point the machine will be more like a human in likeness and function but this likeness will be seen as uncanny and not desirable until the machine reaches a very high level of human likeness where he posits that the feelings of familiarity will rise again amongst the humans interacting with the machine, the uncanny valley is the area of unfamiliarity between the first and second peak of positive feelings of familiarity (Mori, 1970). Mori suggests that it is best for roboticist to design robots in such a way that they sit firmly on the first peak before the uncanny valley; they should be human like in some ways but clearly machines in others. This way they are not threatening and people will happily interact with them. This is a sound design principle if we are to build machines that enhance the human lifeworld rather than disrupt it. In the following sections we will look at some examples of how roboticists in Japan, Europe, and the United States, are thinking about ways to design affective robotics that take into account the ideas and concepts we have discussed above.

4 Affective Robotic Design in Japan

4.1 To Become a Real Atom Boy

Ever since the post war period in Japan, the humanoid robot has been a staple of toy design and the television and movie entertainment industry. Characters such as the friendly, loyal, and heroic little robot boy Tesuwan Atom, (or Astro Boy as he is marketed to the West), who was introduced to the world in a popular anime series begun in 1963, have helped to put a pleasant and obliging face on robotics technology. This interpretation of the robot is quite a bit different from the slave-master paradigm of robots typical of Western science fiction, which from the first mention of robots in the Play R.U.R. to the latest block buster movies have seen robots as menial labors that will eventually rise up to punish their tyrannical human masters. Of course this darker concept of robotics can be found in some Asian science fiction stories and the friendly robot is not absent from the West but overall there is a noticeable trend to be found here.

This friendly take on robotics technology might be based on the vastly different relationship towards technology that distinguishes Japanese culture from that of the West. One theory is that since traditional Japanese culture believes that every thing has a spiritual essence, including nonliving items, so they are more likely to be unbothered by positing some sort of real lifelikeness to machines, a prospect that we in the West find philosophically uncomfortable (Kaheyama, 2004; Perkowitz, 2004). The West, deeply influenced by the materialism/dualism debate, has more trouble with the concept of having an emotional relationship with a machine. The metaphysics of Buddhism also allows for an entirely different relationship to robots then that of the Abrahamic religions of the West and Middle East. Whereas orthodox Christians, Muslims, and Jews might see building a robot as some sort of perverse sub-creation or ultimate graven image, Buddhism allows the machine to share in

the buddha-nature of its creator, or so argues the roboticist and Buddhist scholar Masahiro Mori in his book, *The Buddha in the Robot: A Robot Engineer's Thoughts on Science and Religion*:

> …if men are appearances created by the Void, then whatever men create must also be created by the Void. It must also partake of the buddha-nature, as do the rocks and trees around us. Specifically, since I myself was created by the Buddha, the machines and robots that I design must also be created by the Buddha (Mori, 1981, 179).

Mori goes on to argue that it is indeed possible to recognize the buddha-nature in a robot and to have some sort of spiritual connection to the machine, one manifestation of the buddha-nature to the other. It is very likely that these cultural values are explicitly or tacitly affecting the design of personal robotics by the Japanese and others in the East. As the philosopher Andrew Feenberg has shown, different societies and communities will produce different, alternative expressions of the dominant technological paradigm (Feenberg, 1995). We should therefore expect to see very different relationships to robotic technology between various cultures. As an article from the Japan Economic Newswire reports:

> "For the Japanese, the distinction between 'me and others' and 'man and robots' has been vague," said Norihiro Hagita, head of the Intelligence Robotics and Communication Laboratories of Kyoto who is studying the coexistence between man and robots. "This flexible sensitivity has helped produce a culture to share various jobs and experiences with robots" (Japan Economic Newswire, January 2005).

Karl MacDorman, a researcher at the robotics lab in Osaka suggests an alternative hypothesis as to why the Japanese in particular are working so hard to create personal and service robots (MacDorman, 2005). He suggests that since Japanese culture has so many social mores regarding proper interpersonal relations that can be very taxing and difficult to maintain, it is preferable to them to interact with a machine than with a fellow human being, it is impossible to embarrass a robot with a misspoken phrase or improper gesture so it is a less stressful interaction.

Both of these hypotheses are reasonable and it is possible that they are both true since a traditional cultural predisposition towards animism would reinforce the behaviours MacDorman observes. If relationships with other humans are difficult culturally, and one is predisposed to affable feelings towards robots, then it is natural that we will see the friendly behaviors towards robots that MacDorman and others find in Japanese test subjects.

4.2 Someone to Watch Over Me

More people are living longer and this is beginning to put a stress on caregivers. This stress is particularly evident in Japan where the population of the older generation outnumbers the younger generations. As a world leader in robotics technology, the Japanese have begun to deploy robots to address the problem (Biever, 2004). The hope is that one day robotic devices will provide help, monitoring, and companionship to those elderly that cannot get these things from their family or other sources.