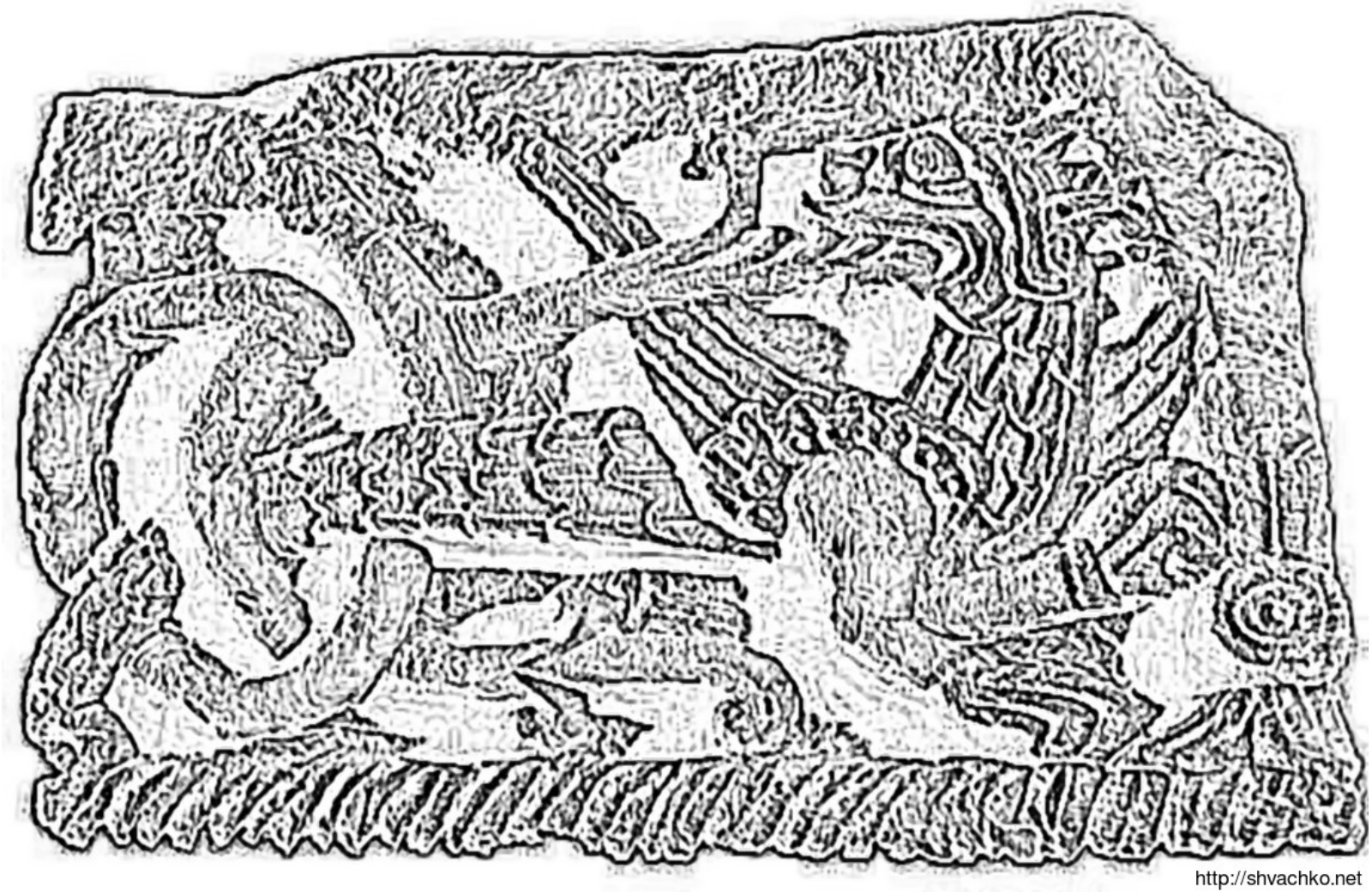
Information Assistant Robot «Semargl»



1. Project overview

1.1. Purpose

Device is the hardware and software complex for performing a wide range of operations related to identifying, searching, accumulating, processing, interpreting, displaying and transmitting of data, efficient use of resources and communication in the modern digital space.

The design is based on the latest advances in information and communications technologies, in particular, computer vision and natural language processing.

