TECHNOLOGIES FOR THE ELDERLY: STATE OF THE ART AND NEW CHALLENGES

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Presentation Topics

- Overview of technology for monitoring
- PERS
- Sensored Environments
- Wandering Alerts
- Residential Facility Monitoring Systems
- Medication Management
- Additional Technology Based Systems
- The Past / The Future

Some classes of available systems

- Personal Emergency Response Systems (PERS)
- Fall detecting systems
- Mobile PERS
- Residential facility monitoring systems
- Home monitoring systems
- Medication management systems
- Home services platforms – social and entertainment

FROM SMOKE SIGNALS TO ALERTS FROM SENSORED ENVIRONMENTS

- Lanterns and smoke signals
- Phone
- PERS
- Passive monitoring / Sensored environments

PERS

Personal Emergency Response Systems

Personal Emergency Response Systems (PERS)

- Enable an individual to call for help in an emergency
- Traditional PERS device (pendant, wristwatch, clip-on) contact emergency numbers stored in the PERS console at the press of a button
- User must manually activate the system within approximately 150 feet of the console unit

PERS

Traditional PERS

- Philips Lifeline: http://www.lifelinesys.com/content/lifeline-products

PERS

Guardian Alert/Freedom Alert: 2-way voice pendant - http://www.logicmark.com/

- 2-way communication between the user and the console
- Pendant contains a Digital Enhanced Cordless Telecommunication (DECT) speakerphone
- Wearer can talk to emergency contact up to 600 feet/183 meters from the console unit

PERS with Fall Detecting

Lifeline with AutoAlert:

http://www.lifelinesys.com/content/lifeline-products/auto-alert

Halo Monitoring:

http://www.halomonitoring.com/

Wellcore:

www.wellcore.com

mPERS (Mobil PERS)

- GPS and 3G wireless based mobile devices
- Provide 2-way speakerphone communication, location/tracking capabilities including geofencing to assist with the management of wandering
- Typically linked to a monthly monitoring/service contract which may provide access to web-based tools to monitor activity
- Provide one button access to monitoring company, caregivers or emergency services
- Some devices incorporate automatic fall detection, waterproof enclosures

Examples of mPERS

GeoSkeeper: Aerotel Medical Systems
http://www.aerotel.com/en/products-solutions/lifecare-personal-safety-solutions/index.php

Lifecomm:
http://www.lifecomm.com/devices.html

- Joint venture between Hughes Telematics, Qualcomm and AMAC
- Waterproof, compact and stylish design
- Automatic fall detection and activity monitoring

Examples of mPERS

Personal Assistant Link (PAL):
ActiveCare
http://www.activecare.com/pal

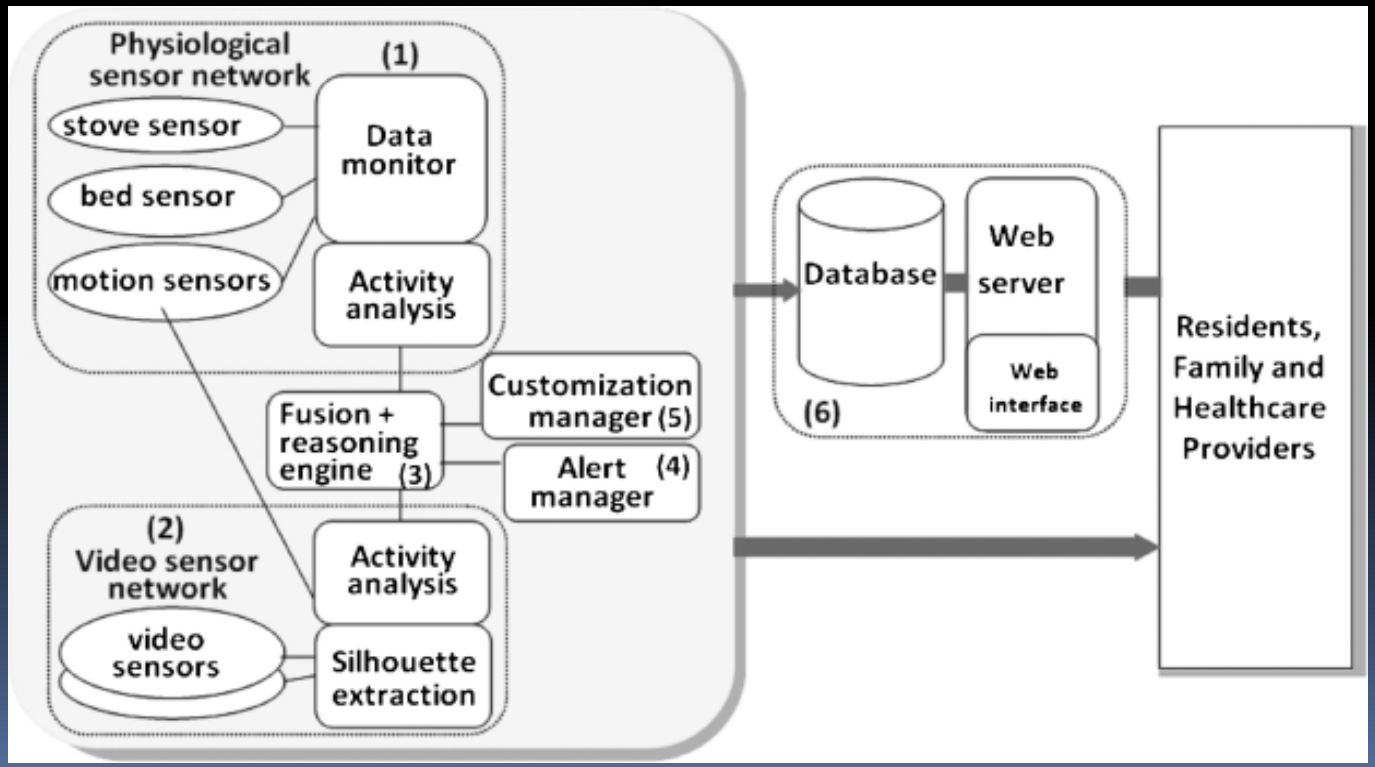
MobileHelp:
http://www.mobilehelpnow.com/

VoCare:
http://www.vocare.com/en/products/button

SENSORED ENVIRONMENTS

Research examples: Tiger Place

- Similar to Acube concept
- Passive sensor networks have been installed in 17 apartments
- Active retirement community developed in affiliation with the University of Missouri
- System block diagram from Rantz et al 2010



