

Final thesis report
DESIGN AND DEVELOPMENT OF A STAIR-CLIMBING BABY
STROLLER

Nicholas Kokkinos

Georgios Chatzigeorgiou

Limassol, May 2025

CYPRUS UNIVERSITY OF TECHNOLOGY
DEPARTMENT OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING AND
MATERIALS SCIENCE

Thesis report

DESIGN AND DEVELOPMENT OF A STAIR CLIMBING
BABY STROLLER

Made by

Nicholas Kokkinos

Georgios Chatzigeorgiou

Supervising professor

Dr. Georgiades Tasos

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This project would not have advanced without the unwavering support and guidance of our university professors, who have provided us with invaluable knowledge and mentorship throughout our academic journey. We extend our deepest gratitude to our university for equipping us with the necessary resources and facilities to bring this project to life. Particular gratitude to our supervising professor, Dr. Georgiades Tasos, for his incisive technical guidance and unwavering encouragement. Additionally, we sincerely thank our families and parents for their continuous encouragement, financial and emotional support, and for fostering our passion for innovation. Their contributions have been instrumental in shaping this work, and we dedicate this project to them.

ABSTRACT

This research critically examines the conceptualisation and prospective fabrication of a novel baby stroller designed to ascend/descend staircases with considerably less exertion relative to conventional models. A staged methodology is advanced that begins with structured ideation and concept screening, progresses through CAD based three-dimensional modelling and finite element analysis (FEA) simulations, and culminates in preliminary market evaluation and pricing analysis. By integrating a specialized wheel assembly with a structurally optimized frame, the proposed design seeks to improve mobility for caregivers in complex urban terrains while satisfying cost-effectiveness and manufacturability constraints.

Greek Abstract

Η παρούσα έρευνα εξετάζει τον σχεδιασμό και τη μελλοντική κατασκευή ενός καινοτόμου παιδικού αμαξιδίου ικανού να αναρριχάται σε σκάλες με σημαντικά μικρότερη καταβολή προσπάθειας σε σύγκριση με τα συμβατικά μοντέλα. Ακολουθείται μια διαδοχική μεθοδολογία που αρχίζει με την επιλογή ιδέας και αξιολόγηση εναλλακτικών λύσεων, συνεχίζεται με τρισδιάστατο σχεδιασμό σε H/Y CAD και προσομοιώσεις ανάλυσης πεπερασμένων στοιχείων (FEA) και ολοκληρώνεται με προκαταρκτική ανάλυση αγοράς και τιμολόγηση σε κλίμακα βιομηχανικής παραγωγής. Μέσω της ενσωμάτωσης εξειδικευμένου τροχοφόρου μηχανισμού σε ένα δομικά βελτιστοποιημένο πλαίσιο, ο προτεινόμενος σχεδιασμός επιδιώκει να βελτιώσει την κινητικότητα των φροντιστών κυρίως σε αστικά περιβάλλοντα, διατηρώντας παράλληλα περιορισμούς ασφάλειας, κόστους και δυνατότητας παραγωγής.