

# TELE-ROBOTICS

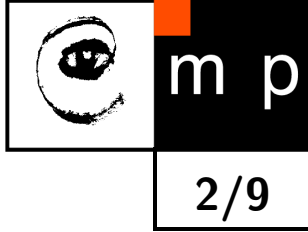
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# TASK IN TELE-ROBOTICS



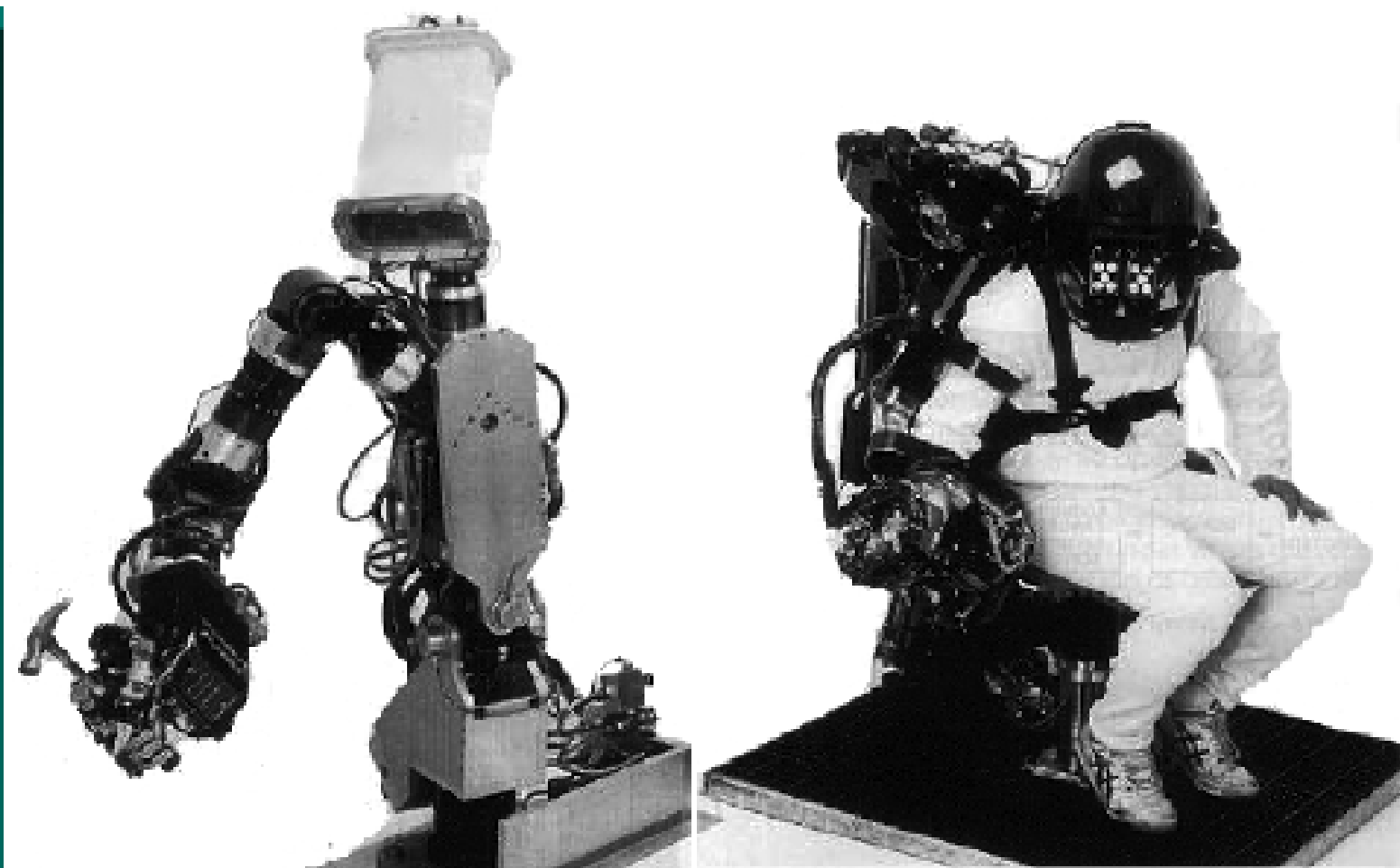
**Teleoperation:** To command locally a remote robot.