System belongs to the «Personal robot» type, is a versatile, scalable, easy to use, compact and inexpensive device.

1.2. Prototypes

The apparatus has similar functions to fictional characters R2-D2 and C-3PO in the «Star Wars» franchise or HAL 9000 in film «2001: A Space Odyssey».

All these characters were inducted into the Robot Hall of Fame (was established by Carnegie Mellon University) that recognizes excellence in robotics technology worldwide and honors the fictional and real robots that have inspired and made breakthrough accomplishments in robotics.

2. Field of activity

2.1. Social relations

This device can perform the functions of the intelligent personal assistant for wide range of tasks or services based on commands or questions.

It is able to accumulate and interpret the video information, human speech and respond via synthesized voices.

Also this robot offers proper answers to the challenges that unfamiliar with information and communications technologies people (as well as the elderly, persons with visual or hearing impairments, etc.) face.

2.2. Industry

Created assistant robot can be used to build various devices, automated and automatic systems, in particular, specialized adaptive and intelligent robots (for example, the service robots) in the future.

2.3. Information Technology

The hardware and software of this robot can be a base (template) for making the wide range of systems purposed for processing of the multimedia data.

The robot can be used directly for creation of the multimedia content for any software.

Also the formed basic software and hardware of the complex can be used separately to create automated workstations for specialists of various fields, research devices or home multimedia centers.

2.4. Broadcasting

The robot can sound or show any static or dynamical information.

The complex can be used for creation the virtual guides, interactive stands, information messages, etc.

2.5. Education

The robot can be used for creation the educational audio and video, lectures, interactive multimedia courses, etc.

Also this robot can produce an effect of telepresence for conduct of seminars or conferences.

2.6. Medicine

The robot can provide videoconferencing between a doctor and a patient.

The ability to connect existing medical equipment will allow to monitor the condition of the ill or isolated person.

Remote control of the robot (in particular by using the voice commands) prevents the risk of a medical stuff and others contracting the virus.

Also this robot can be used for building the expert systems with voice interface.

2.7. Publishing

The robot can sound a content of web-sites, books and articles.

Also it is suitable for making the streaming media, podcasts or videos at social networks.

2.8. Entrepreneurship

This robot can be used for creation the virtual consultants, call centers, video surveillance equipment, notification systems, etc.

It can be a part of the tools and equipment for conduct the business (for example, specialized control systems, time management, measuring instruments).

The thematic multimedia advertising materials can be generated with help of this robot.

Also entrepreneurs can use the existing toolkit of complex (in particular, a free office pack, tools for Internet banking and the online government services, including a platform for the cash register) to perform their daily office tasks.

3. Market Review

3.1. Opportunities

The market of the personal using robots is growing rapidly. Sales of all types of robots for personal and domestic tasks are expected to reach 61.1 million units for $11.5 billion by 2022.