Research Examples: Tampa VA Smart Home

- "Cognitive Prosthetic" that enhances rehab and improves safety for people with cognitive impairment
- Interactive location-based memory aids
- Ultra-wide band, read-time locating system
- 70 elders monitored for 1 year (completed)
- Up to 10 Veterans use system at one time following acute care
- System uses UWB system from Ubisense LTD; able to determine position of wrist-worn tag within .2 meters
- 60 wall mounted LCD touch screen computers with applications providing schedule reminders, location assistance, and interactive prompts

Research examples: ACube

ACube (presented today) http://acube.fbk.eu/it

Fondazione Bruno Kessler, Università degli Studi di Trento, Fondazione Don Carlo Gnocchi Onlus, Center for Research and Telecommunication Experimentation for Networked communities (CREATE-NET)

- Sensors include: microphones, video cameras, RFID, WSN, wearable sensors, smart home sensors

WANDERING ALERTS

Wandering alerts: EmFinders GPS

- Available in standard band and secure band (requires 2 hands to remove)
- Water resistant and submergible
- Requires 2 hour charge once a week
- When active by a caregiver call to the service, the device places a call to 911, reports its location, plays an audio message explaining the nature of the emergency, and an emergency response is provided by the appropriate responder organization.
- http://www.emfinders.com

RESIDENTIAL FACILITY MONITORING SYSTEMS

Residential facility monitoring systems

- Inobtrusively monitor resident activity to determine changes from normal behavior patterns
- Include sensors to monitor resident status and activity, such as
  - Motion sensors
  - Location tracking tags
  - Contact/door sensors
  - Toilet sensor
  - Stove sensor
  - Bed/chair sensors
  - Call pendants, pull cords
  - Vital sign monitoring

Residential facility monitoring systems

- Caregiver web portals
  - Configure individualized monitors for residents
  - Receive and manage system notifications
  - Reports of resident status
  - Some allow access to resident data by physicians and family members

Examples: Inovonics Hardware

- Provides fixed and pendant transmitters, motion detectors for senior facilities
- Based on a proprietary 900MHz mesh network
- Can provide location of the triggered pendant
- Inovonics http://www.inovonics.com/activitysensor.aspx
- Inovonics hardware is used in systems such as CareConnect from Esco Technologies: http://www.careconnectbyesco.com It includes:
  - wireless emergency call system
  - Notifications
  - Reminders
  - environmental monitoring

Examples: Home Free Wireless Resident Monitoring Solutions

Products include:

- Resident emergency call
  - Fixed and resident-worn wireless call buttons
  - Alerts are directed to staff member pagers displaying resident name and real time location
- Wandering solution – Personal Watcher™
  - Real-time indication of residents' location by areas
  - Automatic alerts upon residents leaving or entering pre-defined areas
  - Door and exit alerts with staff notification
  - Watch-style transmitter with removal and cut-band alarms
- Wireless fall management of monitored seating or bed areas
- Wireless staff safety
- Community management and staff can generate resident behavioral and staff responsiveness reports
- :http://homefreesys.com

