

**FRAMEWORK FOR FORECASTING DESIGN  
POSSIBILITIES**

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**JULY 2016**

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POSSIBILITIES**

by

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**INSTRUMENT DESIGN AND DEVELOPMENT CENTRE**

Submitted

in fulfilment of the requirements of the degree of Doctor of Philosophy

to the



**INDIAN INSTITUTE OF TECHNOLOGY DELHI**

**JULY 2016**

*Dedicated to my Parents*

*my Wife, Richa*

*Saanidhya & Vaidehi, jewels of my life*

## CERTIFICATE

This is to certify that the thesis entitled "**Framework for Forecasting Design Possibilities**" being submitted by **Mr. Sugandh Malhotra**, to the **Indian Institute of Technology Delhi**, for the award of the degree of **Doctor of Philosophy**, is a record of bonafide research work carried out by him.

Mr. Sugandh Malhotra has worked under our guidance and supervision, and has fulfilled the requirements for the submission of the thesis, which to our knowledge, has reached the requisite standard.

The results presented in this thesis have not been submitted in part or in full, to any other University or Institute for the award of any degree or diploma.

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## ACKNOWLEDEMENTS

अज्ञानतिमिरान्धस्यज्ञानाञ्जनशलाकया।  
चक्षुरुन्मीलितयेनतस्मैश्रीगुरवेनमः॥

*Salutation to the noble Guru, who has opened the eyes blinded by darkness of ignorance with the collyrium-stick of knowledge.*

I am truly indebted to God 'Almighty' for blessing me through my supervisors Prof. Lalit Kumar Das and Dr. Vijayaraghavan M. Chariar to undertake this task with all sincerity and dedication. Without their consistent support and encouragement this research work could not have been possible. More than the research work, this has been a life-altering experience and I will cherish the experience of working under their guidance throughout my life.

I am grateful to the management of IIT Delhi for permitting me to pursue this research.

My sincere thanks to Prof. Rukmini B. Nair and for the advice and encouragement. Our discussions and your suggestions made me look through a completely new perspective and bring a new level of depth in my research work.

My sincere thanks to Dr. Arun Kumar, Head IDDC for his immense support. My sincere thanks to Prof. I.P Singh and Prof. A. L. Vyas for their kind support and guidance. My sincere thanks to Dr. Jyoti Kumar and Prof. P. V. M. Rao for their kind support and very valuable comments that helped me refine my work further.

My sincere thanks are due to the faculty and staff of Instrument Design and Development Centre, IIT Delhi, for all the help. My special thanks are due to Dr. D.S. Mehta and Prof. Gufran Syed Khan for timely reminding me about the various academic formalities.

I am extremely grateful to Mr. Yadvendra Sahai and Mr. Deepak Manchanda for giving me innumerable feedbacks during my research work. Their hands on

experience, stimulating discussions and debates on various discourses helped me shape up my thoughts into ideas.

I also wish to thank all the respondents who spared their valuable time for patiently filling up the questionnaires. Without their participation, this research would not be possible.

I also wish to thank the management of Hi-tech Robotic Systemz Ltd., Mr. Anuj Kapuria, Managing Director and Mr. Prashant Joshi, General Manager for allowing me to pursue my research while continuing to work in parallel, during my tenure with the company. I also wish to thank the employees of Hi-Tech Robotic Systemz Ltd. for supporting me during the initial phases of my research.

My sincere thanks to Dr. Gaetano Cascini for sparing valuable time in discussions. My interactions with him during IISc ICDC Conference were of great help and encouragement to my research.

My special thanks to Mr. Sumer Singh for his support, encouragement and guidance which was very helpful in my research and fulfilling academic requirements also. My sincere thanks to Mr. Arun Shankar, Mr. Md. Azizur Rahman, Dr. Naresh Kumar and Mr. Rohan. My sincere thanks to Mr. Nusrat Abbas for his continuous support and prayers. I am thankful to Mr. H. Bose and his team for extending all unconditional support for prints. Without the continuous support and encouragement from all these wonderful people, I do not know how would this have been possible.

My sincere thanks to Ms. Hriiyipho Kayina for proof reading my work; Ms. Aakanksha Panigrahi and Ms. Sanchita Khanna for their help and support during various stages of my work.