3.2. Competition

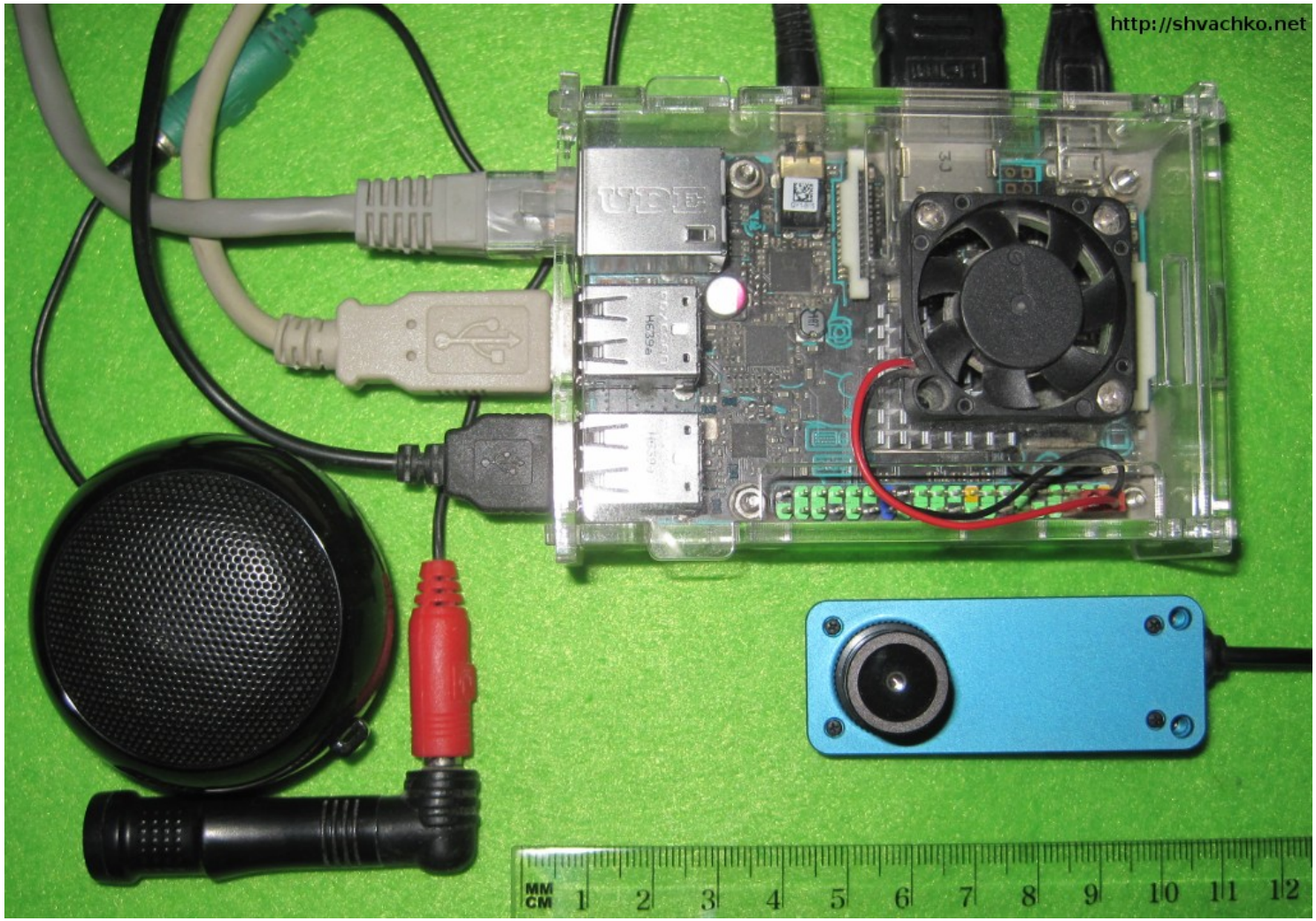
There is a wide range of projects which function as virtual assistants at the modern ICT market, among them should be noted Google Assistant, Envision Glasses, Amazon Alexa, Apple’s Siri, Huawei‘s Celia, Microsoft‘s Cortana, Medical robot developed by Chulalongkorn University, Yandex‘s Alice, Engineered Arts’ RoboThespian.

4. Project description

4.1. Form factor

The complex is built on the basis of a miniature single-board (credit card-sized) general-purpose computer and universal peripherals with using the open source software.

The product is being designed in desktop, wall-mounted and mobile versions, equipped with the corresponding types of enclosures, for work in office / household, industrial environment and outside.



