



Европейски съюз

Проектът се осъществява с финансовата подкрепа на  
Оперативна Програма „Развитие на Човешките Ресурси” 2007 – 2013,  
Съфинансиран от Европейския Социален Фонд на Европейския Съюз



*Инвестира във вашето бъдеще!*

# ЛЯТНА ШКОЛА 2013

WINDOWS БАЗИРАН ПОТРЕБИТЕЛСКИ ИНТЕРФЕЙС ЗА  
УПРАВЛЕНИЕ НА СЕРВИЗНИ РОБОТИ

маг. **Владимир Владимиров**

ПОВИШАВАНЕ НА ЕФЕКТИВНОСТТА И КАЧЕСТВОТО НА ОБУЧЕНИЕ И  
НА НАУЧНИЯ ПОТЕНЦИАЛ В ОБЛАСТТА НА СИСТЕМНОТО  
ИНЖЕНЕРСТВО И РОБОТИКАТА

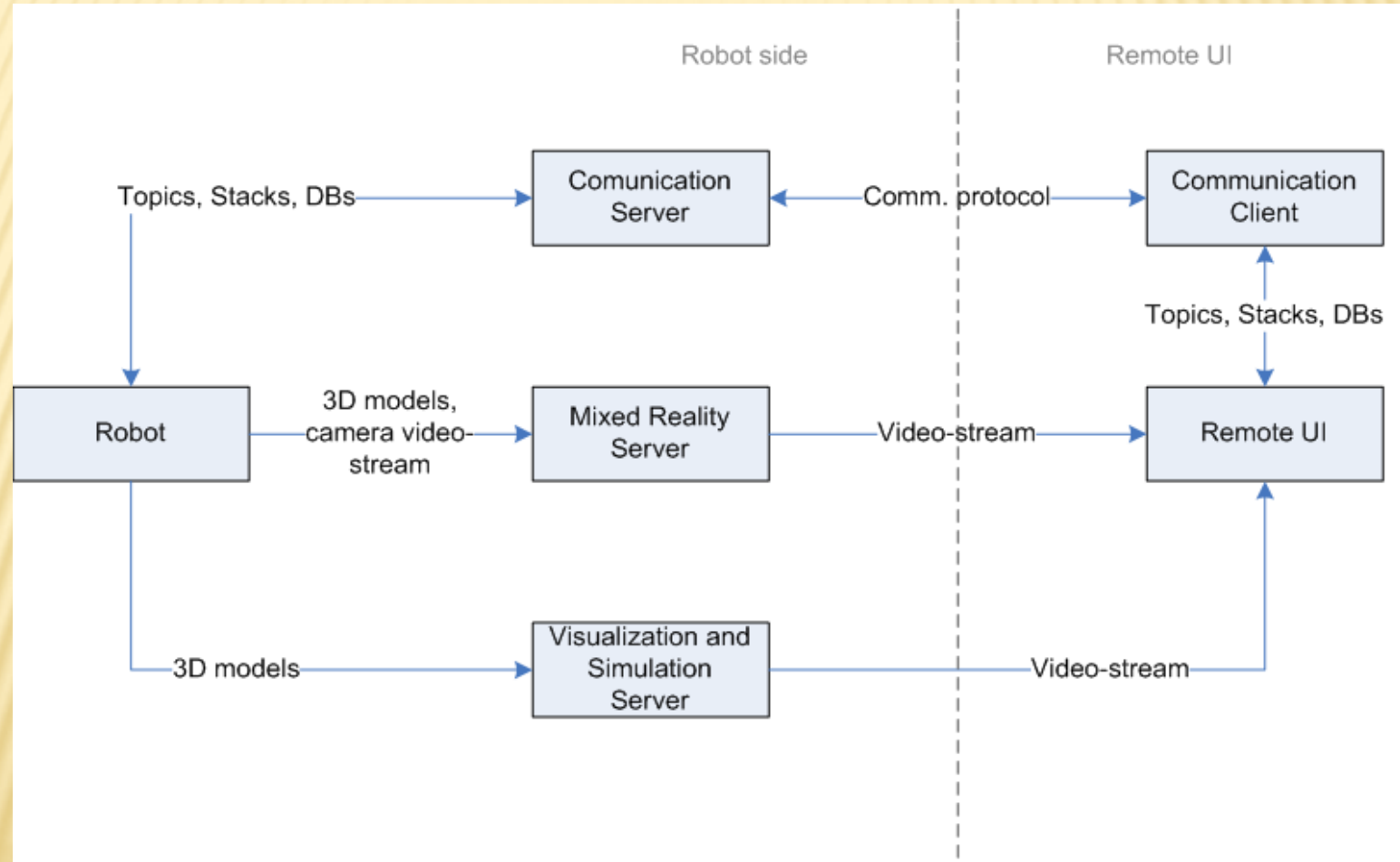
Проект № BG051PO001-3.3.06-0002



Българска Академия на Науките  
Институт по Системно Инженерство и Роботика



# REMOTE UI COMPONENTS



# COMMUNICATION SERVER

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- ❑ Description - Handles the bidirectional communication (non multimedia data) between the robot and the remote UI. Runs on robot side.
- ❑ Prerequisites - Exact format of knowledge database and full list of topics and stacks.
- ❑ Inputs - Robot state and database content – all ROS topics and stacks, knowledge database, learning, etc.
- ❑ Outputs - Communication protocol / Communication server.

# MIXED REALITY SERVER

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- ❑ Description - Visualize the mixed reality of the robot. Runs on the robot side.
- ❑ Prerequisites - Exact format of environmental 3D model and 3D library.
- ❑ Inputs - Video-stream from the robot camera, 3D model of the environment from the robot, 3D library.
- ❑ Outputs - Video-stream to the remote UI / Virtual reality server.

# VISUALIZATION AND SIMULATION SERVER

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- ❑ Description - Visualize and simulate the robot 3D model and environmental 3D model. Runs on the robot side.