My sincere thanks to Prof. Neerja Tikku, HOD and Prof. Manoj Mathur, Department of Industrial Design, School of Planning Architecture, New Delhi. I am also very thankful to Mr. Nishant Sharma, Dr. Gaurav Raheja, Mr. Vinay Sharma, Mr. Amit Dongre, Ms. Kriti Gera, Mr. Ruchin, Mr. Parag Meshram and Mr. Siddharth Kumar for their continuous support and encouragement.

I am thankful to Dr. Amitoj Singh for all the encouragement and valuable support spanning several years. Thanks for being there !

I am wholeheartedly thankful to my mother Mrs. Veena Malhotra, father Mr. Pardeep Malhotra and sister Ms. Srishti Malhotra for blessing me at every moment of my life. This research is dedicated to their love. I am extremely thankful to my beloved Aunt, Mrs. Manju Malhotra, my younger brother Saurabh and sisters Anamika, Anchal, Sunayana and Silky for their love, prayers and blessings.

I am also thankful to my respected father-in-law (late) Mr. Amar Dass Arora and mother-in-law Mrs. Sushil Arora for their constant encouragement, support and blessings.

My heartfelt thanks to my wife Mrs. Richa Malhotra for her unconditional support, immense patience and understanding. Her love gave me strength to persevere and continue further.

Last but not the least thanks to our dearest children Saanidhya and Vaidehi for bringing a smile on my face and cheer me up when I felt exhausted.

Words are not enough to thank the countless people who have been a part of this amazing journey.

New Delhi

(Sugandh Malhotra)

Date

## ABSTRACT

*A well-grounded approach to design forecasting would be beneficial to the evolution of human society. All societies require visionaries who can foresee evolving needs and predict emerging trends. Study of historical trends indicates that there are changing and growing expectations and propensities that govern new design developments. Every very new invention & innovation represented evolution of our social needs and expectations, changed behavior patterns, lifestyles and concerns. It also opened new technological solution space and design possibilities. A well grounded forecasting framework will enable the decision makers, leaders and industries to generate long-term policies, strategies and plans to bring desired and likely circumstances in close alignment with present potentialities and future challenges. Thus, it would help channel energy and resources collectively for a more planned and sustainable future.*

*This dissertation looks at various forecasting approaches used in the industry and evaluates their relevance and application while designing for future. The researcher identified considerations/parameters that tend to maximize propensity for impactful and successful product solutions. These considerations/parameters can be further grouped together under human, technological and environmental considerations/opportunities.*

*The researcher followed a multi-pronged search through historical study of modern design movements, successful products from the past century and award winning contemporary products to identify these design considerations/parameters. Word content analysis of recent technical literature and brainstorming workshops were also conducted. Multiple level assessments and surveys/statistical analyses through SPSS software were carried out to ascertain the varying relevance of three categories, each with multiple parameters, verified across product categories and extent of future.*

*The findings were used to propose a comprehensive Design Futures (DeF) framework that can be used for forecasting design possibilities. This can be of immense help in exploring meaningful design possibilities and developing innovations for a sustainable and better future for all.*

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## LIST OF ABBREVIATIONS

<b>ABBREVIATIONS</b>	<b>FULL FORM</b>
%	Percent
AM	Additive Manufacturing
CSR	Corporate Social Responsibility
E.g.	For Example
EU	European Union
FD	Frequency Distribution
Fig	Figure
FMCG	Fast Moving Consumer Goods
GNP	Gross National Product
GSM	Google Scholar Metrics
Hrs	Hours
IIT DELHI	Indian Institute of Technology Delhi
IDDC	Instrument Design and Development Centre
LCA	Life Cycle Assessment
LESE	Laws of technical evolution
LTF	Long term Forecasting
MTF	Mid term Forecasting
POS	Part-Of-Speech
STF	Short term Forecasting
TASA	Technological approach, system or artifact
TC	Technological Change
TI	Technology Innovation
TFIDF	Term Frequency-Inverse Document Frequency
TLC	Technology life cycle
UV	Ultra Violet
viz	That means; or that are
w.r.t.	With Regards To