Project Andros - Immortality!

by Patrick M. Rael,

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My R.Max android head on my RoboSapiens android body, simulated.

Goal:

1. The goal of Project Andros is **immortality** via the encoding of the mind and experiences and goals of a living human being Patrick M. Rael into an android robot such that:

    1. the robot's mind satisfies Patrick M. Rael that it is him,
    2. the robot's mind is externally a convincing copy of Patrick to others, and
    3. the robot mind internally thinks it is Patrick but for the obvious fact it is in an android robot's body. The robot will think like Patrick, enjoying working on intractably hard challenges at cafes and other locales of solitude, and with a final goal to learn everything, just like the human Patrick. This is an attempt at artificial immortality.

Definition: strong immortality - infinite life extension retaining ALL of the life form's native architecture. eg; an immortal human retaining the entire biological body.

Definition: weak immortality - infinite life extension through artificial means while retaining PART of the life form's native architecture. eg; joint-replacement, cell-reparation/replacement, regeneration.

Definition: artificial immortality - infinite life extension while retaining NONE of the life form's

native architecture. eg; encoding a human being's mind into an android robot but retaining none of the biological organism.

Why:

1. **A larger goal of Patrick is to learn everything: that is the driving force behind this project. Therefore, immortality is merely a means to have the time to learn everything.** "Everything" is not limited to the knowledge of human-kind, nor is there a limitation to the immediate physical neighborhood of Earth and its solar system. This merely keeps the door open to the possibility of external knowledge.
2. The human body is not suited for immortality. Every component of the human body can be afflicted with some kind of disease or degenerative condition. Worse, even if the body remained healthy, geriatric slowdown typically precedes complete biological malfunction anywhere from 60-120 years on average.
3. There is no biological backup mechanism in case of catastrophic failure. Even if the biological human body could be kept young through artificial means, catastrophic accidents can end the life and without a backup this is final. This is a significant limitation of the biological human being.

Sentience:

1. **This is the hardest challenge therefore Patrick will solve it**.

Requirements not otherwise listed elsewhere in this document:

1. The software mind must not be locked into one specific hardware platform.
    1. It must be capable of adapting trivially to alternate hardware components, such as replacement eyes of an improved configuration.
    2. The android mind must be capable of changing physical bodies on the fly.
    3. It must be possible to execute (or live) in a simulated environment where the android body is a simulated avatar. The transition from physical body to virtual body is called Ghosting.
    4. It must be possible to execute (or live) in a non-robotic computer. However, this existence has minimal or no sensory inputs, so this is a limited existence. This experience is called Out-of-body.
2. The vision system:
    1. must have at least 2 eye cams,
    2. must move up and down together,
    3. must allow for triangulation to both point towards a very near object (cross eyed),
    4. must have eye lids capable of rapidly protecting the eyes in case of danger/dust,
    5. must be able to distinguish the red, green and blue light frequencies at a minimum, more frequencies at/past infrared and ultraviolet optional,
    6. must be capable of combining the primary (N) colors into mixed colors,

7. must have eye cams which can focus at arbitrary depths,
8. must have an iris capable of limiting the amount of light entering the eye (less light in bright sunlight, more in dim light and night and indoors),
9. must have 170 degrees both of horizontal and vertical visual field,
10. must be capable of stereo vision, since Patrick's mind will be in the android, he expects to look out of the eye cams and perceive full stereo vision, nothing less will be acceptable. (The Perceiver-Dreamer model [Penzar] should satisfy this reqmt).
11. it's not acceptable to have a simple bitmap of camera images as perception.
12. must have a solution for the question: If ultraviolet or infrared detection is provided, what is the primary color of ultraviolet or infrared, and additionally, are four primary colors required to make white? This analytical challenge is called The Primary Color Challenge (PCC) [detailed discussion in Penzar, Ch. 9, Part 9]. Based on this challenge, the first hypothesis follows:
    1. **The First Hypothesis of the Mind -** The challenge to program color-perception, white-perception, pleasure, pain, emotion, taste, smell, audio, touch and similar is the **same** challenge because these are all minor variations of the same thing in the mind. Therefore, the nature of the solution to the The Primary Color Challenge is also the same nature to the solution of programming color-perception, white, pleasure, pain, emotion, taste, smell, audio, touch and similar.
    2. **The Second Hypothesis of the Mind -** The human brain evolved over millions of years, and if consideration is given for the precursor chain of species then the aggregate evolution extends back to ~500-600 million years ago into the Cambrian time period. Yet the human body has limitations such as knee joints which wear out too soon for many elderly, even though bearing joints are more robust, because natural selection isn't competing for elderly humans bearing children to pass on genes of old robust knees. Generalizing and then Instantiating on the brain (keep up if you can), It should not be assumed that every component of the human brain is optimal, necessary, nor even desired for an artificial intelligence merely because human beings have that component in their brain.