- ❑ Prerequisites - All the inputs.
- ❑ Inputs - 3D model of the robot, 3D model of the environment, all ROS topics and stacks.
- ❑ Outputs - Video-stream to the remote UI / Visualization and simulation server.

# COMMUNICATION CLIENT

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- ❑ Description - Handles the bidirectional communication (non multimedia data) between the robot and the remote UI. Runs on the remote UI.
- ❑ Prerequisites - Exact format of communication protocol from the server.
- ❑ Inputs - Communication protocol from the server.
- ❑ Outputs - Communication protocol for the remote UI / Communication client.

# TECHNOLOGIES

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- ❑ Ubuntu with ROS as operating system.
- ❑ OpenCV and OpenGL for the implementation of augmented reality.
- ❑ Video and audio streaming – standard streaming implementation.
- ❑ Communication protocol for control data based on current ROS network functionality.
- ❑ Communication protocol for 3D point cloud data – custom implementation, supporting partial real-time update.

# AUGMENTED REALITY

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- ❑ OpenCV allows fast and advanced video stream processing.
- ❑ OpenGL allows visualizing the virtual 3D world with all the 3D objects in it.
- ❑ The combination of these two components provides the necessary tools for creating augmented reality interface.
- ❑ Support of 3D transformations of the environmental objects and camera position.



# REMOTE UI - CONTACTS VIEW

The screenshot displays a remote user interface for a contacts application. The window title is "UI\_PRI".

**Contacts Sidebar:**

- C
- Claudia Moreno
- E
- Elisabeth Baker
- M
- Martin Baker** (selected)

