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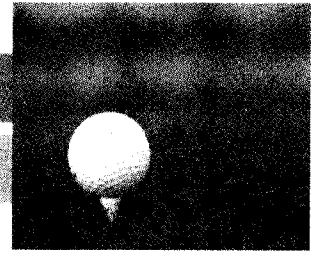

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WHICH ONE IS THE ROBOT?

An IUPUI professor is one of the world's leading researchers in the study of androids such as China's Xi'an Superman

Answer: The robot is on the **right**; the man on the left is **Zou Ren-Ti**, founder of Xian Superman **Sculpture** Research Council in **China.**

GETTING REAL

By Erika D. Smith
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They laugh alike. They walk alike. At times, they even talk alike. But one is real and one isn't.

That's the beauty of the apparent twins — a Chinese researcher and the android robot he created — says Karl MacDorman, an associate professor at IUPUI.

MacDorman is one of the world's leading experts on android science, the development of robots that mimic and resemble humans. Think Data from the TV show "Star Trek: The Next Generation," not Rosie the robot maid from "The Jetsons."

Karl MacDorman studies android science.

IUPUI is the only university in the United States to offer instruction on android science.

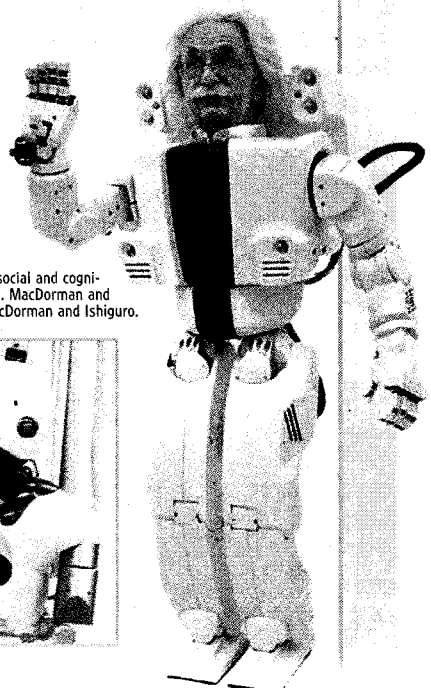
The goal of MacDorman's research at Indiana University-Purdue University Indianapolis is to make these androids act so much like humans that they can be used for research on human behavior and social interaction, and even for companionship. He doesn't want to build his own android. He's focused on the programming that makes an android realistic, such as how to nod to convey confusion or how to recognize a joke or how long to wait to answer a question.

In MacDorman's view, androids are destined for more than menial labor. Service robots that don't look human can do the hard work.

KNOW YOUR ROBOTS

- **Humanoid:** A robot with a human shape, such as Eveliee P1 (below right), a joint effort of Osaka University's Intelligent Robotics Laboratory and Mitsubishi Heavy Industries.
- **Android:** A robot with both a human shape and appearance, such as Repliee R1 (below left). A 2005 article by professors Karl MacDorman of IUPUI and Hiroshi Ishiguro of Osaka University defined an android as "an artificial system designed with the ultimate goal of being indistinguishable from humans in its external appearance and behavior."
- **Hybrid:** A robot with a human shape but also more realistic human elements such as Albert HUBO (right), with a head resembling Albert Einstein on the body of a humanoid. Texas-based Hanson Robotics developed the head; the Korea Advanced Institute of Science and Technology created the body.

Source: "The uncanny advantage of using androids in social and cognitive science research," Interaction Studies, 2006, by Karl F. MacDorman and Hiroshi Ishiguro. Photos shown are from the report by MacDorman and Ishiguro.



See Real, Page A4

Real

◆ Japan is using robots to care for the elderly.

From A1

"I really don't see androids doing things like mowing the lawn, washing dishes . . . and fighting fires and defusing bombs," he said. "When Americans think about robots, they typically think about tasks they can do."

JAPAN IS AHEAD OF U.S.

Asians, especially the Japanese, have more imagination about possible uses for androids, MacDorman said.

They could be used as guides for people entering museums or as receptionists in office buildings. The female android Repliee QlExpo, modeled after TV anchor Ayako Fujii, has hosted regional news in Osaka, Japan, twice in the past few years.

Japanese nursing homes are using realistic-looking robotic pets as companions for residents. The pets respond to the sound of a person's voice.

Some have proposed taking that a step further by having androids take care of Japan's elderly population. Less human-like robots already are being used to lift patients and give them baths.

So far, the reaction has been generally positive. Not only are the Japanese more comfortable with robots than Western nations (as shown by Japan's fascination with anime cartoons), but there's a critical shortage of caregivers for the elderly there. The sense is something has to be done now, and so far, robots and androids have been one answer.

"Robotics seems to be more politicized in Japan than in the U.S.," MacDorman said.