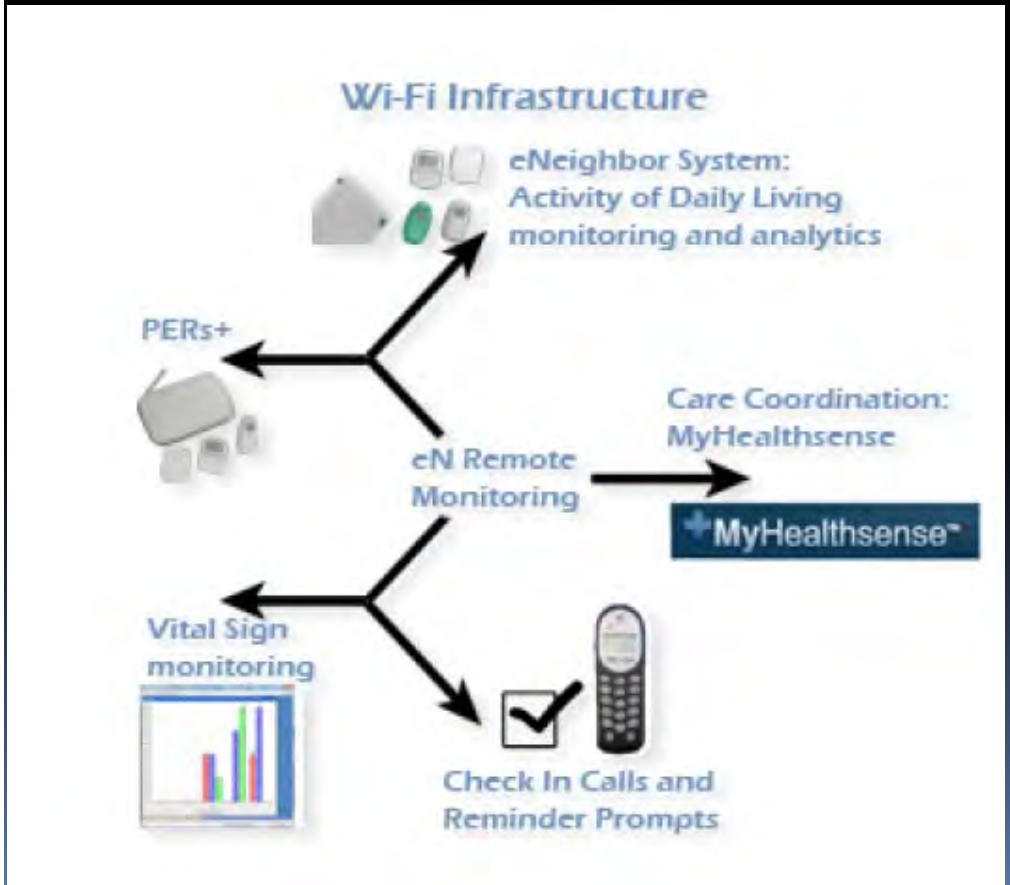
Examples: GE QuietCare

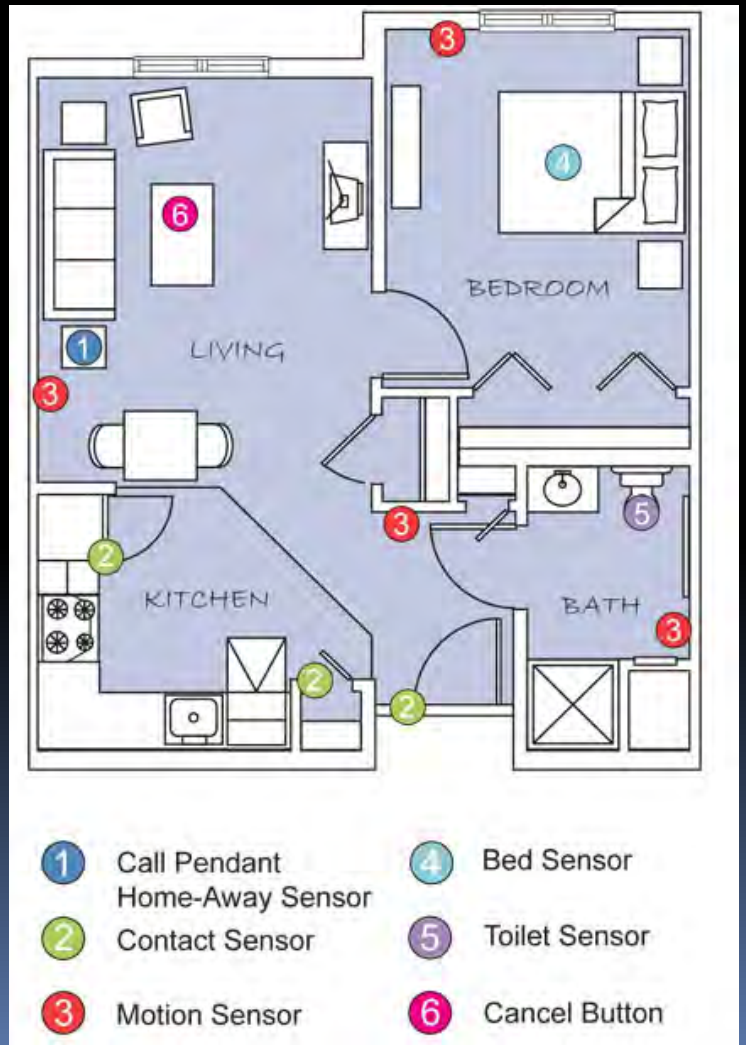
Living Independently Inc, acquired by GE, was a pioneer in the remote monitoring field

http://www.gehealthcare.com/usen/telehealth/quietcare/proactive_eldercare_technology.html

Examples: HealthSense

- An integrated solution including passive remote monitoring, wireless emergency call/PERS with location tracking, nurse call system
- *http*://www.healthsense.com/





Other Examples: WellAWARE Systems

- Based on system developed by the University of Virginia: Includes:
  - Sleep quality sensor
  - Activity sensors in bedroom, bathroom, general living areas
  - Threshold sensor to monitor entrance/egress
  - Optional PERS console
- LivingWell@Home Project : Good Samaritan Society collaborates with WellAWARE Systems, Philips Lifeline and Honeywell HomMed to study improvements to senior wellness: http://www.wellawaresystems.com/news/110322_press.php
- Philips Lifeline provides the medical alert service and fall detection components, including Lifeline with AutoAlert.
- Honeywell HomMed provides telehealth services for the LivingWell@Home research study. http://www.wellawaresystems.com

Home monitoring systems

- Provide similar features as residential facility monitoring systems, aimed at in-home use
- May also incorporate X-10, Zigby, Zwave, etc include "Smart home" features such as
  - Temperature sensing
  - Control of home lighting
- Other features may include
  - Social connections to family
    - Video conferencing
    - Simplified email interfaces
    - Share and view photos
  - Entertainment
    - Simplified web interfaces
    - Games
  - Wellness monitoring
    - Blood pressure
    - weight
- Caregiver alerts can be sent via phone, text messages, email based on changes in activity
- Caregivers can monitor activity and status via a web based interface
- Some systems utilize a wireless 3G connection to transmit data to the monitoring service, provide VOIP phone service, in some cases eliminating the need for a home phone

Examples: GrandCare System

- 2-way web video conferencing
- Interactive touchscreen interface
- Manage chronic health conditions
- Remotely assess activities of daily living
- Entertainment
- Temperature monitoring and lighting control
- http://www.grandcare.com/ (also available for residential facilities)

Other Examples

- AFrame Digital: http://www.aframedigital.com/index.html

  Features alerts if the wristwatch device is not being worn

- Simply Home: http://www.simply-home.com/

- CloseBy Network: http://www.closebynetwork.com/

Multi-service devices

Sonamba Wellbeing Status monitor and Medical Alert system: http://sonamba.com/

- Wellbeing monitor
- PERS
- Medication reminders
- Social communications
- Digital photo frame
- Games
- Remote configuration

MEDICATION MANAGEMENT

Medication management

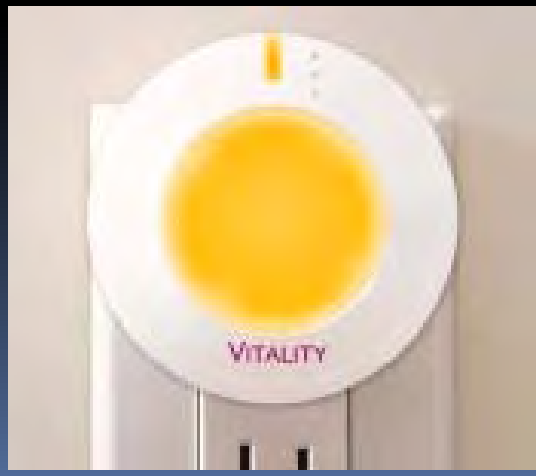
Electronic pill bottle

Vitality GlowCaps http://rxvitality.com/

GlowCaps use light and sound to signal when it is time to take a pill.

- sense when the bottle is opened and wirelessly relay their status to Vitality's secure network.
- flash and play a ring-tone reminder
- wireless reminder light plugs into a kitchen or bathroom outlet and pulses orange when it is time to take a pill.
- If the bottle is not opened two hours after a scheduled dose, the user is automatically reminded with a telephone call or a text message

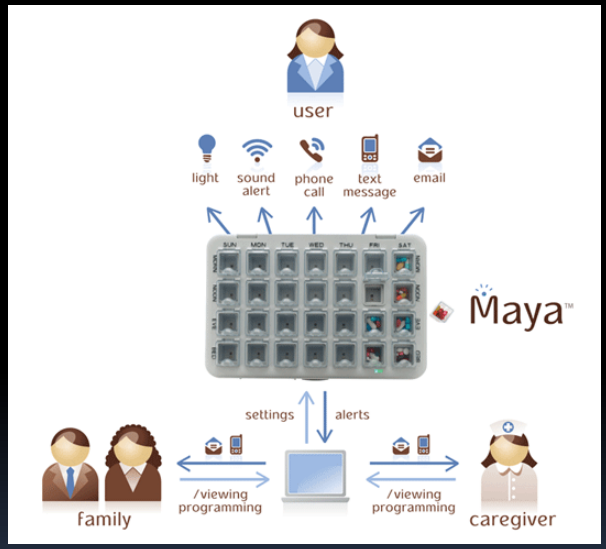
Data generated by GlowCaps can be used to automatically refill prescriptions



