

# Hybrid-Structure Robot Design

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# Introduction

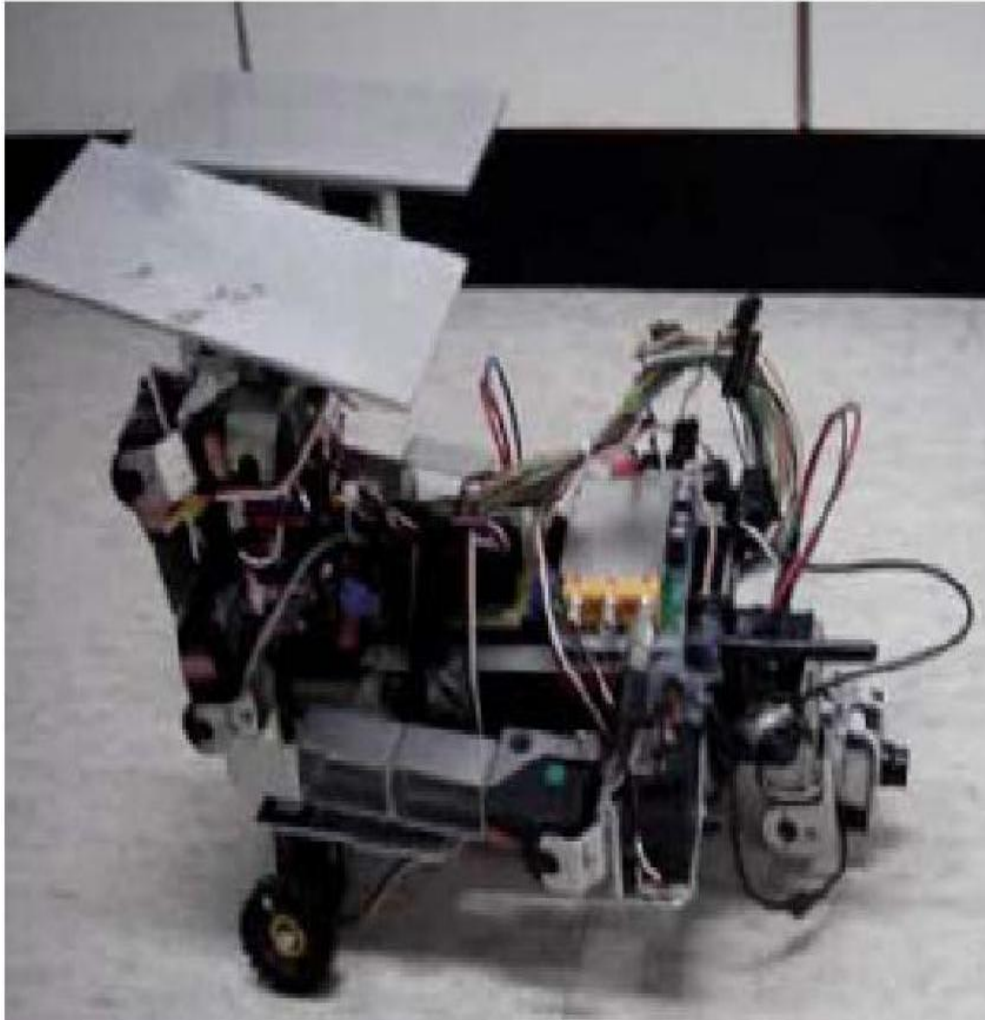
- Industrial robots and non-industrial robots ?
- Moving capability is the important feature of the non-industrial robots.
- The movement of non-industrial robots are categorized as wheeled and legged mechanical platforms.
- The wheeled platforms performs stable and fast movement.
- The legged platform performs better adaptations to different types of ground conditions.
- The authors built a hybrid-structure robot with humanoid and vehicle types to perform home security tasks. So it's a hybrid-structure security robot.

