

# Clement A. Skalski, Ph.D., P.E.

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[skalskic@comcast.net](mailto:skalskic@comcast.net)

860-673-7909 (Connecticut)

941-375-2975 (Florida)

860-402-8149 (cell)

## EXPERTISE

- Elevators
- Control Systems, Transducers, and Actuators.
- Induction and PM Synchronous Motors, Electromagnets and Solenoids.
- Motor Drive Systems.
- Modeling and Simulation of Physical Systems using Matlab/Simulink.
- Motion Controls and Safety Systems for Elevators and Land Transport Systems.
- Systems Using Embedded Processors. Mechatronics.
- Magnetic, Capacitive, and Electro-Optical Sensors.
- Vibrations and Ride Quality. Active Vibration Control Systems. Levitated Systems.
- Commercial Product Design, Innovation and Marketing.

## QUALIFICATIONS

- Electrical Engineering degrees through the PhD from Rensselaer, Cornell, Columbia, and Northeastern.
- Registered Professional Engineer, Connecticut (20821)
- Numerous technical publications and holder of 30 Patents.
- Senior Member IEEE.
- Past Chairman, IEEE Consultants' Network of Connecticut.

## EXPERIENCE

- Consulting Engineer with Skalski Associates since 1999.
- Chief Engineer of elevator consulting company since 2000.
- 21 years as Principal Engineer with United Technologies Corporation, Otis Elevator Engineering Center in Farmington, Connecticut.
- 5 years as Member of Technical Staff at Mitre Corp. supporting Federal Railroad Administration and Urban Mass Transit Administration.
- Many years experience doing research engineering in Aerospace Industries.
- DETAILED EXPERIENCE, PATENTS, AND PUBLICATIONS FOLLOW

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## **DETAILED EXPERIENCE**

### **1999-present: Skalski Associates**

Dr. Skalski founded Skalski Associates in 1999. Some of the work performed to date includes:

- Assistance to patent attorneys as technical expert
- Assistance to attorneys related to breach of contract
- Assistance to attorneys related to elevator accidents
- Design of motion controls for CT scanner (includes motors & drives)
- Simulation and study of system for extraction of energy from ocean waves
- Analysis of problems related to failure of electrical machinery
- Analysis of problems related to motor drive failures
- Design of power feeder systems
- Mechanical design of elevator systems
- Trade-off studies related to elevator systems
- Consultation on automatic door systems
- Consultation on robot safety
- Consultation on new motor technology for appliances
- Hardware evaluation and data acquisition
- Extensive use of Matlab®/Simulink software

He is belongs to the IEEE Consultants' Network of Connecticut and is a past Chairman.

### **1977-1999: United Technologies Corporation, Otis Elevator**

As a Principal Engineer with Otis Elevator Company, he was charged with product innovation and worked in the following areas:

- Preliminary system design studies
- System analysis and simulation using Matlab®
- Product innovation, proof of concept, and outsourcing
- Vertical and horizontal elevator ride quality
- Motion control systems for high-rise elevators
- Cost-effective, mass-produced elevator systems
- Safety and control systems using radars and lasers
- Electronic safety governors and techniques for elevators
- Active roller guide and magnetic guidance systems
- Design of various control circuits, sensors and actuators
- Load-measuring and pre-torque control techniques
- Rotary and linear motors and drives (DC, induction, synchronous)
- Automated people mover systems

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Some specific product related activities were:

- Established motion control technique used on Otis high-rise elevators since early 1980's
- Proposed in mid 1980's and then built active vibration controls to improve ride of high-speed, high-rise elevators
- Designed and built low-cost linear-motor door operator
- Tested motion controls and active vibration controls on high-rise elevators
- Improved performance and reduced cost of the Primary Position Transducer used on high-rise elevators
- Instrumental in introduction of Matlab® and other simulation tools into engineering center
- Solved many dynamic controls problems related to systems having structural resonances, nonlinearities, and time-variable parameters
- Employed vendors and consultants in areas related to electronics and electromechanical apparatus

## **1972 - 1977: MITRE Corporation - Washington Operations**

Systems engineering. Staff support to Program Manager in Federal Railroad Administration. Reviewed technical reports and plans prepared by contractors to FRA. Planning related to advanced electrical propulsion and suspension systems, railroad electrification, signaling and communications, and braking systems. Advanced studies related to linear electric motors and magnetic suspension systems. Developed three-dimensional computer model for linear induction motors (published paper and extensive report). Work for Ontario Ministry of Transportation and UMTA on propulsion systems for people movers.

