prof. Kolyo Vasilev, Prof. Georgi Popov, Prof. Mityo Kanev, Assoc. Prof. Boris Borisov, Prof. Emil Marinov, Prof. Hristo Beloev. The individual members number nearly 300 recognized scientists from Ruse, organized in 13 scientific sections. There are several collective members too – organizations and companies from Ruse, known for their success in the field of science and higher education, or their applied research activities. The activities of the Union of Scientists – Ruse are numerous: scientific, educational and other humanitarian events directly related to hot issues in the development of Ruse region, including its infrastructure, environment, history and future development; commitment to the development of the scientific organizations in Ruse, the professional development and growth of the scientists and the protection of their individual rights.

The Union of Scientists – Ruse (US – Ruse) organizes publishing of scientific and popular informative literature, and since 1998 – the "Proceedings of the Union of Scientists- Ruse".

BOOK 5

"MATHEMATICS, INFORMATICS AND PHYSICS"

VOLUME 9

CONTENTS

GLOBAL REPOSITORY FOR SEQUENCES
OF ROBOTS INSTRUCTIONS

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Abstract: *This paper presents a global repository for sequences of robots instructions which stores all possible sequences of operations performed by robots. Such a repository would help in the process of standardizing the various sequences of operations performed by robots and will lay down the foundations on a platform on which to develop robotics as a whole.*
Keywords: *robot, instructions, repository, sequence*

INTRODUCTION

The development of robotics in the last 50 years has led to the fact that almost every part of everything produced by humans is due to robots. The large number of manufactures and various types of robots led to these actions and technologies for production of different parts and materials are not yet standardized (in terms of humanity as a whole). The development of robotics and the globalization of the world require organization, standardization and storage of all possible operations that robots could perform. The emergence of such a repository for instruction sequences would provide the necessary basis on which to begin building robots using predefined and stored instructions. The sequences of instructions are a description of actions that the robot must perform in order to achieve or fulfill a specific objective. Thus in the repository are stored sequences for activities such as:

• construction of various objects such as bolts, nuts, springs, microchips, computers, cars;

• actions to carry out various operations such as moving, loading and unloading;

• others.

Thus if the robot is located on the assembly line for making holes in wooden details, the sequence of operations for drilling, which the robot would read from the repository, will be:

1. Move drill with 10 cm on the left;
2. Move drill down with 2 cm (drilling a hole depth of 2 cm);
3. Return to starting position.

Depending on the structure of the robot instructions could be more detailed and could include specific instructions for each of its moving parts.

GLOBAL REPOSITORY FOR SEQUENCES OF ROBOTS INSTRUCTIONS

Such a repository would allow easy change of use of robots and would make them multifunctional, as in need of performing an action each robot could connect to the repository and request the necessary sequence of actions to perform an operation. This means that a robot could carry out any activities as long as it has the necessary equipment.

An example of communication between the storage of instructions and different types of robots is shown in Figure 1. It shows robots that extract sequences of instructions from the repository over the Internet. From programming point of view the realization of the repository for the sequences of instructions is a web server.

The actual storage of the sequences of instructions must be done in an appropriate form to be most convenient to be used by the robots. Therefore process modeling

languages are being used. Currently, they provide a convenient way to store the sequence of instructions needed by the robots.

Once stored in the repository, the instructions can be accessed and used by each robot all over the world. Obtaining a particular sequence of instructions is being made over the HTTP protocol. It was chosen because it is one of the most commonly used and also is quite simple. If necessary, the robot sends a request to the storage saying which set of instructions is seeking and storage sends it back. When receives it, the robot reads the instructions and may begin to implement them. Extraction of a sequence of instructions is illustrated in Figure 2.
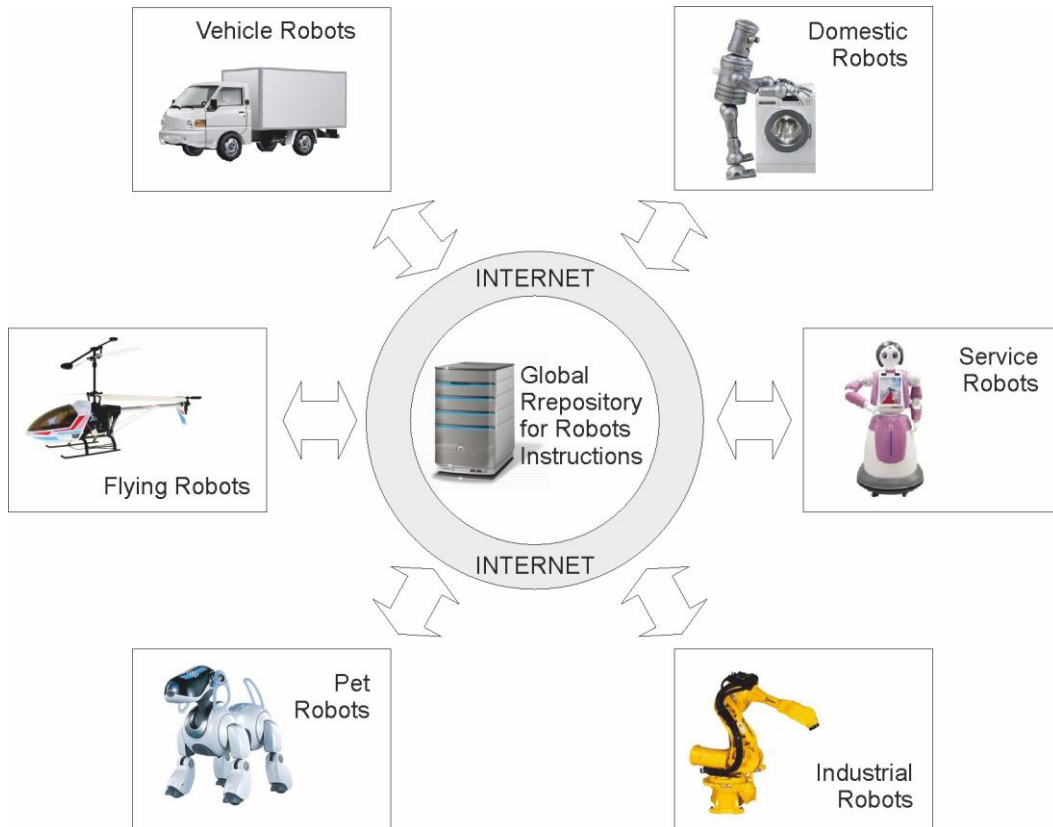

