zOS: Next Generation Paradigm for Artificial and Emotional Intelligent Networks and Services

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Outline

- Project Goals, Motivations
- Project Overview
- Project team members
- Background and Related Research
- Overview of project tasks
- Activities and outcomes
- Deliverables and benefits
- LIFE form input
Project Team Members

Faculty

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Students

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Motivation

- Smart devices are proliferating with the promise to make human lives better.
- Large set of smart wearables: phones, watches, glasses, etc.
- The machines are monitoring almost every aspect of our lives.
- Problems arise because these technologies use proprietary underlying infrastructure that enforces brand controls.
- Current control and management technologies are incapable to manage and secure such complex, dynamic infrastructures and services.
Project Goals, Motivation

Goal

- Primary goal is to empower the human
- Unification technology that reduces the proliferation of personally identifiable information
- Introduce a new model where people manage their own information, not Facebook or Google, or some other company
- Machines, hardware or software can comply, cooperate or be firewalled by intelligent proxies
- Using AI technology to learn and understand emotional patterns to assist human-coached decisions
  - Providing services to help daily life
zOS architecture
zOS Application

Intelligent Cyber Security Assistant ICSA

Learning & Intelligence
Predicts Event Behavior
Provides Recommendations
Engage and Apply Automated Actions
Create a smart zOS based backup system using voice commands

Can be partially on cloud & partially on the device
zOS Application
A system can be considered as a tuple as
\[ \text{System} = \{\text{Hardware, Software, Configuration}\} \]

We can create a device specific unique ID using the system definition as

- **Hardware specific information:**
  - MAC
  - CPU information

- **Software specific information:**
  - Active services
  - Kernel

- **Configurations:**
  - Users and their passwords
  - Boot configuration
zOS boot-up time integrity check

Boot-up time system integrity check

Hardware attributes

Key generator

Obfuscator

System Encryption/Decryption

Success

Decrypt & Run

Failure

Shutdown

Software attributes
zOS System Registration

- Step 0: Create zOS system
- Step 1: Create KP1 and KP2 and keep the PUB keys on zOS and PRI keys on-house
- Step 2: zOS creates AF
- Step 3: zOS contacts LS with AF (encrypted with PUB2)
- Step 4: DigitalMe servers generates LC using AF with PRI1
  \[ LC = AF + \text{Capabilities} + \text{Time info} + \text{Signature (using PRI1)} \]
- Step 5: DigitalMe uploads LC to LS and AS through HTTPS
zOS License Check

- Step 1: Get time information from LS (can be encrypted using KP3)
- Step 2: Using PUB1, validate signature (through RSA) in ThinPad (AS)
  - Valid license? Continue operation.
  - License expired? Buy license
  - License invalid? Shutdown system
zOS Environment Setup

- Create AEIOS environment
- Task 1.a – 3 Raspberry Pi will be used for thin-tech POD
- Task 1.b – A cloud environment will be created for the application deployment
- VM from Amazon or ACL private cloud
zOS Voice Interface Setup

- Include speech recognition & voice to text
- Open source tools: CMUSphinx, Mozilla Speech Recognition, Kaldi, Simon, etc.
- Commercial tools, e.g. Google API
Milestones and Deliverables for 2018

Milestones for the current proposed year:
- Q1: Building the framework, including registration & licensing system together with footprint
- Q2-Q3: Creating speech recognition & voice based service oriented commands and creating thin-pads to be used for the personal assistant
- Q4: Building proof-of-concept environment

Deliverables for the current proposed year:
1. Expanding framework;
2. Improving the personal assistant capabilities and connecting to the services;
3. Various services;
4. Public reports or publications.
Potential Member Company Benefits

Expected benefits to members and other CAC projects include:

• Creating the next-gen open-source middleware/OS
• Help community through services such as
  • Digital Patient Assistant
  • Digital IT Assistant
• Know-how on how to enhance the living environments
Please take a moment to fill out your L.I.F.E. forms.

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Select “Cloud and Autonomic Computing Center” then select “IAB” role.

What do you like about this project?
What would you change?
(Please include all relevant feedback.)