Medication Management

Electronic pill boxes

Medminder Maya
https://www.medminder.com/Medication-Management-System



- Wireless link updates central system with the patient's dosage activity
- Provides patient reminders via the device and phone calls, text messages and emails
- Provides family and caregiver updates and web based reports

Medication Management

Automatic Dispensing Systems

- Store and releases medication on a set schedule
- Prevent overmedicating by accommodating "As Needed" medications ("PRNs")
- Provide patient reminders
- Alert caregiver or call center if the patient fails to take medication

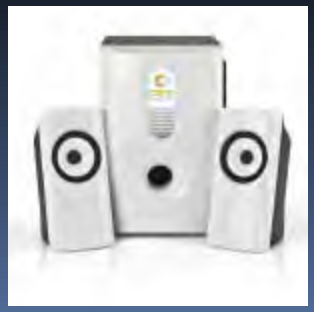
TabSafe http://www.tabsafe.com/ Dispense A Pill (DAP) http://www.healthonemed.com

Beyond physical health……

Therapeutic audio software CoroHealth: http://www.corohealth.com/

- Individualized programs
- Includes music, faith-based programming, news
- Provides reminders to assist with daily tasks
- Scheduled content is played at convenient times throughout the day
- Residential facility (tablet or secure un and home user (PC-based) versions

Residential facility (table, secure) and home users versions shown



ADDITIONAL TECHNOLOGY SYSTEMS

Computers and Interactions

Telikin simplified computer: http://www.telikin.com/

- Touchscreen interface
- Video chat
- Photo sharing
- Email
- Calendar
- Web browsing

Vitallink: http://www.vitallink.net

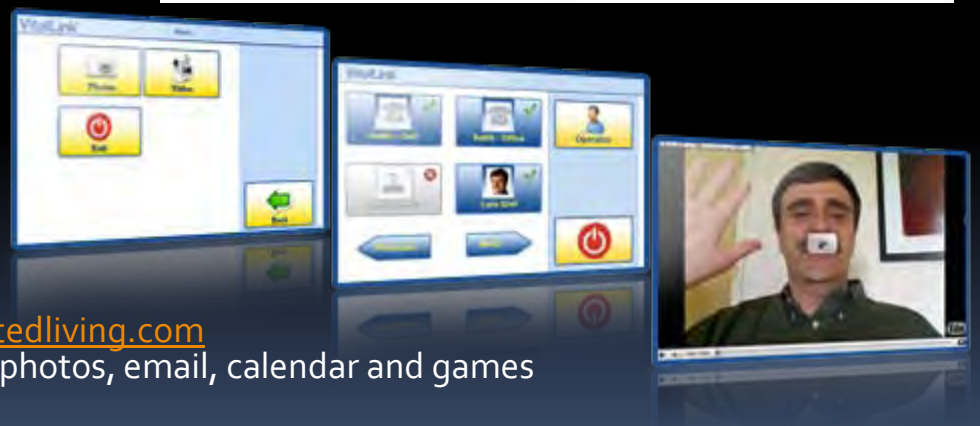
Software shell for a touchscreen computer

Simple access to

- Photos
- Videos
- Video chat
- News, weather, games

Entertainment

- Computer/web access



Connected Living: http://www.connectedliving.com
Provides simplified access to the web, photos, email, calendar and games

AgeLab

Smart Personal Food Advisor

- AgeLab has developed a Smart Personal Advisor to provide guidance at the point of decision--in the aisle rather than in the home, uses personal diet information.
- Fosters "Technology-enabled behavior"
- Leverages radio frequency identification (RFID) and wireless technology
- Can be used in the home, workplace, store and leisure environments

(Image from BusinessWeek http://images.businessweek.com/ss/06/12/1205_boomertech/source/2.htm)

Challenges: development and adoption of technologies for the elderly

- Knowledge/skill /comfort with computers and electronics
- Sensory limitations
  - Sight
  - Hearing
  - Touch
- Motor limitations
- System reliability
- Security
- Rising cost of long term care
- Perception of benefits/advantages – feeling of need/want
- Adherence to adoption of mobile/wearable devices
- Ease of use/accessibility
- Appropriate use of technology to improve life
- Reimbursement/cost
- Privacy and trust – monitoring ranges from the bedroom to the bathroom
- Aging population and increasing disability with age
- Understanding the needs and expectations of the aging population, including Aging in Place desires
- Training for caregivers, both formal and family

Advancement of Technology

THE PAST /THE FUTURE

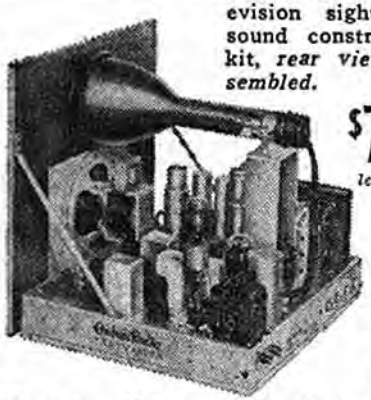
THE HOUSE OF TOMORROW (STEEL AND GLASS)

Andrea Radio

"SHARP FOCUS"

TELEVISION

SIGHT AND SOUND RECEIVERS



Andrea KT-E-5 television sight and sound construction kit, *rear view, assembled.*