# What is a Security Robot?

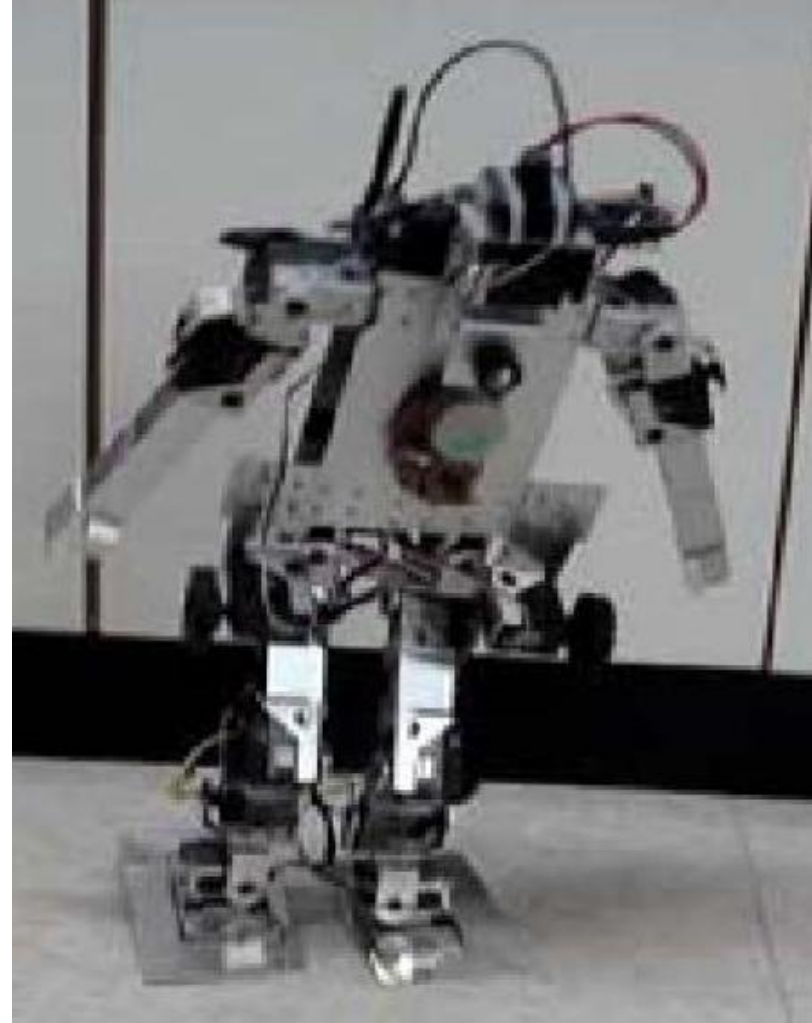
In general the security robot consists of the

- Movement platform
- Motion control module
- Vision Module
- Sensor Modules
- Wireless communication modules