3. The audio system:
    1. must have two directional microphones for sound detection which can detect the spatial direction of the sound source.
    2. must support stereo sound just as in humans,
    3. must support at a minimum the same range of audio frequencies humans hear, any extra range is an optional bonus,
4. The olfactory system:
    1. must support the same range of aerosolized and/or molecular compound sampler as in humans, any extra range is an optional bonus,
    2. is not required to have nasal cavities since breathing is not a requirement, and for the same reason does not require the nasal passage to connect to the throat,
5. The taste system:
    1. must be capable of detecting the 5 primary tastes,

2. need not have salivation capability,
3. need not be connected to the throat since there will be no stomach,
4. need not have teeth, but that can be an optional bonus,

6. The touch system:
    1. must have a body-perimeter-touch sensory ability of the entire body,
    2. is not required to have human-like skin, metallic look-and-feel is ok,
    3. can use hair as a short-range proximity sensor, but not to satisfy the touch reqmt,

A comparison of human and android characteristics:

AN OBJECTIVE COMPARISON OF HUMAN AND ANDROID-ROBOT CHARACTERISTICS, ver Feb 19, 2012		
ISSUE	**HUMAN**	**ANDROID**
Lifespan	Finite.	Infinite
Stages of life	1. Baby - Birth, 100% dependency on others, built-in hunger alert. 2. Childhood - Learning phase of motor skills, basic knowledge base expansion. 3. Young adult - Continued learning in prep for adult phase, experimental adult context formation. 4. Adult - Independence phase. 5. Geriatric - Physical and mental slowdown. 6. Death - The end.	A choice is available to either: 1. Duplicate the human stages or 2. Begin at adult phase with pre-programmed memories, knowledge and motor skills. In Project Andros the choice is #2 to begin adult phase with pre-programmed history.
Mind-backup for disaster recovery.	N/A	Easy
Pleasure	Default built-in capability.	Expectation of easy via PCC.
Pain	Default built-in capability.	Expectation of easy via PCC.
Food/energy-replenishment	Bio-mass ingestion 1-3 times daily on average. Excess leads to dynamic energy stores (aka fat).	For electrical model, electrical recharge N times daily TBD. Excess recharge does not lead to dynamic energy stores.
Food/energy variations and preferences.	Easy, subjective preferences for food.	Expectation of easy via PCC.
Inputs	1. Electromagnetic radiation (aka vision).	1. Electromagnetic radiation (aka vision).

	2. Energy replenishment via esophageal aperture input of bio-mass, water, (solid and liquid phases with early chemical analysis(taste). 3. Pulmonary input of oxygen+nitrogen (gaseous phase). 4. Skin can absorb some compounds. 5. Olfactory input/sampler (smell) of aerosolized molecules. 6. Auditory sampler of air/liquid vibrations (sound). 7. Spatial extents perimeter deformations (skin touch).	2. Energy replenishment via electrical recharge, and/or light for solar cells. 3. Auditory sampler of air/liquid vibrations (sound) via directional microphones. 4. Spatial extents perimeter sensors (touch). 5. Olfactory input/sampler (smell) of aerosolized molecules. 6. Pulmonary breathing dependency - N/A. No need to design a very limiting case since it's unnecessary, but a speaker(s) and resonating chamber should suffice.
Outputs	1. Dual gastro-intestinal output of excrement and urine. 2. Pulmonary exhaust of CO2 + nitrogen through the intake. Perspiration (water, salt, pheremones) from skin and glands. 3. Nasal mucous. 4. Ear wax. 5. Hair growth. 6. Nail growth.	Electricity and/or heat.
Disease/Illness/syndrome/allergy	There are 12,199 distinct diseases listed by the World Health Organization in ICD-10 for human beings.	EVERY impairment such as rust/oxidation, pink-plastic, worn-bearing, metal fatigue, un-rechargeable battery, brownout, etc ... , is fixable by easy replacement.
Emotion	Easy for most, hard for some.	TBD, expectation of easy via PCC.
Emotive cut-off switch	Easy for some, impossible for others.	Easy depending on design.
Level 8 IQ on L8-IQ-Scale.	Easy for some, seemingly impossible for others.	Expectation of Easy

Scope:

1. The initial goal is to encode 1 person's mind (Patrick M. Rael) into the android robot.
2. Nothing precludes from using the knowledge gained in this project to **repeat this process for other volunteers**, however the initial goal is to encode the scientific mind cast (see

mind-casts from Penzar Ch. 6 Design of the Android Mind -> M1 Architecture). This reduction from 10 to 1 range of behavior is thus a 10x decrease in behavioral programming. This is a significant simplification while honoring the scientific personality of Patrick Rael.