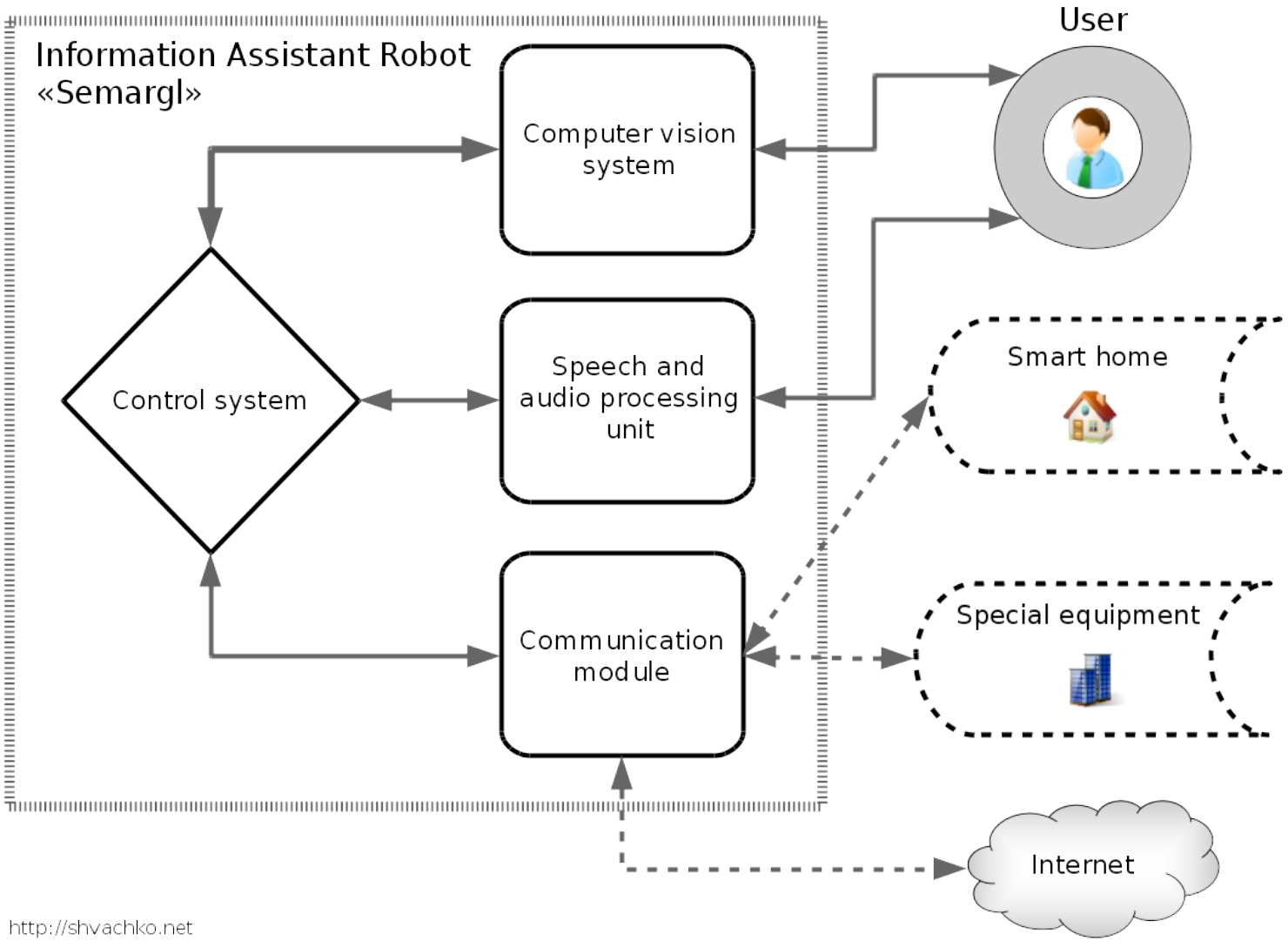
Prototype of the Information Assistant Robot «Semargl»
(Desktop version for work in an office / household environment).

4.2. Structure

The device is designed according to a modular principle, the developed software is cross-platform, its individual components or the complex as a whole can be transferred to the existing standard computer architectures.

Also all these components can be provided to user separately as the complete devices. The complex itself can be a part of another device as a control or an auxiliary system.

The information that is produced by device can be used as the final multimedia product.