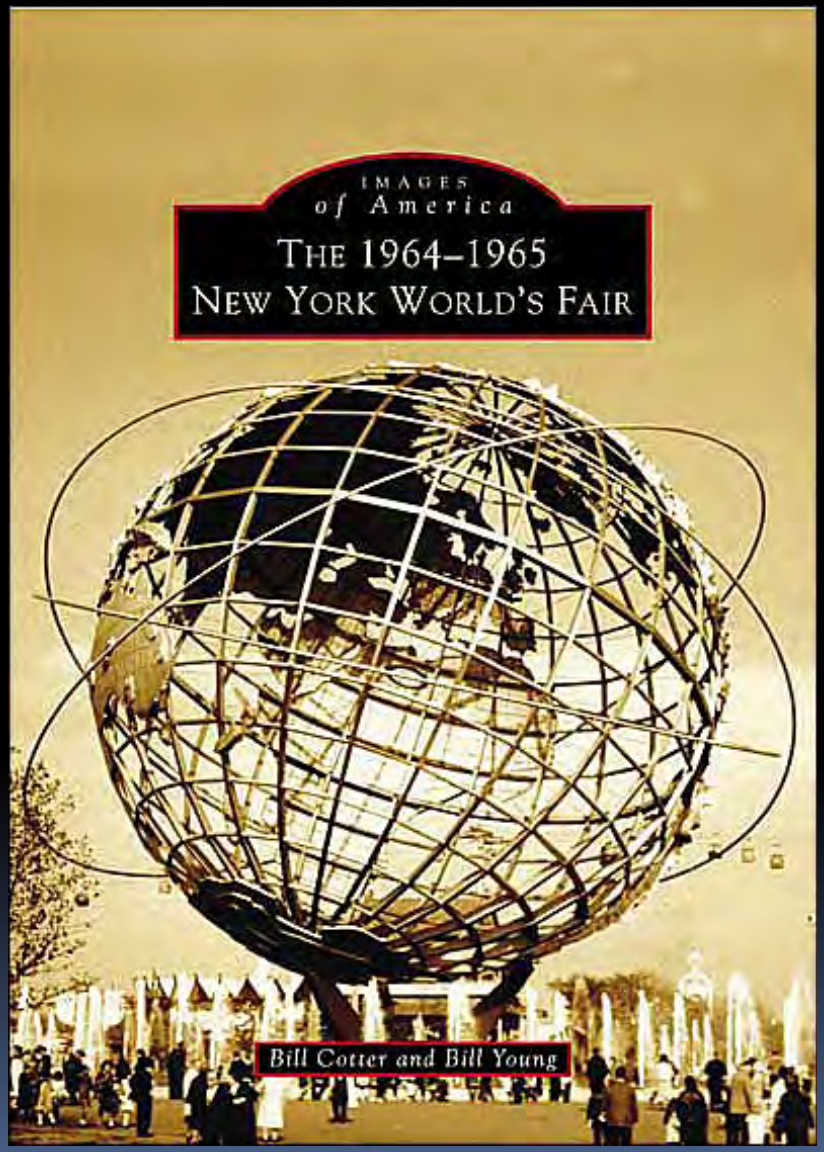
$79.95 *less tubes*

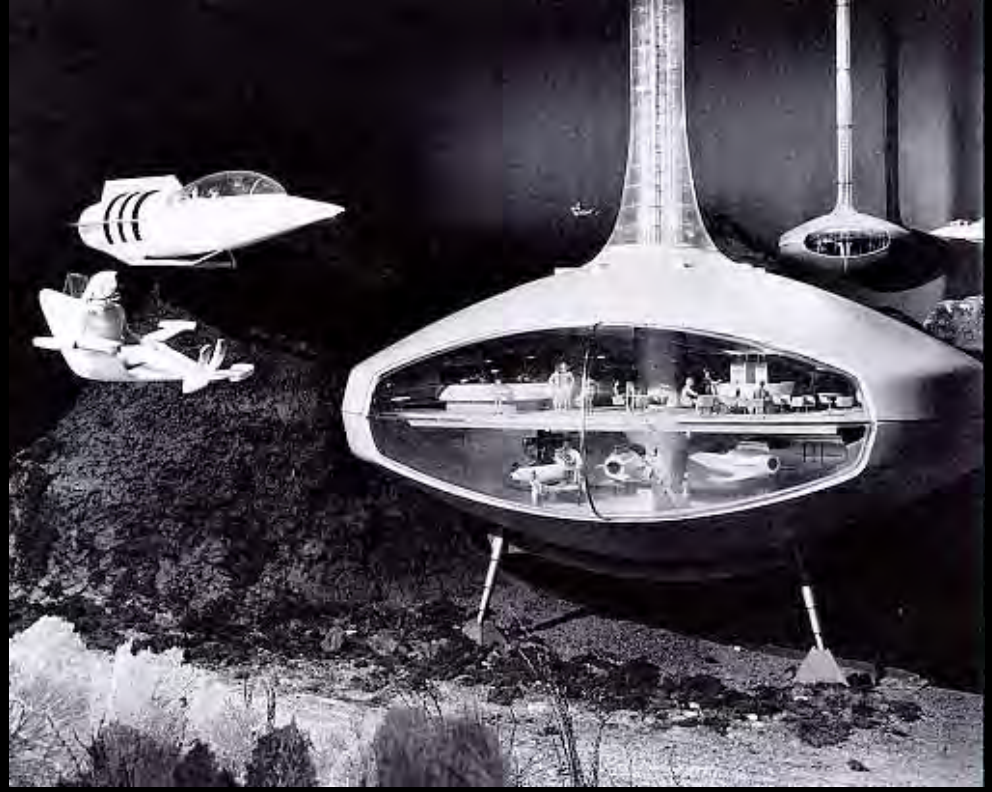
Complete, factory-built table model television sight and sound receiver Model I-F-5. $189.50 *with tubes*

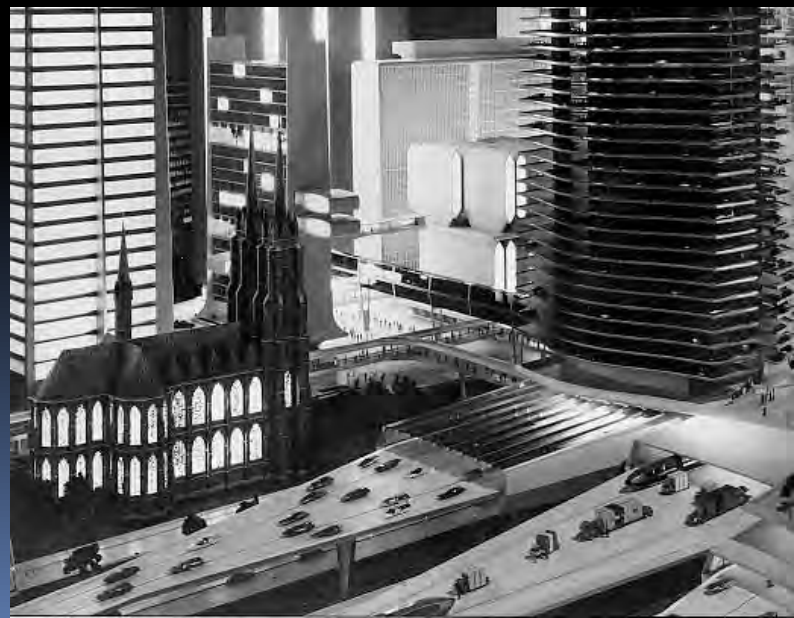
Now on display at leading dealers throughout New York.