Time-line:

1. The start of the project is Dec. 17, 2011, and the allotted time is 5 years, so completion time is Dec 17, 2016. It is well known in software engineering that software takes twice as long to complete than the original estimate. The 5 years is a hard date, therefore the software encoding of the mind is initially planned for 2.5 years, which allows the time to slip to twice as long. Although this seems like an optimistic estimate, Patrick is not starting from a blank slate. A large amount of up-front work is completed and published (Penzar) and will form the basis of the starting point. Additionally, some android hardware and software is already available, that can be used also as a starting point.

Approach:

1. The implementation of Project Andros will borrow heavily from the Penzar e-book:
    1. Chapter 6, Design of the Android mind, including the M1 Architecture, the 10 components necessary for a sentient android robot. This is a very high-level architecture which allows for any of the 10 components to be implemented with maximum flexibility.
    2. Chapter 3, On intelligent life,
    3. Chapter 4, On a measure of intelligence of life forms,
    4. Chapter 5, World peace,
    5. Chapter 10, Immortality via the android robot,
    6. Chapter 11, Gender neutral third person pronouns.

Phases:

1. Implement the M1 Architecture, specifically all 10 components.
2. Encode the memories.
3. Implement the Feel-brain, the emotional half of the mind.
4. Implement the Imprinter pattern where R. Patrick learns to imitate Mr. Patrick.

Participants:

1. Patrick M. Rael (to solve sentience and any other seemingly intractable problems)
2. A project leader. [Patrick will be acting in these other roles until they are filled when resources become available].
3. Secretary if that becomes necessary (the secretaries actually run everything).
4. See Resources -> Technical expertise further below.
5. Software team.
    1. Unix Kernel internals.
    2. Bios knowledge, pre-boot environment, hardware tweaks and on/off peripherals.
    3. Unix run-time expert (pre-boot, boot, init+, run-levels, processes,...).
    4. File-system expert: layout of system configs (ie, /etc, /boot, ...).
    5. Unix processes, run-time monitoring (truss, /proc, dtrace, ...), command shell pipelines, re-direction of stdin/stdout/stderr, cron, editors (vi/emacs ...).
    6. Application defaults: where run-time application defaults and per-user configuration and options go.
    7. Knowledge of Unix or willing to learn (extra points for a plastic mind):
        1. ldd.
        2. lsof.

3. sockstat/netstat.
4. tcpdump, ssldump.
5. for and while loops at the command line unscripted.
6. Virtual Machines: VMware, VirtualBox, Xen, ... and/or similar.
7. Virtual Machine as Libraries: Wine, ...

8. Experience with any of these 3-D Graphics first-person-shooter games:
    1. BattleField-II or similar. Extra points if you can shoot down a helicopter on approach and it crashes on you and 2x points for how many times (x) your body somersaults in the air from the explosion (meaning you need high-performance graphics to see that).
    2. Tribes: Pads training course, extra points if you can beat Pat's time around course.
    3. Star Trek Voyager Elite Force expansion pack. Extra points if you found a good reason to shoot ensign Paris in the mess hall. Extra points if you did it to explore the boundaries of the game, not out of revenge. Double points if you guessed correctly what would happen subsequently. Extra points for being a model prisoner. Was species 8472 a worthy opponent? How about the Hirogen?
    4. Return to Castle Wolfenstein (defeat the Uber Soldat).
    5. Quake II. Extra points if you enjoy dueling with Makron.
    6. BattleZone arcade: extra points for the supertank solution, dodging missiles, maximum number of shots fired before missiles strike/impact, and Nx points for ability to dodge the missiles repeatedly N times for the same missile.
    7. Dungeon Master. Extra points if you discovered the anti-copy device on the 3.5 diskette on your own.
    8. Mech Warrior 2 - Extra points if you found the physics violation (the bounce) on your own and could exercise it at will at the raised ground circular area. Extra points if you could bounce high into the clouds. Double points if you have a picture to prove it, triple if you have a recording of it. Points resets to 0 if your consulted a cheat-sheet to find this.
9. Knowledge of 3-D Graphics: Commander-mode 3D games (or willing to learn):
    1. Homeworld 1 or 2. Extra points if you think the Dreadnaught derelict ship is really just a supergigantic laser beam gun with severely underpowered engines added as an afterthought, but you like it anyways because it lights up the enemy.
    2. Other examples where the user gives orders to individual units/groups to do the details, eg; group 1 is aggressive and goes to this location, group 2 is defensive of home base.
10. We do not use windows OS since we want a robust, open platform.
11. Extra points given for knowledge and use of: VMware, linux, freebsd, solaris, Plan 9 (bonus points extra for the movie too), vnc, ssh, alias. Extra points for the obvious hidden eggs, more or less.
12. Cut all your remaining extra points in half if you run any Unix virtual machine on top of windows, obviously a severe deficiency in understanding the concept of robustness.