# How this Hybrid-structure security robot looks like?

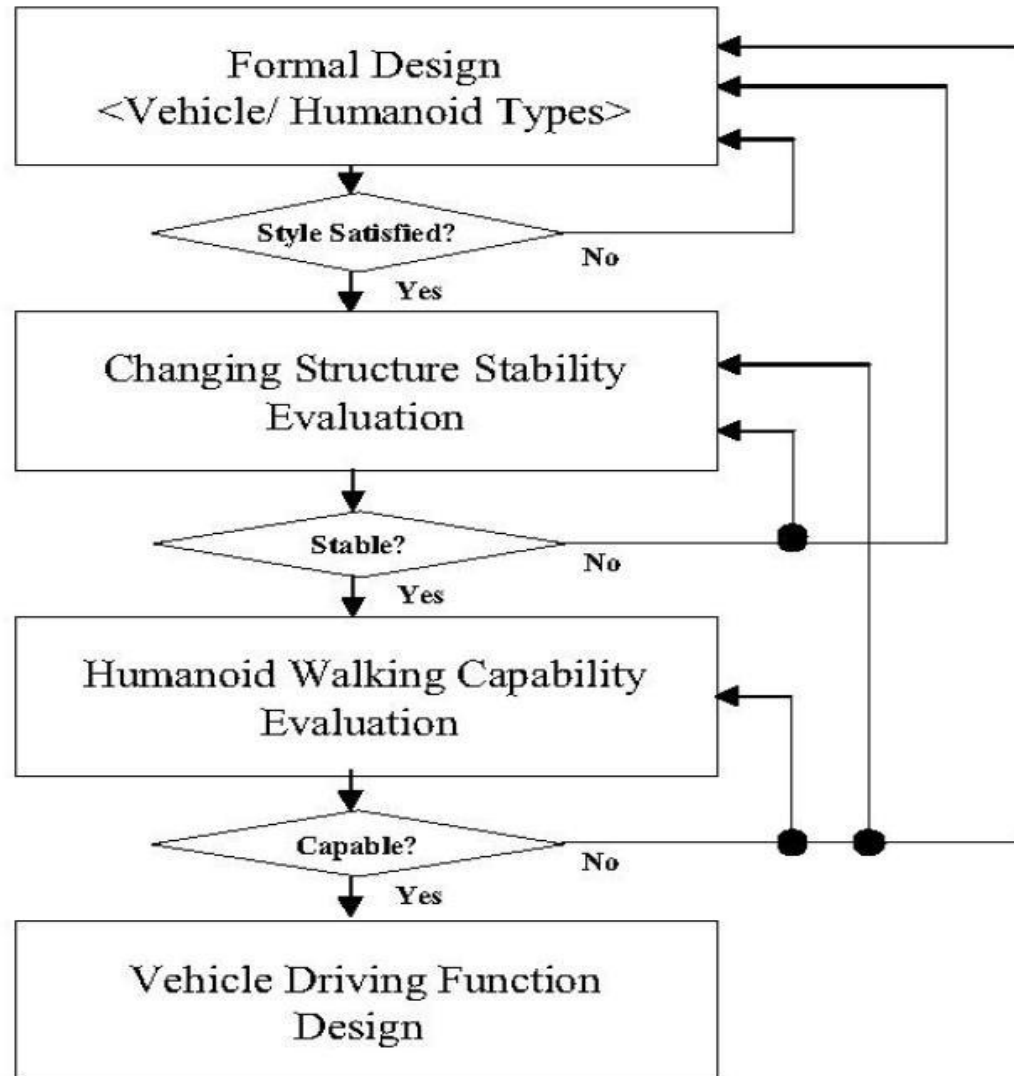


Vehicle type



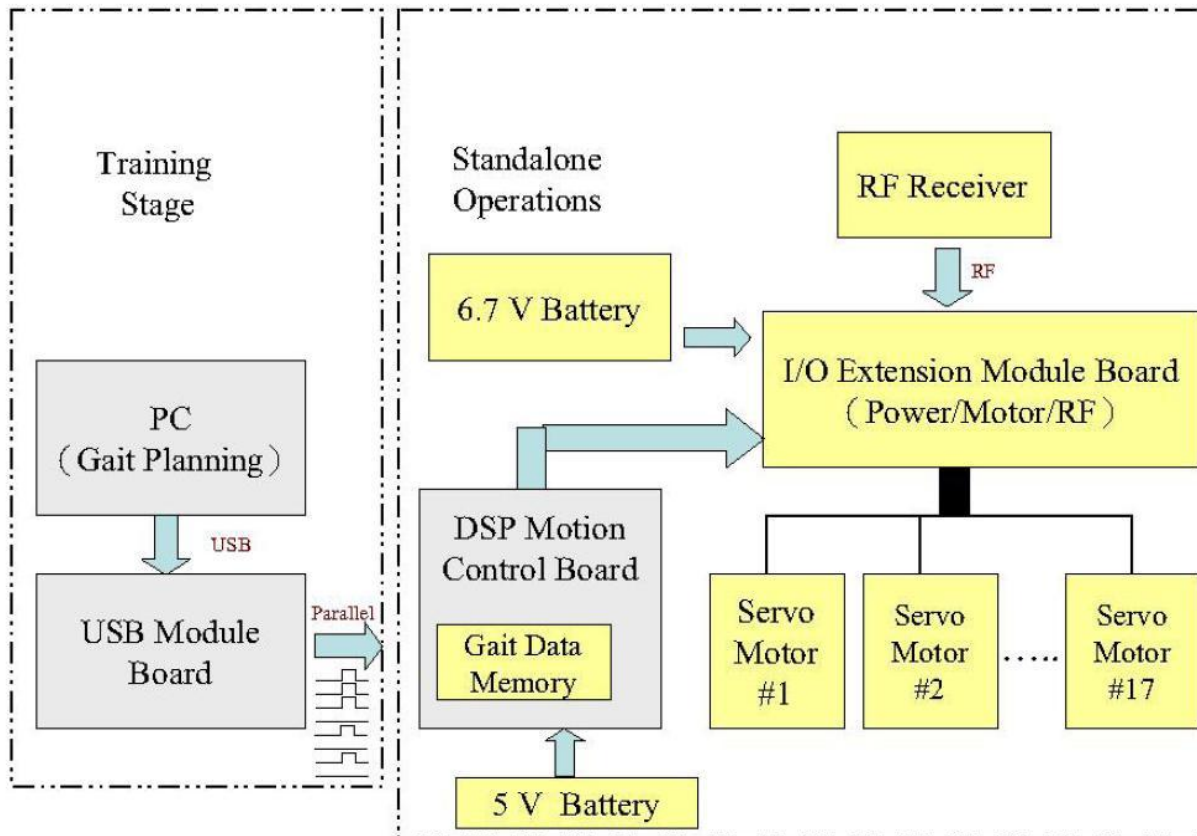
Humanoid type

# Mechanical Design of the Hybrid-Structure Robot



# Realizations of Motion Controller

- The motion and gait controls of this robot is implemented as
  - PC based gait training program
  - DSP based real time gait controller