**Telepresence:** To feel locally as being and doing something at a remote place.

**Virtual Robotics:** Combination of teleoperation and telepresence, but the robot does not exist!

**ee-robot (webot):** Real robots on the web which available, e.g., on the internet, from everywhere.

# TELEOPERATION AND TELEPRESENCE (1)



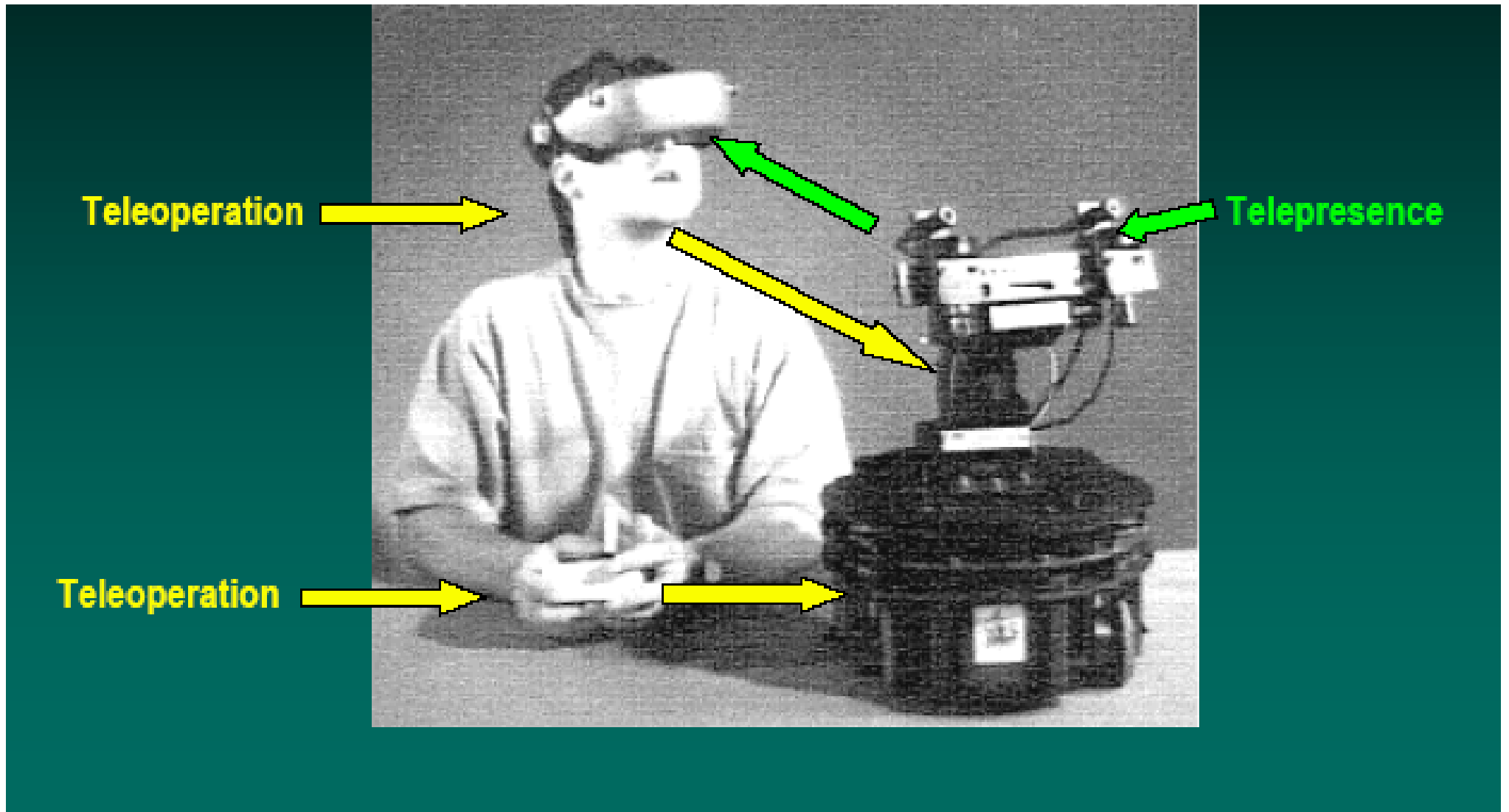
**Teleoperation:**

**actuators** ← **position sensors**

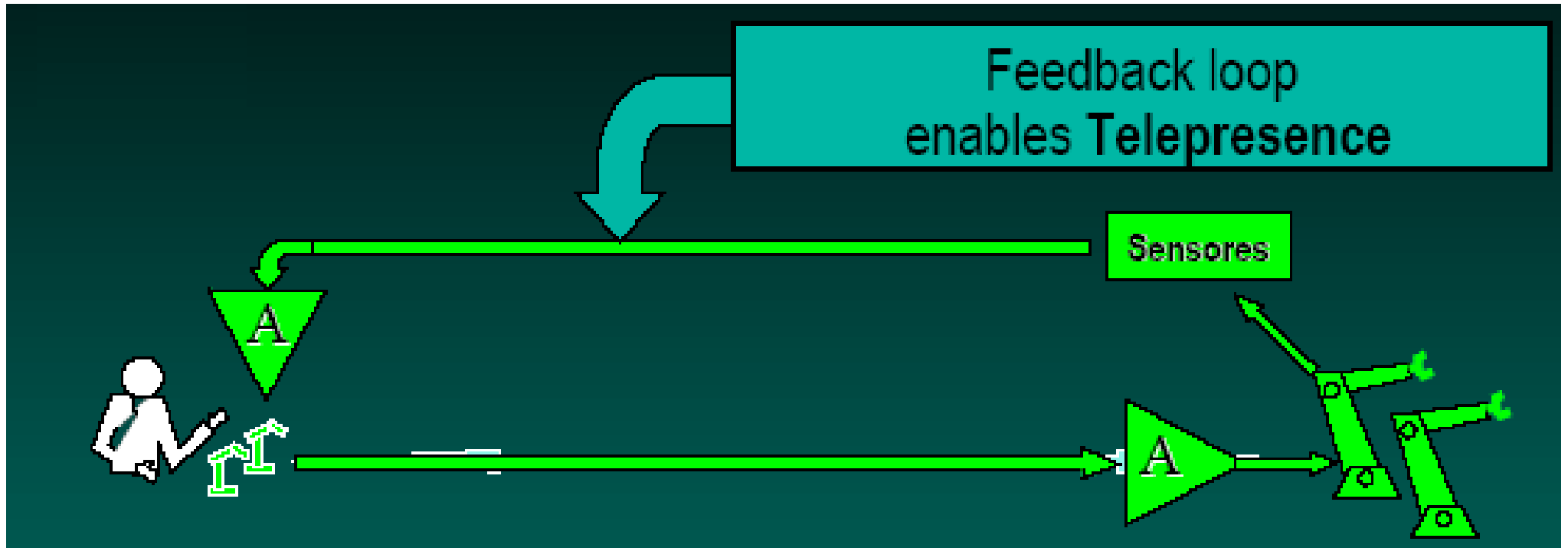
**Telepresence:**

**force sensors** → **actuators**

# TELEOPERATION AND