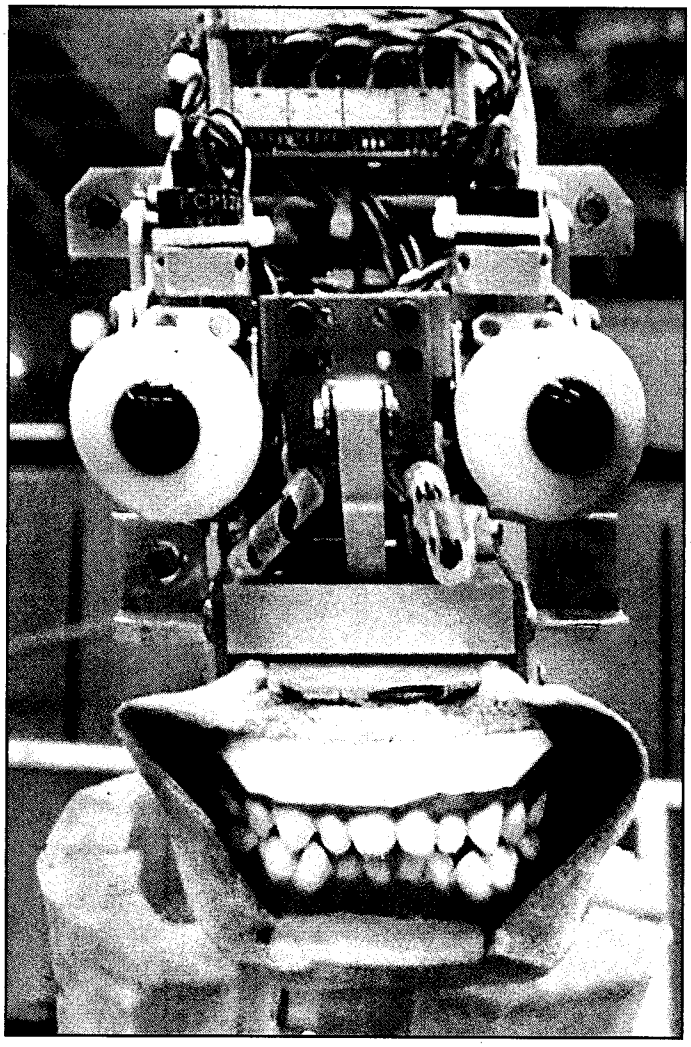
The California native spent much of his early career in Japan. He got hands-on experience and held several positions at Osaka University when android science was just getting off the ground.

MacDorman came to IUPUI in November 2005. He is an associate professor of human-computer interaction in IU's School of Informatics, and also an adjunct professor with Purdue University's School of Engineering and Technology.

Other universities, such as Carnegie Mellon University and the University of Texas, have professors who've expressed interest in android science. But the research for the discipline is only a couple of years old and to perform experiments, they need androids. There are fewer than 10 androids in the world, and most are in Japan at places such as Osaka University.

"It's not very pervasive. It's definitely a growing field, though," said Alan Levine, vice president of the New Media Consortium, a tech-focused group of universities and colleges.

Last week, the "twins," Chinese researcher Zou Ren-Ti and his Xi'an Superman android, billed as China's first robot with "flesh and blood," appeared in Chicago at the International Robots and Vision Show. Zou's android is super realistic and can roll its eyes, move its head and talk. MacDorman was a featured speaker for the educators and scientists pondering the future of robots.



SAM RICHE / The Star

LESS THAN LIFELIKE: Karl MacDorman was working on this robot during his studies in Japan. There are fewer than 10 androids in the world, and most are in places such as Osaka University.

Read detailed writings about android science from Kyle MacDorman at his Web site, www.macdorman.com.

OVERCOMING 'UNCANNY'

MacDorman's goal is to create an android that is so real that humans are comfortable with it. He wants to beat the "uncanny valley," the phenomenon in which the more realistic the robot, the better people will react to it – up to a certain point. Then, the resemblance causes repulsion or eeriness.

If an android walks, talks and acts exactly like a human, but suddenly repeats the same word like a scratched CD or falls down and bends a limb in an odd way, the uncanny valley would come into play.

To avoid such uneasiness requires a lot of work, including programming an android not only to talk but to interact, nodding the right way and at the right time according to cultural norms. Sensors in some robots already allow that interaction.

MacDorman envisions androids one day acting as social workers, calming a distressed person or assessing a person's condition in a way that takes personal bias and emotion out of the diagnosis.

Sound a little scary?

MacDorman says he's well aware of the ethical concerns.

There's the attachment issue.

"The relationship cannot continue to develop in the same way a human relationship can develop," he said. "It also can be dangerous when people think they're understood by a robot when the robot really doesn't understand anything."

He also worries people may give up some of their autonomy in decision making. If a human followed an android's suggestion to play in the street and then got hit by a car, it would still be the human's fault.

So far, MacDorman says, he hasn't encountered any ethical backlash. Maybe it's because android science is still under the radar in much of the world. It's academic.

"Usually the people in the field of robotics are very excited about pushing the envelope of technology," he said, "not so much about ethical concerns."

★ Call Star reporter Erika D. Smith at (317) 444-6424.