## Realizations of Motion Controller (contd..)

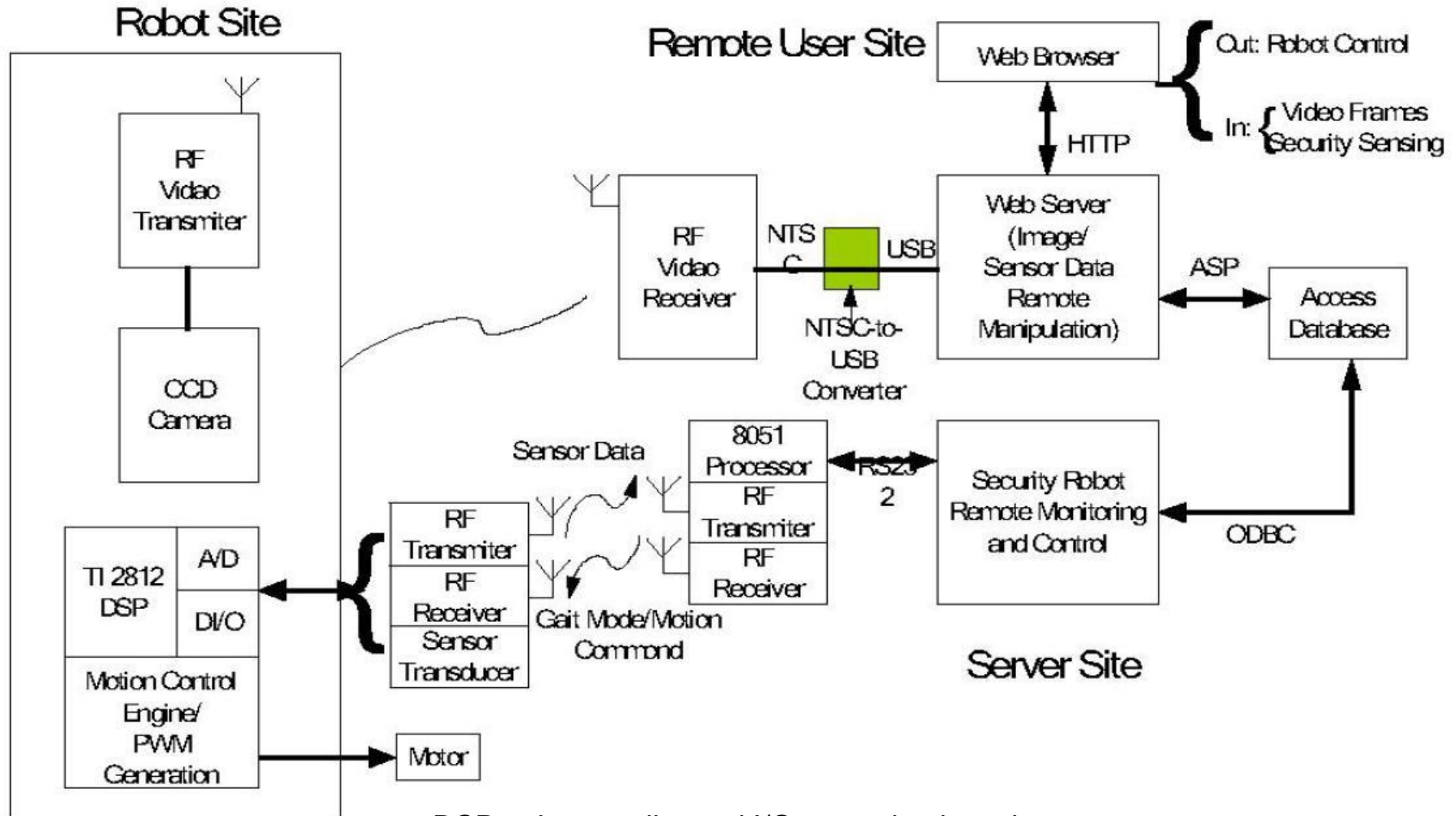
### ❑ PC based gait training program

- It's a self-coded MS Visual C++ program
- Provides USB based interface with DSP based gait controller
- Controls the joint angles of the robot in real time
- Records the gait training data in the Microsoft Access Database
- Capable of downloading the selected training data to the DSP memory

### ❑ DSP based real time gait controller

- Receives individual control command in training stage and entire gait training data before standalone operations.
- In standalone operation waits for the command from RF data receiver module
- The linear and parabolic interpolation approaches are used for used.