TELEPRESENCE (2)



# TELEOPERATION (1)

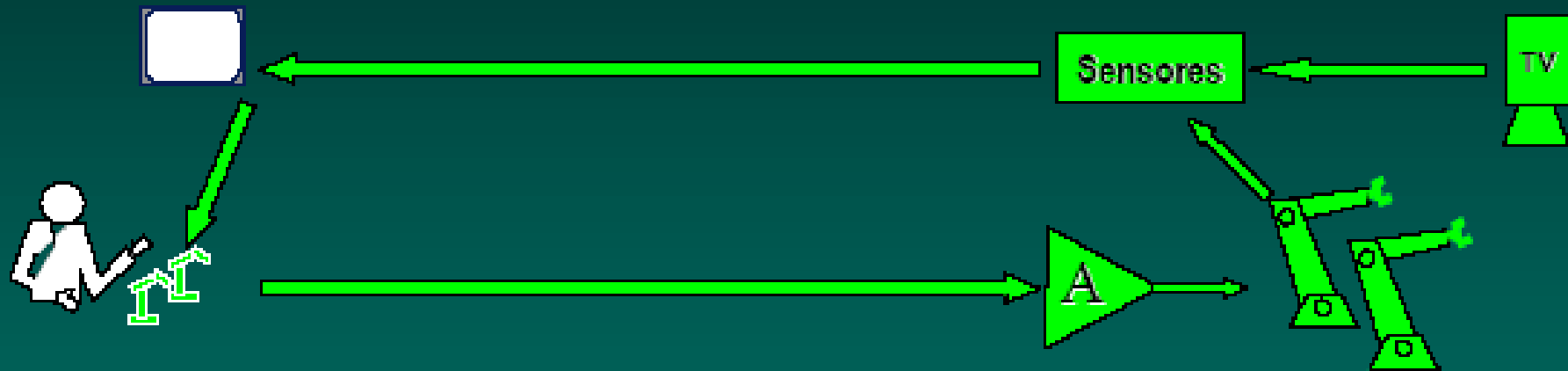


Master-slave manipulator.

# TELEOPERATION (2)

For big distances:

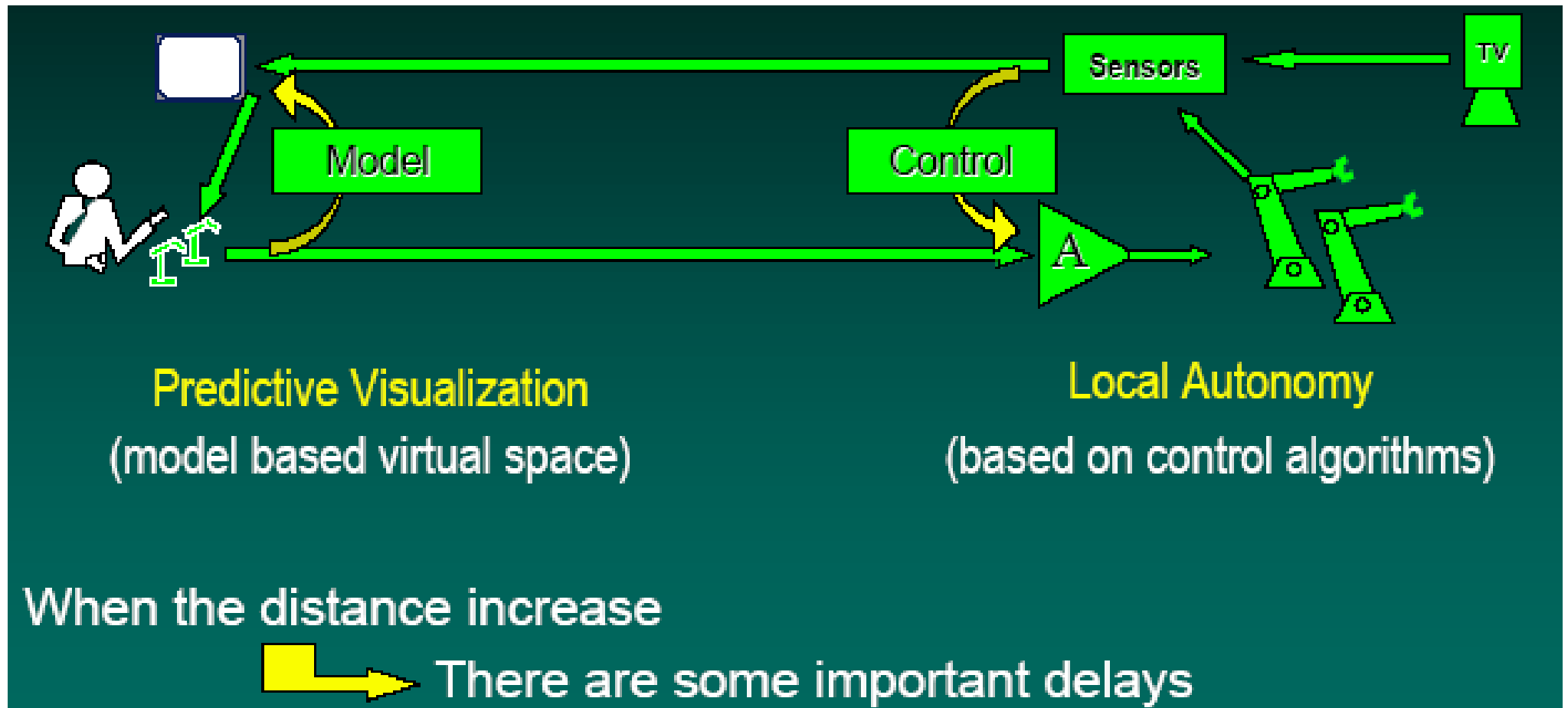
- Force sensors (vision independance)
- **Vision Sensor (distance independance)**