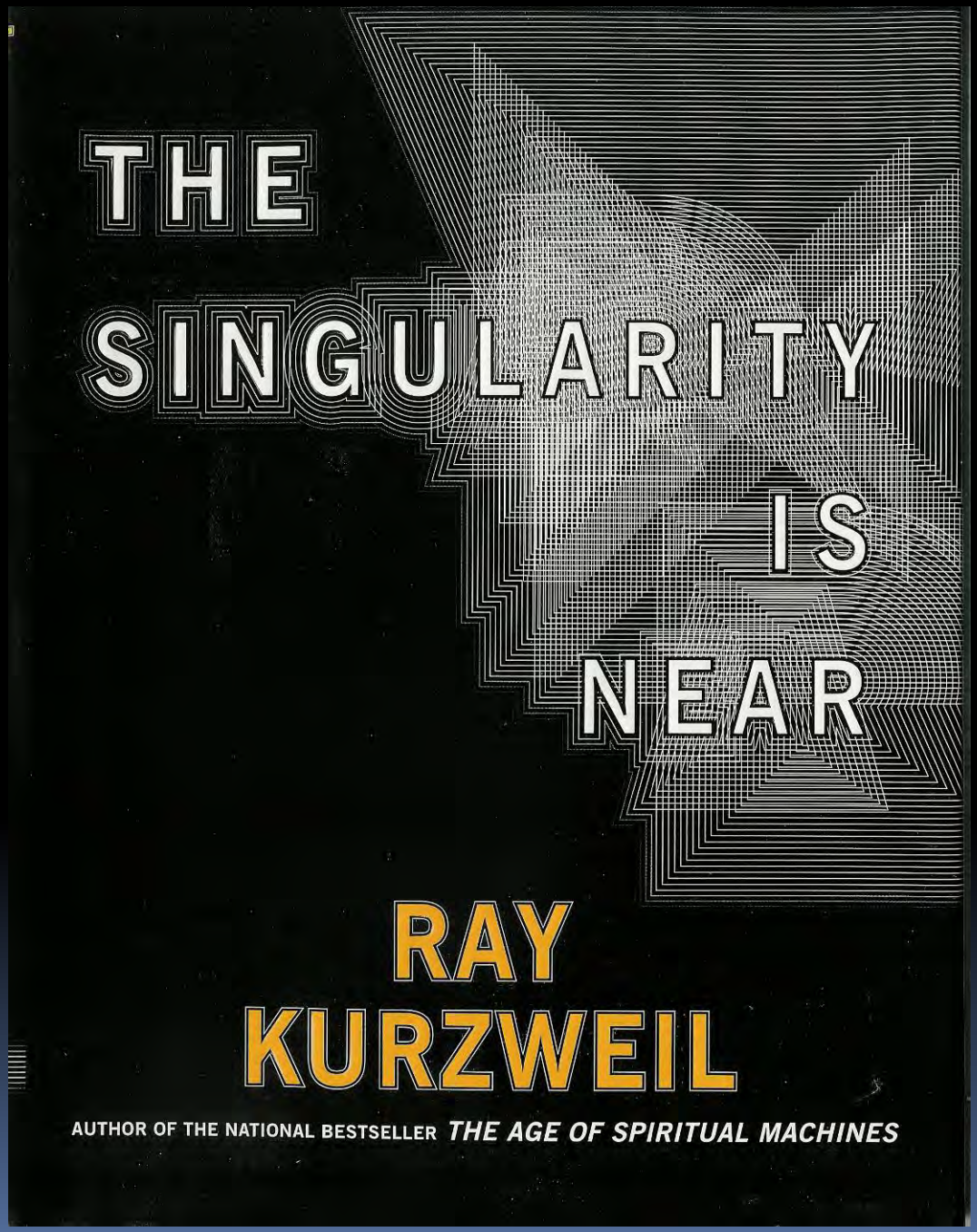
IMMEDIATE DELIVERY.

ANDREA RADIO CORP., 48-35 48th Ave., Woodside, L. I., N. Y. Tel. STillwell 4-4754


IMAGES
of America
THE 1964–1965
NEW YORK WORLD'S FAIR
Bill Cotter and Bill Young






THE
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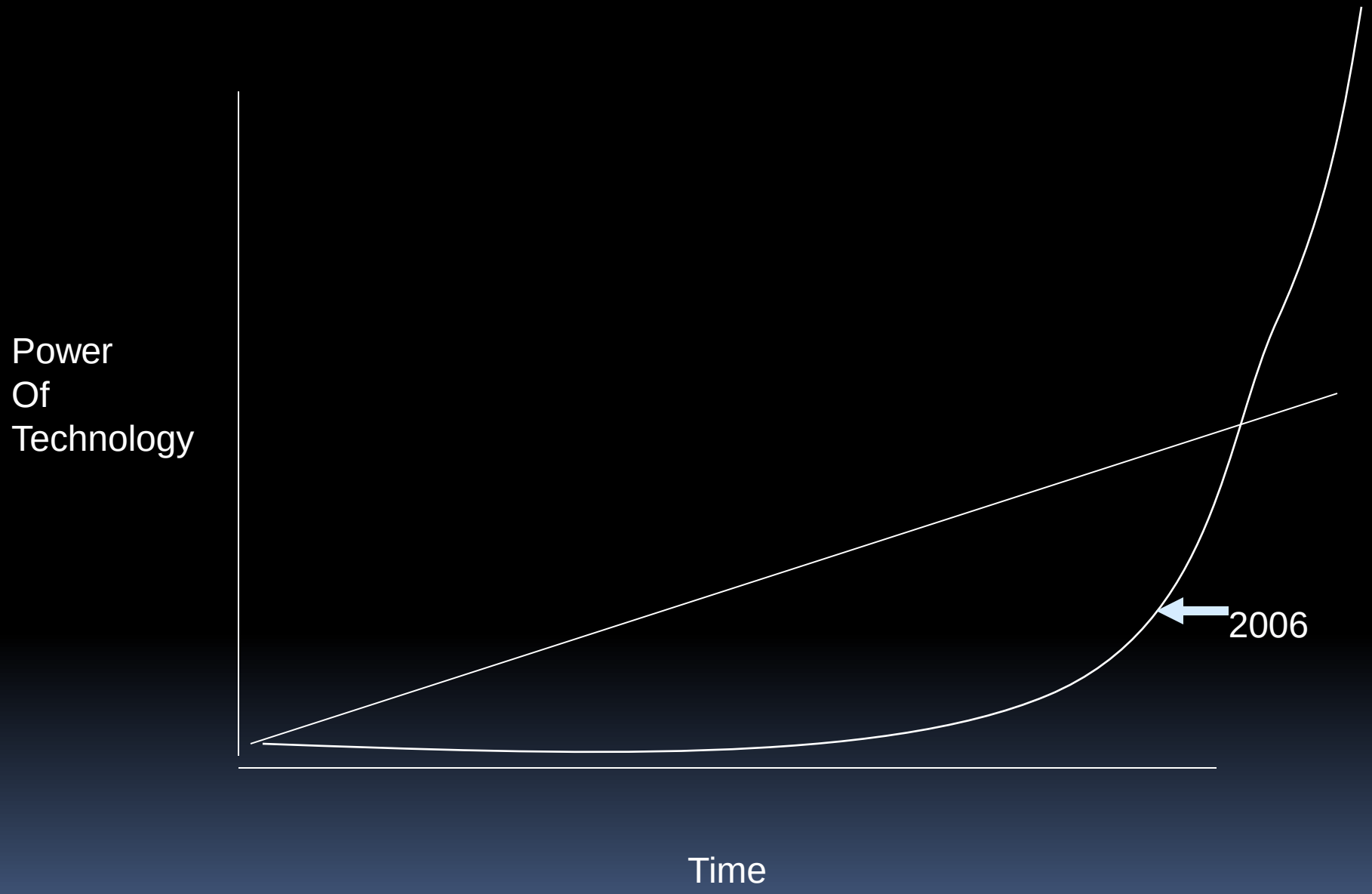
AUTHOR OF THE NATIONAL BESTSELLER THE AGE OF SPIRITUAL MACHINES