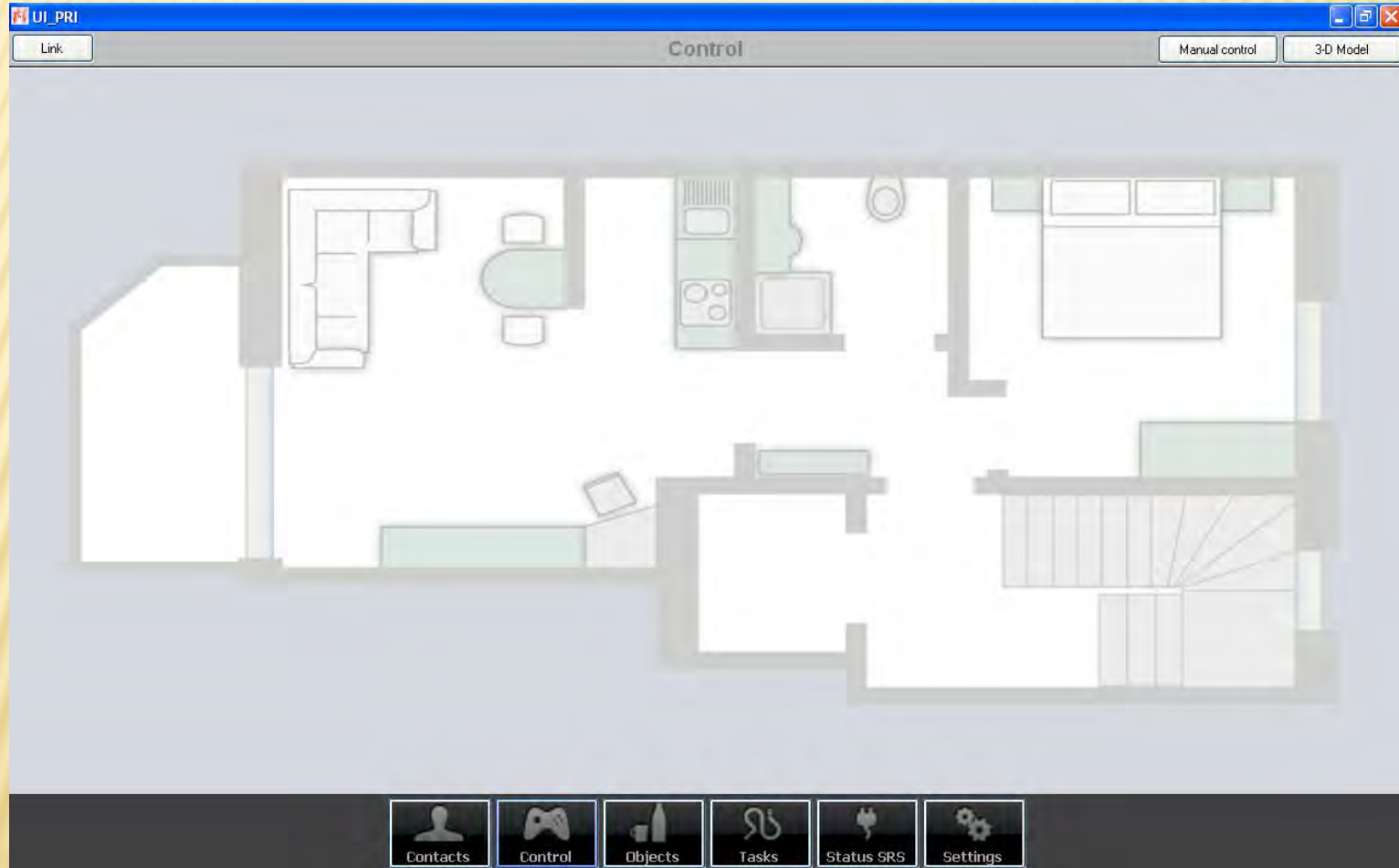
**Contact info Panel:**

- Martin Baker** (Name)
- Facetime** Video call (Action)
- Birthday** 10. August 1926 (Date)
- Address** Wolframstr. 32, 70191 Stuttgart, Deutschland (Location)