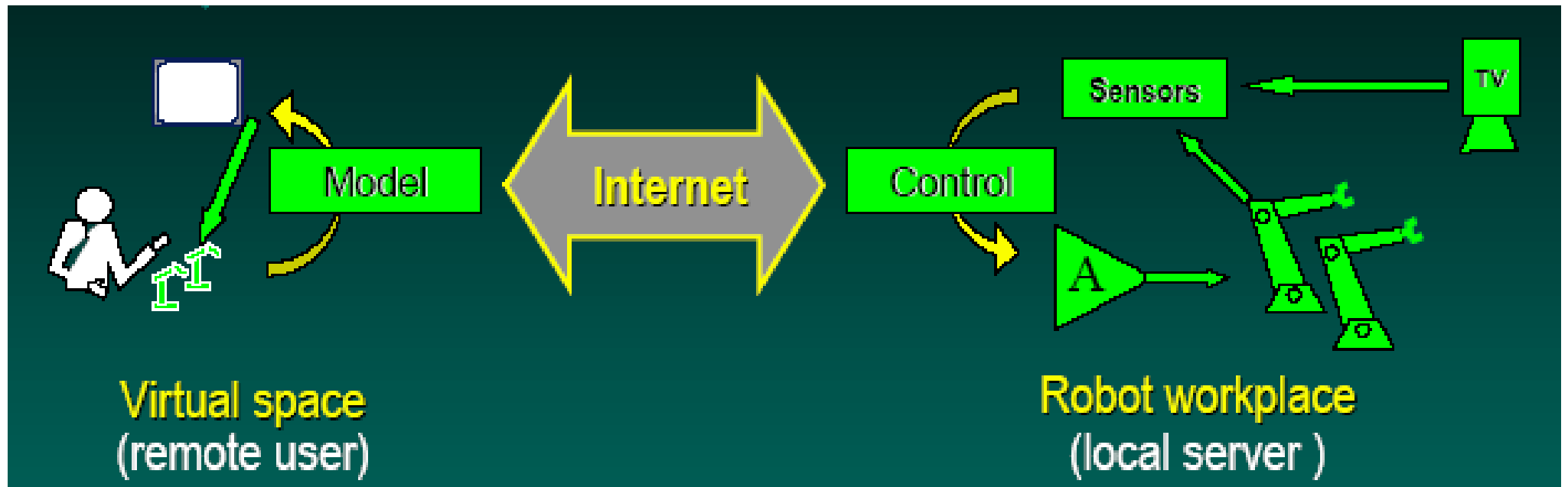
- Possibility of create centering potentials
- Gestual Memory and programation
- Alows Telepresence
- **Requires a good calibration, or an image space control scheme**
- **Improves Telepresence**

# TELEOPERATION AND TELEPRESENCE

For very big distances, e.g. rover on the Moon, there is need for autonomy on both sides.



