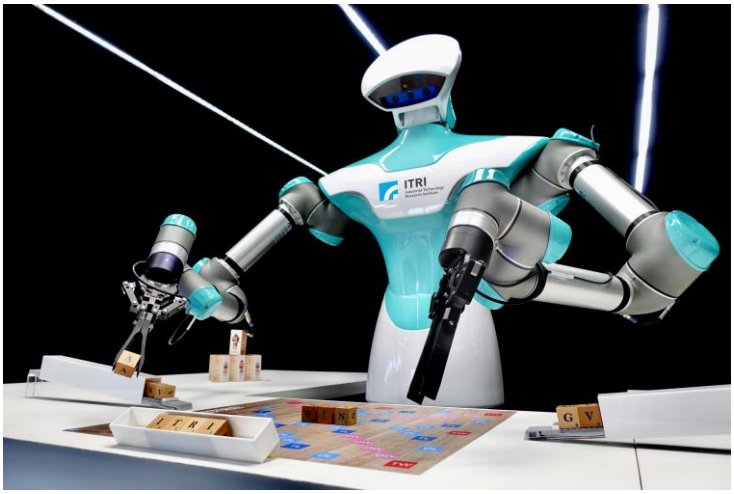
Intelligent Vision System for Companion Robots



ITRI's **Intelligent Vision System for Companion Robots**, **a CES 2018 Innovation Awards Honoree**, integrates AI, 3D vision recognition, and eye-hand coordination technologies to play Scrabble and learn from experience.

At CES 2018, the Industrial Technology Research Institute (ITRI) is exhibiting its Intelligent Vision System for Companion Robots, which can play Scrabble with attendees. ITRI's Intelligent Vision System for Companion Robots delivers the following technology breakthroughs:

- **Intelligent Vision Technology and Developmental Learning Position Detection for perception of objects:** In the companion-robot demonstration at CES 2018, the robot can distinguish between various Scrabble cubes, words, and their locations. It can recognize individual letters and the words spelled by other players. The same intelligence applies in various industrial-automation and Industry 4.0 applications; for example, a robot equipped with ITRI's Intelligent Vision System could differentiate objects based on their size, positions, and surface details, even if their dimensional information is similar.
- **Smart Grip Technology for interaction with objects based on perception:** In addition to perceiving different objects based on size, shape, color and location, ITRI's Intelligent Vision System for Companion Robots enables a robot to grip, move and interact with the objects, while avoiding collisions with other objects. In the CES 2018 companion-robot demonstrations, the robot can drive its arms to grip and move the Scrabble cubes and place them in correct cells without dropping them or hitting other cubes. In an industrial-automation and Industry 4.0 application, a robot equipped with ITRI's Intelligent Vision

System could grip and move an item to another location based on the robot's perception of its attributes such as size, color, shape, and location.

- **Deep learning:** The Intelligent Vision System for Companion Robots enables a robot to adapt to changing conditions and act accordingly. Unlike most current robots that are programmed to repeatedly perform a specific task at a specific time and location, robots equipped with ITRI's Intelligent Vision System for Companion Robots can change their behavior and perform tasks based on random events and requirements. In the CES 2018 Scrabble demonstration, the robot evaluates the random moves of its human opponent and move its cubes according to its current abilities. It verifies spelling through visual input and the dictionary of its game engine, and chooses the spelling that scores highest from possible combinations. It learns to play Scrabble better by experience, like humans do. In an industrial setting, a robot equipped with ITRI's Intelligent Vision System could change its behavior based on which assemblies are currently running on an assembly line, without prior notification of changing conditions, greatly reducing the time required to change assemblies. It also could alert operators when an exception condition in the assembly occurs, helping with quality assurance. In another companion-robot application, a robot equipped with ITRI's Intelligent Vision System could notice that a guest is sitting down for dinner, and provide an extra table setting.

Applications of the Intelligent Vision System include:

- Companion robots
- Random bin picking
- Automated loading and unloading
- Automated inspections

About ITRI

The Industrial Technology Research Institute (ITRI) is one of the world's leading technology R&D institutions aiming to innovate a better future for society. Founded in 1973, ITRI has played a vital role in transforming Taiwan's industries from labor-intensive into innovation-driven. It focuses on the fields of Smart Living, Quality Health, and Sustainable Environment. Over the years, ITRI has incubated over 300 innovative companies, including well-known names such as UMC and TSMC. In addition to its headquarters in Taiwan, ITRI has branch offices in the U.S., Europe, and Japan to extend its R&D scope and promote opportunities for international cooperation around the world. For more information, please visit http://www.itri.org/eng.