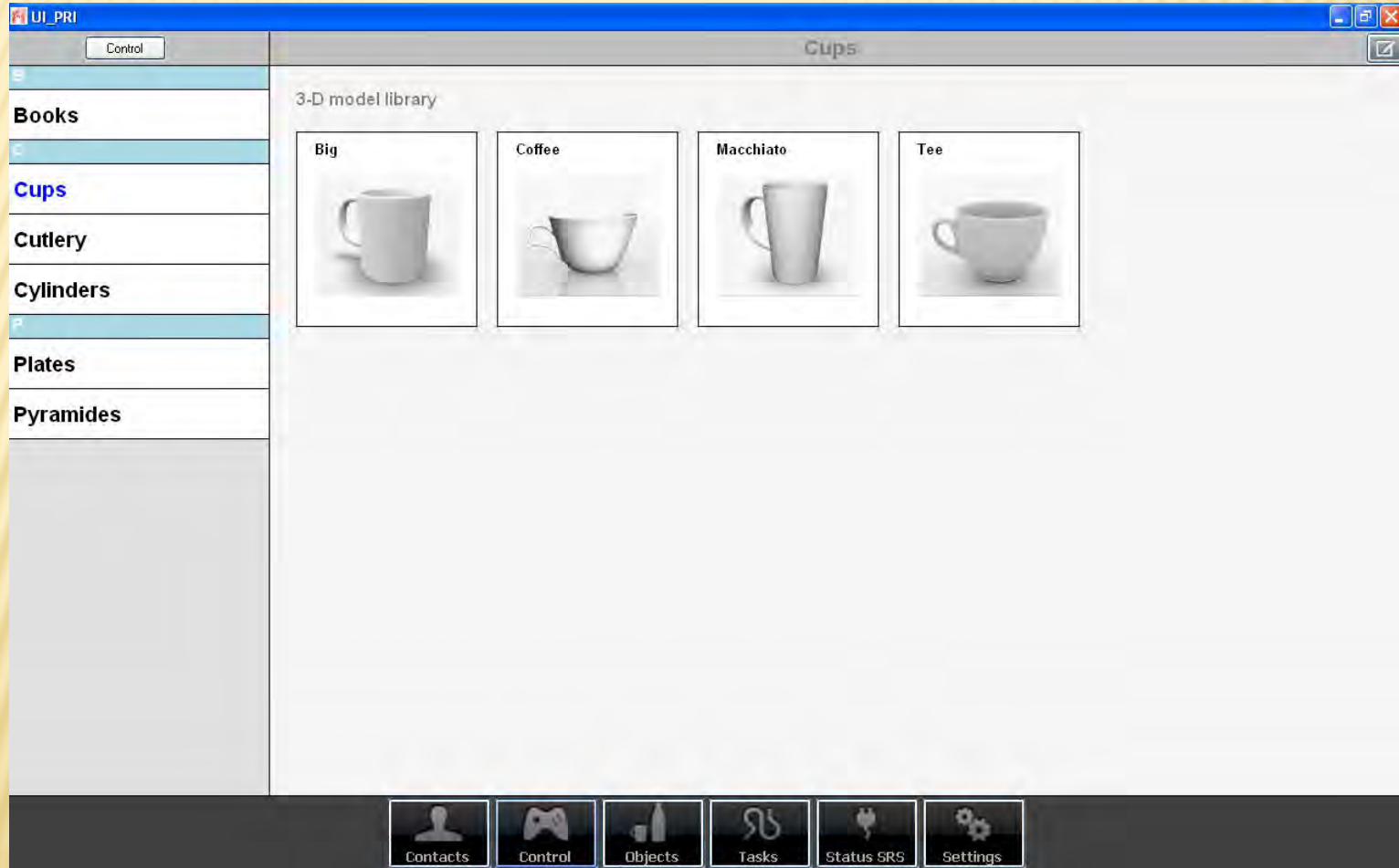
**Bottom Navigation Bar:**

- Contacts (Active)
- Control
- Objects
- Tasks
- Status SRS
- Settings

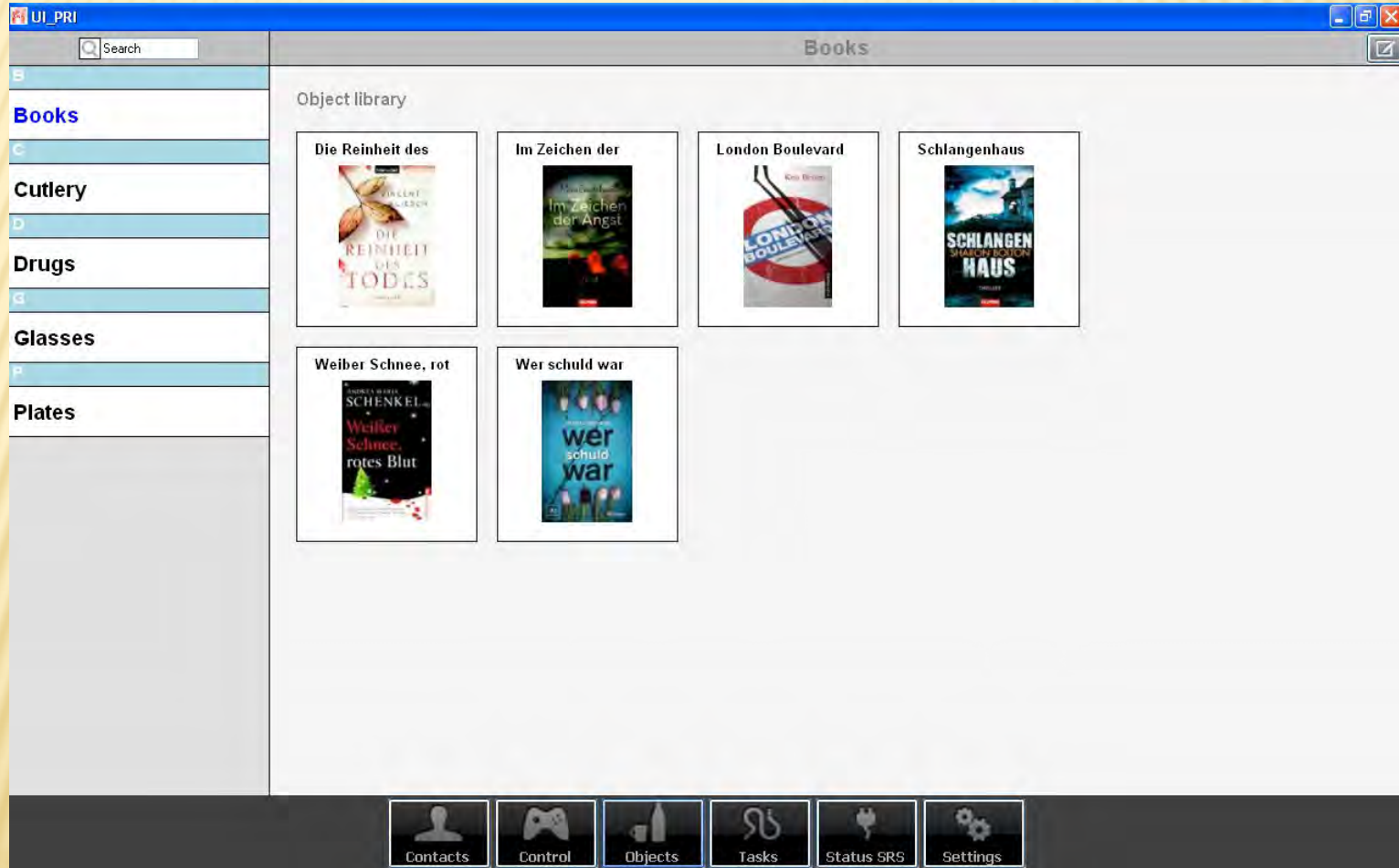
# REMOTE UI - NAVIGATION VIEW



# REMOTE UI - CONTROL MENU/3-D MODEL



# REMOTE UI - OBJECTS MENU/BOOKS



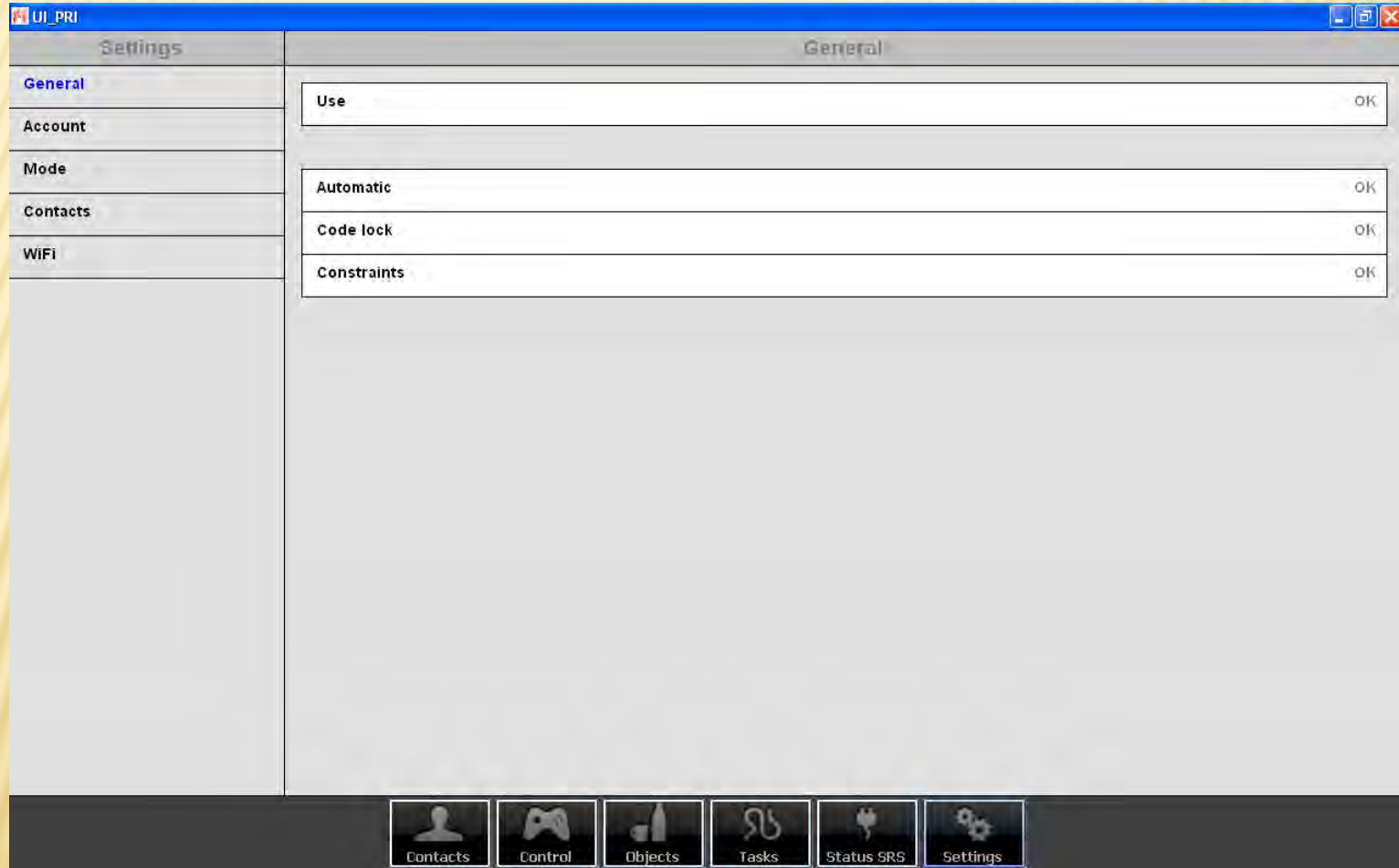
# REMOTE UI - STATUS VIEW

The screenshot displays a remote user interface (UI) for a robot, titled "UI\_PRI". The interface is organized into several sections:

- Status:** A vertical menu on the left side with the following items: General, Gripper (highlighted in blue), Power, Server, Network, Space, and Version.
- Functions:** The central area features a 3D rendering of a robot. The robot has blue arrow icons on its head, its right arm, and its base, indicating interactive points.
- Gripper:** A table on the right side provides status information for the gripper's joints:

Joint	Status
Joint 1	OK
Joint 2	OK
Joint 3	OK
- Bottom Navigation Bar:** A dark bar at the bottom contains six icons with labels: Contacts, Control, Objects, Tasks, Status GRS, and Settings.

# REMOTE UI - SETTINGS MENU



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THANK YOU!