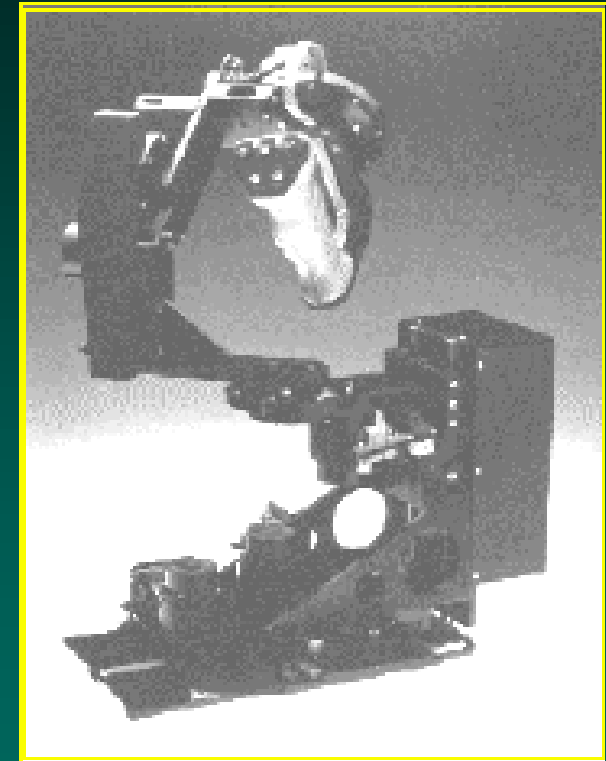
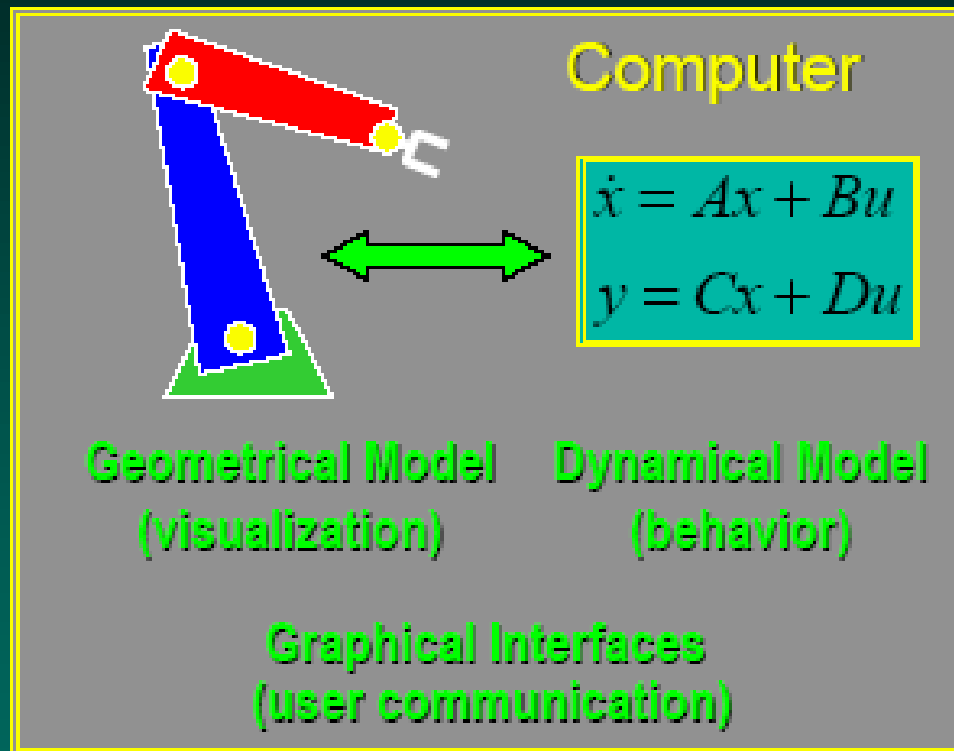
# VIRTUAL ROBOT (1)





# VIRTUAL ROBOT (2)

## Teleoperation



## Telepresence

Virtual Robot  
(mathematical models)

Haptic Interface  
(sensors & actuators)