Power
Of
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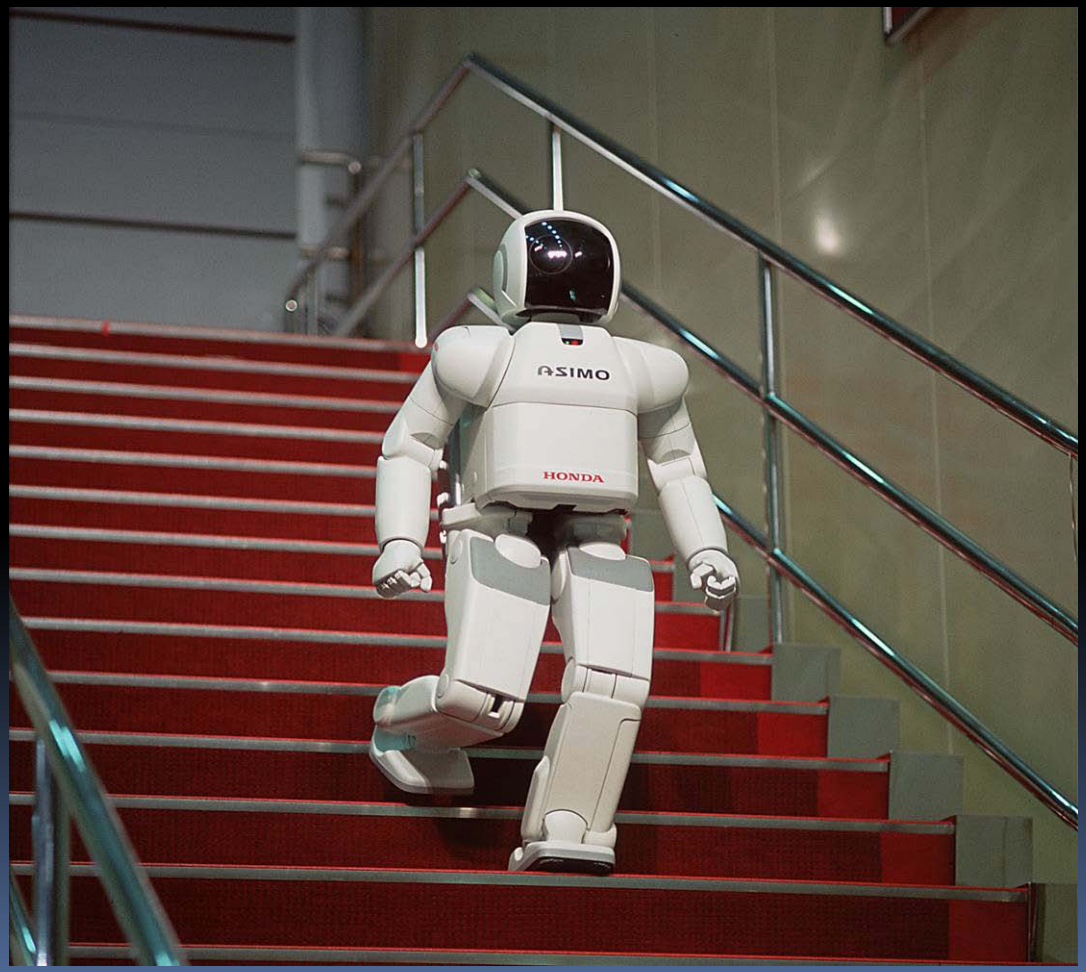
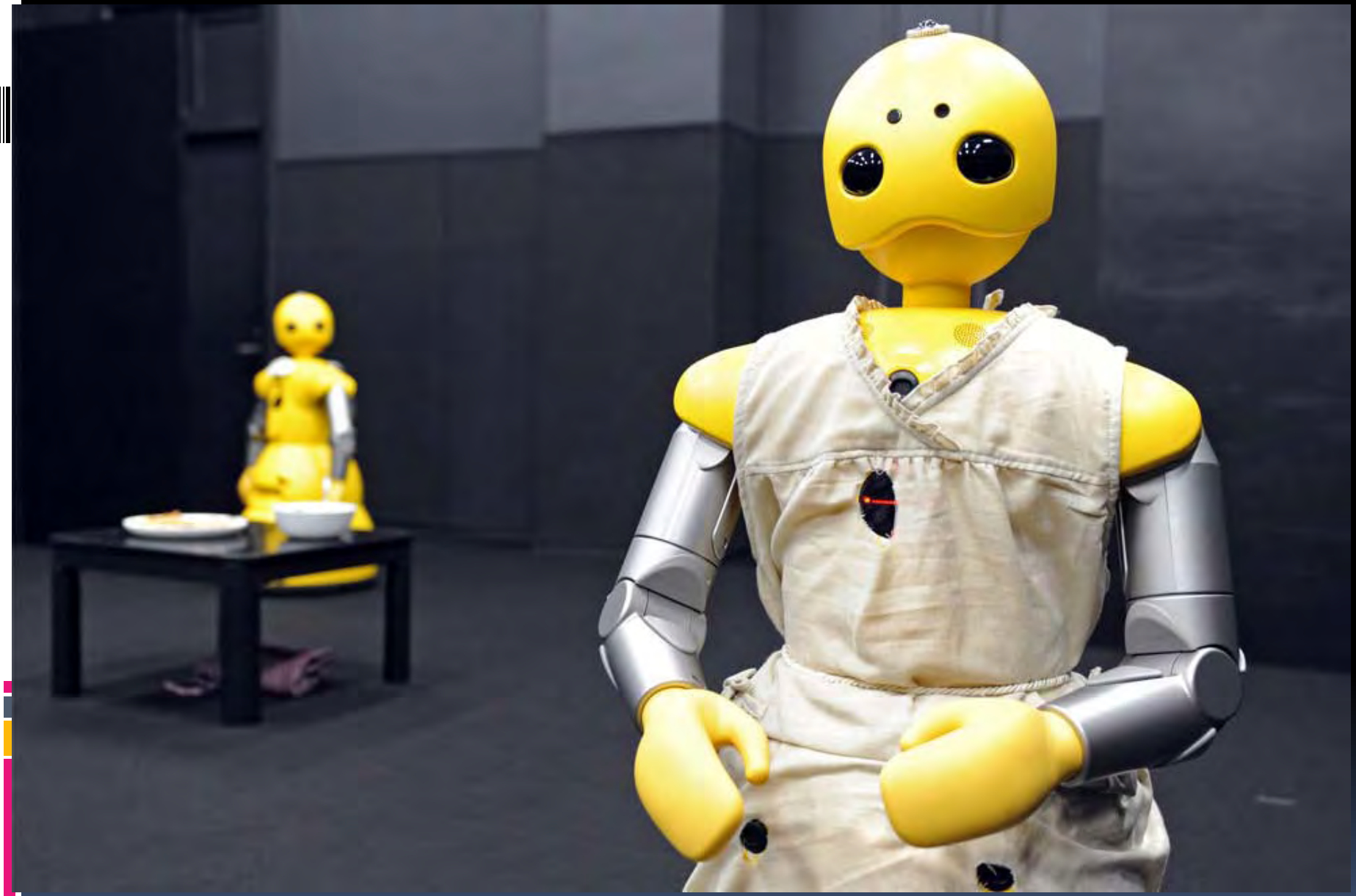
Time