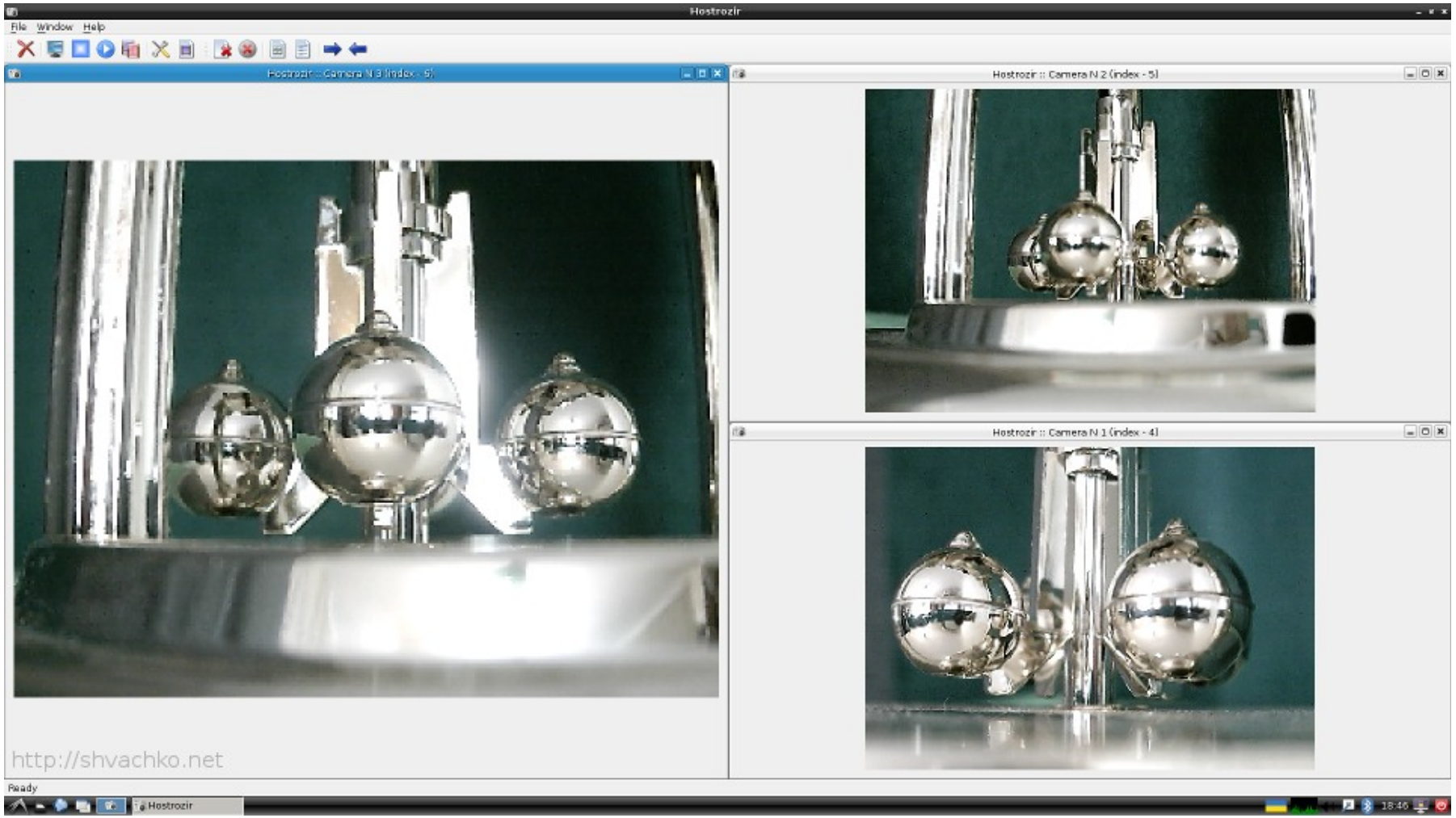


Functional scheme of the Information Assistant Robot «Semargl».

4.2.1. Computer vision system

The complex is equipped with the computer vision system «Hostrozir», which provides the simultaneous function of several video cameras that can operate with variable resolution and speed.

It also has the ability to process the corresponding video data in real time, store and transfer it via a wired or wireless network.