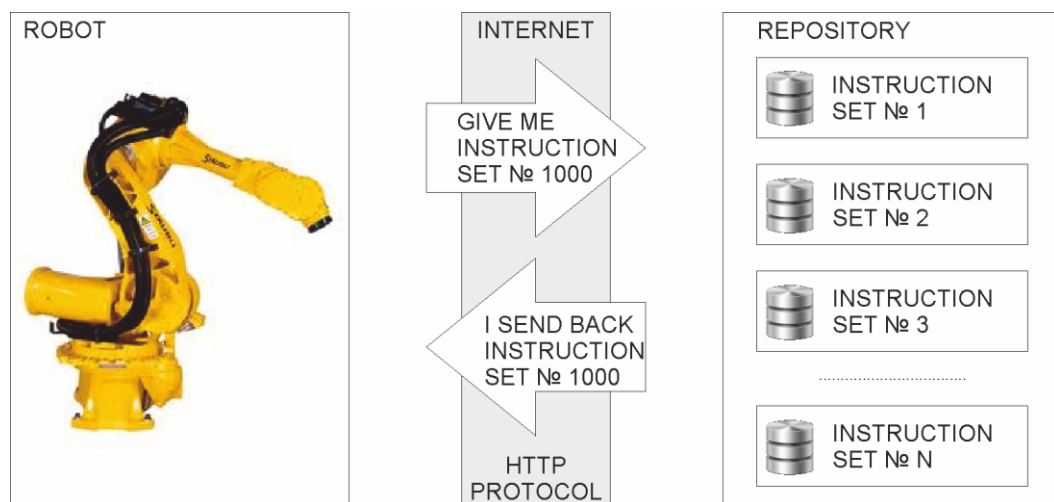**Figure 1.** Interaction between different types of robots and repository for instructions

Figure 2. Obtaining the sequence of instructions from the repository

It is appropriate the sequence of instructions stored in the repository to be categorized. Thus, if there are a need of human intervention, the administrator of a robot can quickly orient, understand and review the available sequences of operations in the repository and if necessary to correct particular sequence or to choose another one.

Adding a new set of instructions to the storage entirely depends on the robot's manufacturers. It is analogous to the creation of drivers. When a manufacturer develop and produce a new robot he should describe in appropriate language and in appropriate form the sequence of actions or sequences of actions that can be performed by the robot and send them to the repository. Thus, each customer purchasing the robot will be able to take advantage of data stored in the repository.

This way of adding data to the repository suggests that certain people or organizations will have some privileges over others. Therefore the storage is organized so as to provide different levels of access (some users can only read the sequence of operations while others will be able to compile and add new sequences).

CONCLUSION
A global repository is proposed. Its purpose is to bring together all possible sequences of robots instructions. Such a repository would allow easy change of use of robots and would make them multifunctional, as in need of performing an action each robot could connect to the repository and request the necessary sequence of actions to perform an operation. This means that a robot could carry out any activities as long as it has the necessary equipment.

Such a repository would also help in the process of standardizing the various sequences of operations performed by robots and will lay down the foundations on a platform on which to develop robotics as a whole.

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ГЛОБАЛНО ХРАНИЛИЩЕ ЗА СЪХРАНЕНИЕ НА ПОСЛЕДОВАТЕЛНОСТИ ОТ ИНСТРУКЦИИ ЗА РОБОТИ

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Резюме: Статията представя глобално хранилище за съхранение на всички възможни последователности от действия, извършвани от роботи. Такова хранилище би подпомогнало процеса на стандартизация на различните последователности от операции, извършвани от роботи и ще постави основите за платформа, върху която да се развива роботиката като цяло.
Ключови думи: *робот, инструкция, хранилище, последователност*