ROBOTICS……





Momoko – Experimental Theater

My Spoon

Toyota Robots

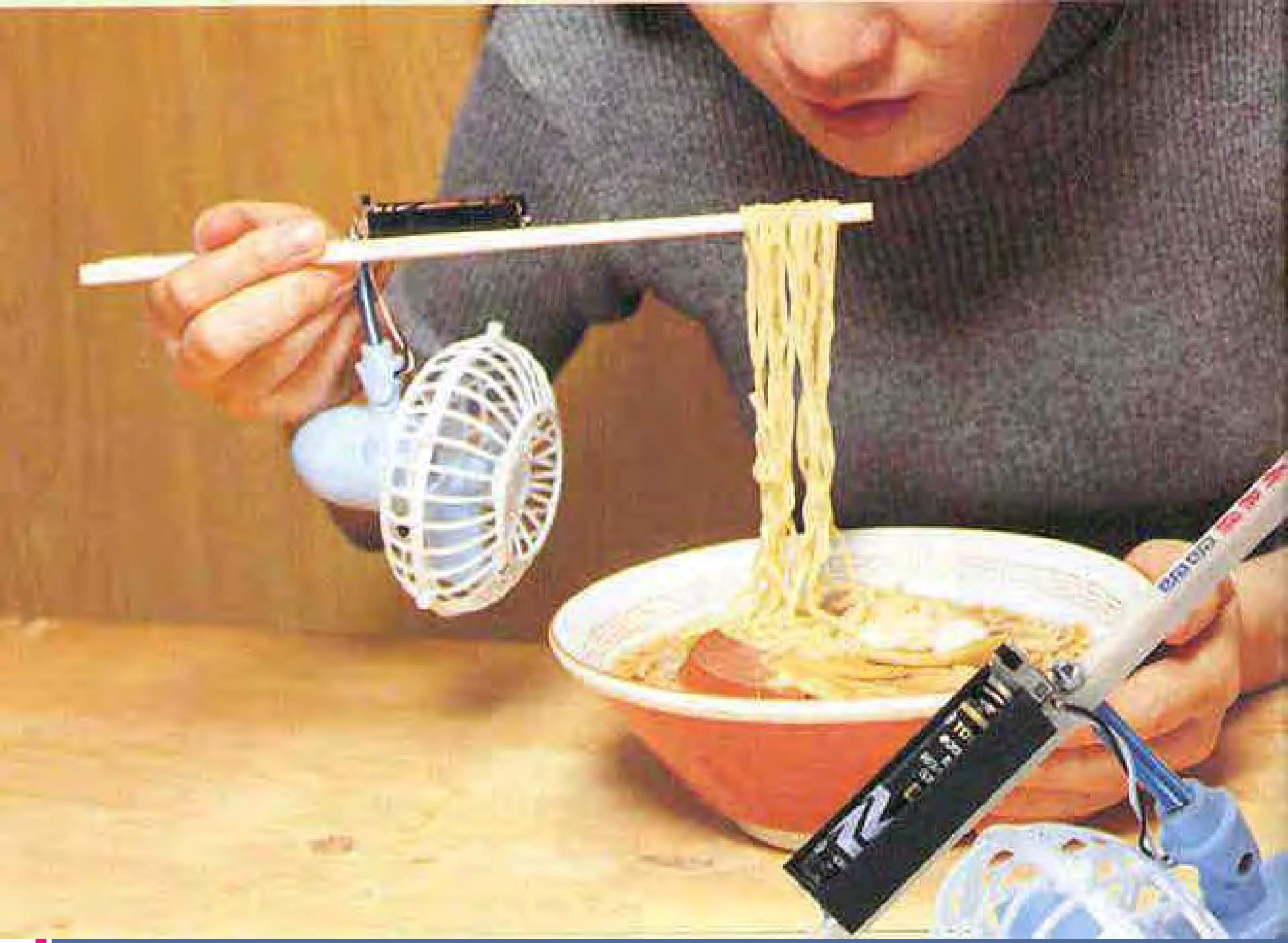
Farmer Wu’s home made robot

Rollin Justin (preparing tea)

Paro – robotic baby seals

I’m back….. (robotic arm)


Being Creative:

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