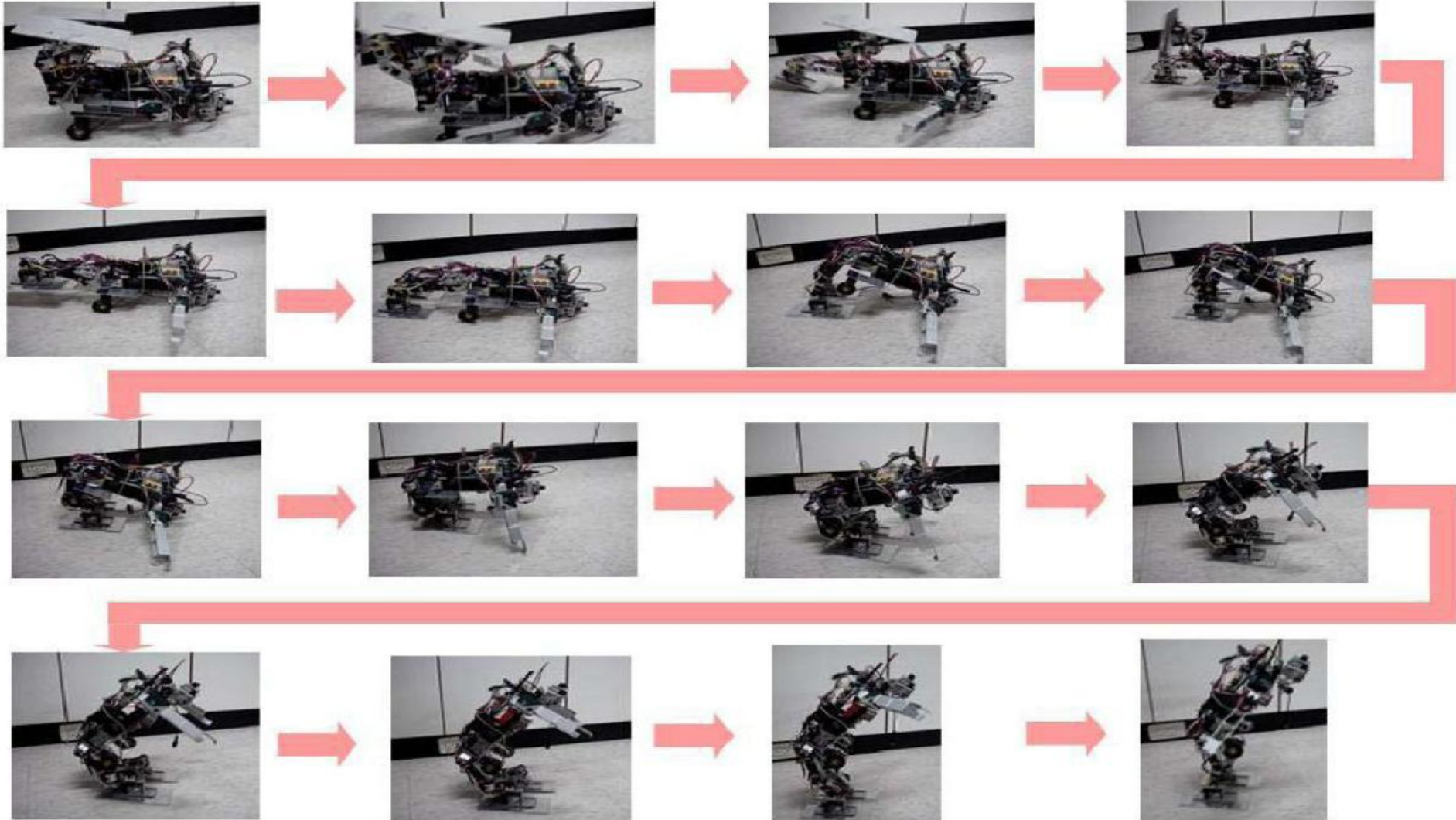
# Implementation of Remote Security Functions



DSP gait controller and I/O extension board



# Changing from Vehicle Type to Humanoid Type



## Conclusion and Future Work

- The ability to change structures from vehicle type to humanoid type significantly improves moving capability of the security robot
- The security functions of acquiring different data of the guarded areas are implemented and integrated using web technology
- In future larger size of robot will be implemented.
- Intelligent functions such as image recognition, sensor fusions, autonomous walking, path planning etc are to be developed for enhancing functionality of the hybrid-structure robot.