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Professor Paolo Atzeni
Università Roma Tre
Dipartimento di Ingegneria
Sezione di Informatica e Automazione
Via della Vasca Navale 79
00146 Roma, Italy

Re: Reference letter for Professor Alberto Paoluzzi's elevation to Emeritus Professor

Dear Professor Atzeni,

I am extremely pleased to give my contribution in evaluating the academic activity of Professor Alberto Paoluzzi in support of his elevation to the role of *Emeritus Professor*. I am very familiar with Professor Paoluzzi's research activity, which overlaps my own research in the areas of computational geometry and topology, and in solid modeling, and with his numerous outstanding academic achievements. I know him since the beginning of my career in Italy, and I learn a lot from his work and accomplishments over the years.

Alberto Paoluzzi played a central role in the development of both research and university education programs in computer graphics and in solid modeling in Italy. He has been a pioneer in computer graphics education by introducing the first course in computer graphics in an engineering program in Italy. This was for me an important inspiration and reference when I developed the first computer graphics course in a Computer Science department in 1987, and the first curriculum in visual computing in 1990. More recently, he contributed to the foundation of a new graduate program in Computational Science. Alberto started also a very successful computer graphics research laboratory at Roma La Sapienza, which with the labs in Genova, at the University and at CNR, and at the CNR in Pisa, paved the way for the success of the research in computer graphics and in geometric and solid modeling in Italy.

You can see the quality of his research and his mentoring from the very successful researchers he formed over the years, who occupy   prestigious positions in industry and academia. I can mention Roberto Scopigno, Director of CNR-ISTI, Fausto Bernardini before at IBM and now at Google, Valerio Pascucci, professor at the University of Utah, the most prestigious visualization venue in US. Alberto continued important collaborations with his former students, but he has also been actively and successfully collaborating with many very prominent scientists in the field of geometric and solid modeling around the world.

Professor Paoluzzi has been a pioneer in the research in geometric and solid modeling, with an undisputed national and international reputation of excellence. A very distinct and extremely important characteristic of Alberto's research activity, that makes his contributions unique in the field, is the combination of a

strong mathematical component with the development of efficient and effective software tools, based on principled computer science techniques and languages.

A fundamental contribution of Professor Paoluzzi's work has been the multidimensional generalization of geometrical methods and algorithms in solid modeling, which has been the basis for fast implementation of robust geometric languages and systems. An impressive result in this context is the "winged" representation of multidimensional triangulated spaces, proposed in a paper appeared in Computer Aided Design in 1993, to be used both for boundary models. and cellular decomposition of solids. This constitutes a milestone in the research on data structures for d-dimensional simplicial complexes, and has been also fundamental for the subsequent research on dimension-independent representations for simplicial complexes and beyond.

The "winged-triangle" representation, later extended in the "winged" representation, supporting Boolean algorithms has been at the core of the Minerva solid modeler, a solid modeler written in Pascal working on IBM and Apple personal computers, presented in a paper appeared in CAD in 1989. This work provided also foundations for the design language PLaSM, published in his famous ACM ToG paper in 1994, as a geometry-oriented extension of the Backus' FL language, with various implementations of its kernel in Common Lisp, Scheme, C++, interfaced from Python. PLaSM is used widely for teaching programming and geometry to students at all levels in K-12 schools and universities, and by researchers as a powerful tool for fast testing of geometric algorithms and data structures. Alberto's multi-decade-long work culminated in the linear algebraic representation, a sparse-matrix encoding for chain complexes, that unifies the representation of meshes, solid and graphical models, and images, also discussed in his 2020 paper appeared on ACM TSAS.

Professor Paoluzzi is a very distinguished scientist with an undisputed national and international reputation of excellence in solid modeling. He co-authored more than 120 papers in international journals and conferences, plus three books, including "Geometric Programming for Computer-Aided Design" published by Wiley, which has been and is a fundamental reference for any student and researches in geometric and solid modeling. Alberto's international leadership in the field and seminal contributions have been recognized by the elevation to Pioneer of the Solid Modeling Association (SMA).

In summary, Professor Paoluzzi has given fundamental contributions to the research in the geometric modeling field, at the intersection of applied math and theoretical computer science. As you can see, I have the highest opinion of Professor Paluzzi's achievements and a high consideration of him as a scientist and as a colleague. Thus, I strongly recommend granting him the title of Emeritus Professor.

Please feel free to contact me for any questions that can help in your deliberation.

Sincerely,

Leila De Floriani
Professor,
University of Maryland at College Park