6. An oversight committee (below).
7. An advisory panel (below).

Resources:

1. Physical robotic hardware (see Hardware below).
2. Time for Patrick to think and make breakthroughs in this complex project. Having an unrelated real-world job takes away time from this project, so his salary should come from the foundation.
3. Technical expertise in:
    1. Mechanical engineering.

2. Electrical engineering.
3. Computer engineering.
4. Optical engineering.
5. Acoustics engineering.
6. Robotics engineering.
7. Language.
8. Sculpture/Art.
9. Chemistry (for the taste and olfactory systems).

Hardware:

1. An android robot is necessary to complete this project, but not to start it.
2. A compact computer to fit in the cranium chassis. This might possibly come from COTS, however the limited space in the cranium-chassis means space is tight. Check to see if an entity will build it for free provided they get their logo in a highly visible space.
3. A high-survivability head with reinforced bullet-protected material (kevlar, ...). Also shock absorption for the robot's computer brain and other head components.
4. Vision: Dual eye-cams for stereo. The Dreamer-Perceiver model from the M1 Architecture (Ch. 6, Design of the Android Mind, Penzar, Rael). This design permits the robot to have both real-world visual perception and also dream-time visual perception.
5. Eye-Lids: Eye-cam protectors will have a range of motion to open and close and in-between (squint).
6. Eye movement: Synchronized up-down, synchronized left-right and with triangulating ability to point both directly at close objects. The triangulation mechanism will be used to aid in depth perception using simple math.
7. The Visual system will NOT emit electromagnetic radiation as in some modern visual ranging hardware. Instead, we will find the heuristic/algorithm/technique to do this just as humans do. Emission of rays could impact the M1 component of survival, giving away the robots location when undesirable to do so.
8. Eye focus: Dynamic focus for determinant of real world, and also under android control to force focus depth. This will aid in looking through a partially clear window, or to focus on the window, each being valid focus depths. Also, the stereographic focus diagrams (dot-pictures) pictures will require this arbitrary depth of field focus. Many cameras provide this auto-focus by default, with manual override of focus.
9. Eye brows for non-verbal gestural communication.
10. Graphics Accelerator: A multi-processor graphics card which will allow for the creation of a high-performance first-person 3-D virtual world.
11. Audio Input: Two directional microphones will be used for input to determine direction of sound source.
12. Audio Output: Device to generate sound from the mouth region.
13. Olfactory Input (aka smell): gaseous particle/molecule discriminator. (LOWER PRIORITY)
14. Taste: Solid/liquid phase molecule/particle sampler, 5 tastes as per humans. This is not necessary for ingestion of food, that is not in the design. Nevertheless, it will be useful to have taste ability to relate to human beings. (LOWER PRIORITY)
15. Balance gyros or similar: Maintenance of the up-vector in the 3-D Perceiver-Dreamer virtual world.

Software:

1. Operating System: Unix. This is a pragmatic choice for: robust, free, virus-free, shells, configurable, and with the source code can be changed and recompiled if necessary.