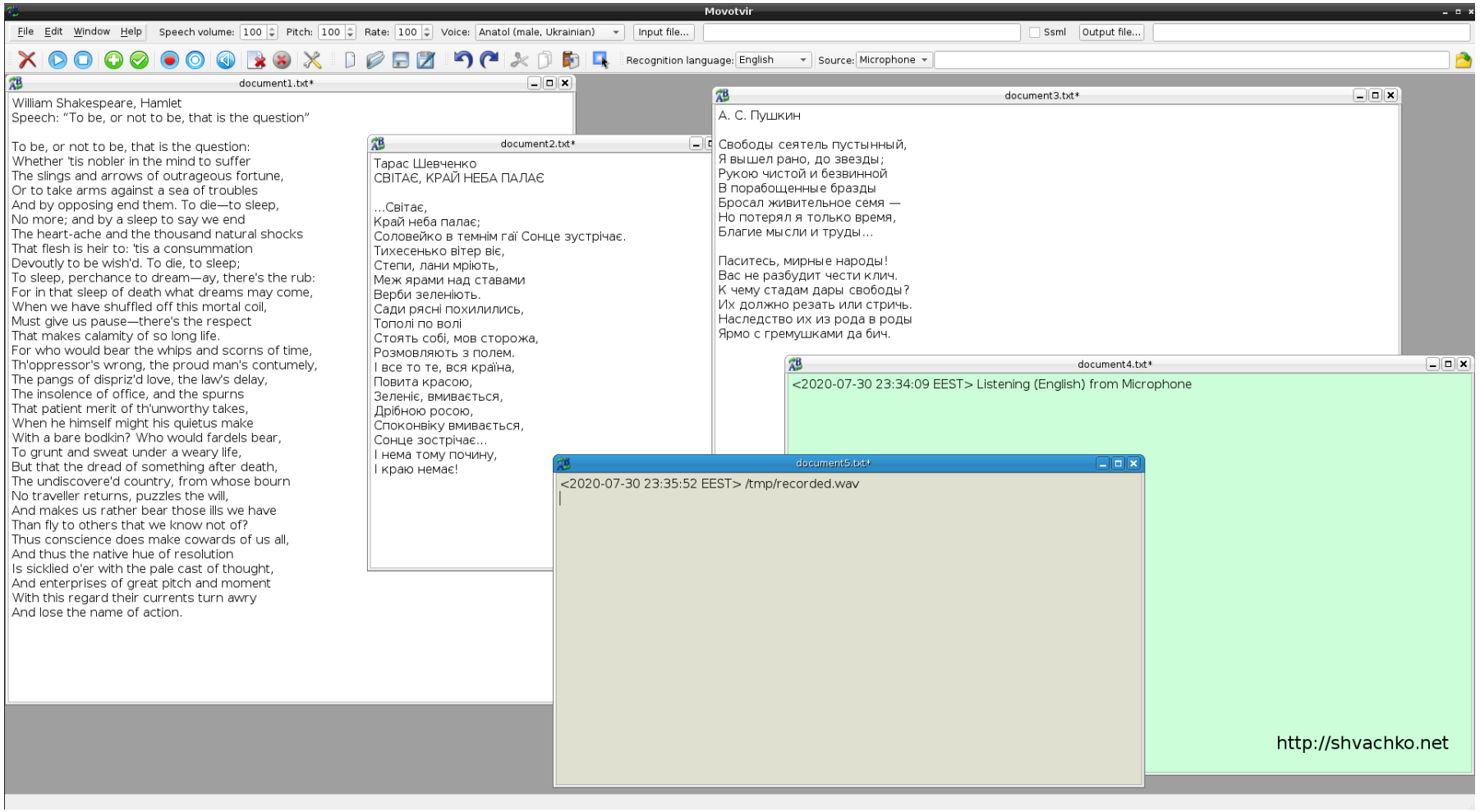


The screenshot of the computer vision system
for the Information Assistant Robot «Semargl».

4.2.2. Speech and audio processing unit

The product is equipped with the offline speech and audio processing system «Movotvir», which is capable of speech synthesis and recognition, as well as processing, reproducing, storing and transmitting the audio data in general.

Initially, the system works with English, Russian and Ukrainian languages and has the ability to add others, in particular Sign languages.



The screenshot of the speech and audio processing system for the Information Assistant Robot «Semargl».

4.2.3. Communication module

The complex contains the network controller «Svitokol», which includes a set of tools for processing network data, working with electronic messages, organizing the information exchange with specialized peripheral devices, including, for example, medical equipment.

4.2.4. Control system

The device has the scalable automatic control system «Prudkodum», which provides the work logic of the complex as a whole, processes and redirects the information flow, interacts with existing automated systems, industrial and research equipment or the smart home devices.

5. Sales

Marketing and sales will be organized according to the traditional scheme, targeting particular industry sectors, with a focus on the users, with an informational campaign on the Internet (including social networks).

Price of the device will depend on selected configuration and quality and/or quantity of the necessary equipment.

Special low prices will be set for the some groups of customers and the revenue target will be reached by involving big number of people from these groups. For example, there are more than 45 million blind people worldwide. More than 11 million pensioners live in Ukraine. The number of households in Ukraine is over 14 million. More than 220 thousand people are native speakers of Ukrainian Sign Language.

6. Development benefits

This project offers a lot of opportunities in terms of practical use, functionality, integration with existing software and hardware, accessibility, etc.

The proposed virtual assistant is an affordable, scalable, able to interact with the user in a convenient way.

It is a compact device that has a wide range of functionality, the common serial components, the software and hardware interfaces which allows to connect a variety of external equipment, the ability to configure and work according to specific needs of people.