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## U.S. PATENTS

<b>NUMBER</b>	<b>TITLE</b>
6,437,315	Radiation-based contactless position reference system and method for elevators
6,253,879	Apparatus and method of determining overspeed of an elevator car
6,161,653	Ropeless governor mechanism for an elevator car
6,137,255	Apparatus and method of controlling a linear motor door operator
5,955,709	Elevator control system featuring all-electromagnet vibration and centering elevator car controller for coupling a roller arranged on a pivot arm to a guide rail
5,816,369	Method of mounting an elevator roller guide on a guide rail
5,749,444	Contactless slide guide for elevators
5,652,414	Elevator active guidance system having a coordinated controller
5,617,023	Industrial contactless position sensor
5,597,988	Control system for elevator active vibration control using spatial filtering
5,535,853	Actuator having a two ended actuator rod movable longitudinally and transverse
5,467,850	Permanent magnet, magnetodynamic safety brake for elevators and the like
5,467,243	Electromagnet control system
5,439,075	Elevator active suspension system
5,400,872	Counteracting horizontal accelerations on an elevator car
5,373,123	Electromagnetic gaging of elevator rails and other structures
5,367,132	Centering control for elevator horizontal suspension
5,329,077	Elevator ride quality
5,322,144	Active control of elevator platform
5,321,217	Apparatus and method for controlling an elevator horizontal suspension
5,308,938	Elevator active suspension system
5,304,751	Elevator horizontal suspensions and controls
5,294,757	Active vibration control system for an elevator, which reduces horizontal and rotational forces acting on the car
5,274,203	Smart position transducer system for elevators
5,117,946	Elevator cab guidance assembly
5,035,301	Elevator speed dictation system
4,527,662	Elevator speed control
3,878,432	Contactless ignition system
3,255,421	Negative resistance distributed amplifier
3,235,814	Tunnel diode amplifier stabilized against oscillations

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## PUBLICATIONS

1. Hundreds of internal, proprietary reports.
2. *Active Vibration Control for Elevators*, IEEE CT Mini-Conference, Control Systems - Theory and Applications; Nov, 2005.
3. *Succeeding With Innovative Product Ideas*, IEEE/CNC Newsletter; Jun, 2001.
4. *Use of Modern Technology to Improve Elevator Safety*, NAESA workshop; Oct, 1996.
5. *Elevator Vibration Reduction Using Closed-Loop Controls*, presented at United Technologies Engineering Coordination Activity (UTECA) meeting; 1995.
6. *High-Performance Elevator Control System*, presented at Industry Application Society (IAS-IEEE) Annual Meeting in Mexico (1983). This paper was reprinted in Elevator World; Nov, 1984.
7. *The Air-Core Linear Synchronous Motor – An Assessment of Current Development*, MITRE Corp. Tech. Rept. MTR-7028; Sep 1975 (public document no longer available from NTIS, request PDF from Skalski Associates).
8. *Application of a General Analysis for Single-Sided Linear Induction Motors*, IEE Conference on Linear Electric Motors, London; Oct, 1974.
9. *Performance of Magnetic Suspensions for High Speed Vehicles Operating Over Flexible Guideways*, ASME Transactions, JOURNAL OF DYNAMIC SYSTEMS, MEASUREMENT, AND CONTROL; Jun, 1974.
10. *A General Analysis for Spherical Electromagnetic Bearings*, PhD Thesis in Electrical Engineering, Northeastern University; Apr, 1972.
11. *Application of Electromagnetic Pressure Phenomena to Inertial Instrument Engineering*, 1969 Symposium on Unconventional Inertial Sensors.
12. *Comparison of Actively Leveled Test Platforms*, IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT; Mar, 1968.
13. *Capacitance Distance Transducer*, PROCEEDINGS OF THE IEEE; Jan, 1968.
14. *Results Obtained with Tunnel Diode Superregenerative Receivers*, PROCEEDINGS OF THE IRE; Oct, 1962.
15. *Negative-Resistance Distributed Amplifier*, PROCEEDINGS OF THE IRE; Nov, 1960.