2. Architecture: The M1 Architecture in Penzar which has 10 components will satisfy this.
3. The encoding of the mind is planned to use the Brain-Store component of the M1 Architecture, a Unix file system with symbolic links. This design was in the original M1 Architecture from 1999 at howtoAndroid.com. The file system symbolic link allows for arbitrary connection of any location/idea to any location/idea, which will be implemented as a file system tree.
4. The brain-store file system can be tar'd/zipped and transferred with nominal physical hardware dependency. Any Unix neophyte can do this.
5. Additionally, this file system of memories can be traversed with the shell. Therefore, Unix shell programmers will have the knowledge of traversing the brain-store of the memory of this android robots mind, and the file system syntax and semantics will be familiar.
6. File System: A mirror file system (RAID 1) for extra robustness will limit the impact of a hardware drive failure. Also, off-body (aka off-site) backups will be critical to solve the catastrophic failure case. Hot-spares are not necessary, robot clones are not required!
7. Analytical Methods: The section titled Analytical Methods of the Robots Mind, Ch. 6 Penzar, will be used for the robot minds analytical abilities as a start.
8. Thinking versus Emotion: The Think-Brain and the Feel-Brain (Design of the Android Robots Mind, Ch. 6 Penzar, Rael) will be run-time detachable (modular instead of monolithic). This will allow for a thought to initiate an emotion, and the reverse. This doesn't preclude an emotion deriving from other means.
9. Mind-Cast: The Mind-Cast for this project will be Scientific (as is P. Rael) from the list of ten common Mind Casts from the M1-Architecture, Ch 6. Design of the Android Mind, Penzar.
10. Memory Model - The Trigger Memory model from the original M1-Architecture (http://howtoandroid.com/Architecture.html). In the Trigger Memory model the emphasis is on limiting the triggers, else the entire brain could trigger from being well-connected. Therefore, the memory Visitor and the Suppressor are key components.
11. OpenGL high-performance graphics library for quick and dynamic changing of the Perceiver-Dreamer vision model.
12. Perceiver-Dreamer Visual model - In the Perceiver-Dreamer model, the robot lives in and reacts to it's virtual world. All physical input to the android is mapped into the avatar in this world, and it thoughtfully and emotionally reacts to what it's avatar perceives. This decouples the android robot from reality by 1 layer, also known as perception. This is a natural model for the human dreaming visual system, so two birds with one stone.

Strategies:

1. It is not necessary to set as a requirement a feature that is beyond human capability. The bar is lowered to the capabilities of humans. eg; it is not necessary to make a requirement that the android learn an entire new language in 1 day.
2. A feature need not be implemented simply because humans have it. Humans have calcium bones, but this can be improved with carbon-fiber or titanium for the android. Ditto for joints: ball- and roller-bearings may be better than cartilage fluid joints. Humans also are susceptible to diseases, but it's not necessary to duplicate that feature in the android robot.

Testing for success/failure:

1. Identification, or establishment, of an entity such as a University or Institute which can perform psychological testing of the R. Patrick Rael to assess IQ using standard approved IQ tests.
2. Non-standard tests such as taking the robot to lunch (energy replenishment), or agree to a request from the robot to join zim for lunch.
3. Psychological testing for the establishment of self.
4. Testing will additionally include from the M1 Architecture:

1. Spatial-Extents - The bounds of self in space. aka I in the physical sense.
2. Species-Recognition - Others like me. This is the Social Context. Remote minds.
3. Survival - Food and energy replenishment, fear of dismemberment.
4. Temporal Extents - The awareness of the passage of time, the speed of thought.
5. Analogy Processor - The system to understand and create analogies.
6. Mind Casts - The top 10 observed mind patterns and some of the characteristics frequently associated with them: Science, Religion, Warrior, Political, Business, Art, Bios, Herd, Self, Partner.
7. Brain-Store.
8. Sensory Input/Output - The physical interface with the world.
    1. Electro-Magnetic Spectrum - Video, Infrared, UV, ... (aka vision).
    2. Molecular Vibration Waves in mediums - Audio (aka hearing, speech).
    3. Molecular/Atomic vibrations - Temperature.
    4. Physical Bounds Intersections:
        1. Short-range extended proximity sensors (aka hair).
        2. Perimeter sensors - skin.
    5. Chemical Analysis :
        1. Solid/Liquid-Phase Sampler - taste.
        2. Gaseous-Phase molecular sampler - olfactory.
        3. Ingestion - aka energy replenishment.
    6. Balance - Gravitic/Inertial up-vector stabilizer.
    7. Motor Control - The control of the robot's moving parts and other hardware features.
9. Focus - What I'm doing right now.
10. Language – Internal and external representation.

Risks:

1. Programming an android sentient mind has never been done before. Most efforts to date create a neural-like network and the goal is for it to learn. That approach is not the approach in Project Andros, since an already existing mind in Patrick Rael including memories is the goal of the Project Andros. As with any new seemingly intractable challenge, breakthroughs will need to be made. Fortunately, most of the hardware for the android robot body exists, but is costly. The big challenge is to achieve sentience in the android robot, and specifically the encoding of the sentient mind of the human Patrick M. Rael. He has worked for decades on understanding how his and other minds work, and thinks he has a head start, and has published related material on his website howtoAndroid.com and his e-book Penzar.
2. Acquisition of a physical android robot body. This either costs a lot of money. Explore the possibility of a donation of a robot to this project. The Asimo android from Honda looks ideal.
3. Pat normally works without a time-limit, yet a time limit is imposed on this project. Time pressure could be a detriment. It could also force pragmatic solutions instead of ideal solutions.
4. Pat normally works alone without interruption and without others aware of his project. This project has higher visibility. It remains to be determined if this is effective for him.