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Antenna Miniaturization for IoT Applications

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Annexure 01

Summary

Long-range wireless connectivity is the critical issue for many Internet of Thing (IoT) applications especially for those that need to be mobile. The communication among gadgets and other entities relies on radio wave, that's at risk of many attacks. Size anticipation is one of the questions while thinking about IoT devices, in conjunction with radio performance and charge. IoT is an extremely convoluted heterogeneous organization stage. The antennas used for IoT bundles are needed to demonstrate three essential qualities, as (i) miniature length, (ii) electricity performance and (iii) capability to perform in multi-antenna climate. IoT gadgets show highlights IEEE 802.15.3 A (high-data-rate WPAN) standard such as high data transmission, basic equipment setup, low force utilization, little size, low obstruction, omnidirectional patterns and a direct stage reaction. Latest expertise in 3D-antenna is assumed to overcome some of the disadvantages identified in conventional antennas where it is required for a certain application. Twodimensional equivalents of volumetric meta-material engineered as Meta-surfaces (MTSS) are to achieve extraordinary electromagnetic properties in 3-dimensions. Dipoles and waveguides horns produced low bandwidth in most of the remote gadgets. Consequently, high data transmission with the smallest antenna measurements with the basic plan is needed for any handheld IoT gadgets.

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Chapter



RECENT TRENDS IN COMMUNICATION AND ELECTRONICS

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Analyzing the impact of variation in hole block layer thickness on OLED performance

By Shubham Negi, Poornima Mittal, Brijesh Kumar

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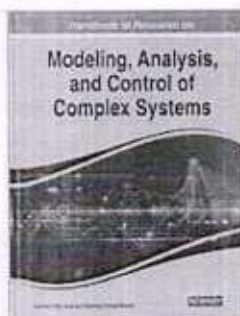
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annexure 03

Soft-Computing-Based Real-Time Control of Two Wheel Mobile Robot (TWMR)

Ashwani Kharola (Tulas Institute, India), Suyashi Raiwani (EXL Services, India) and Shristi Kharola (Graphic Era University, India)

Source Title: Handbook of Research on Modeling, Analysis, and Control of Complex Systems (/book/handbook-research-modeling-analysis-control/253254)

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Abstract

This chapter considers various soft-computing techniques for control of self-balancing two wheel mobile robot (TWMR). Initially, a mathematical model of the system was developed using Newton's second law. Thereafter, a simulink of the proposed system was developed in Matlab Simulink environment. Two different controllers, namely fuzzy logic controller and ANFIS controller, were used for control of proposed system. Finally, a real-time model of TWMR was designed which was controlled using Arduino Uno microcontroller, and its results were used for training of ANFIS controller.

Chapter Preview

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1.0 Introduction

Robotic systems comprises of elements of complex configurations which are keen source of interest for researchers in the past few decades (Yasuda, 2016). Two-wheel mobile robot (TWMR) is a complex dynamical configuration of robot in which a single rotating wheel is replaced by two identical rotating wheels (Pham *et al.*, 2017). The configuration of the system increases its nonlinearity thereby making it difficult to control (Melkou & Hamerlain, 2014). The objective remains same to stabilise chassis and wheels at upright angle and at particular position in presence of external uncertainties and disturbances (Ghazi *et al.*, 2018). Watanabe (1993) recommended a fuzzy gaussian neural control for position and azimuth angle regulation of a two-wheel movable machine. The author designed the proposed controller using gaussian shape neural networks having different configuration and weighted connections. A simplified model of two-input and two-output fuzzy neural controller having 49 fuzzy rules was considered in the study. The study can be further extended to a balance control problem. In a study by Ruan *et al.* (2008) reinforcement learning based fuzzy neural controller was successfully applied for motion control of a double-wheel portable robotic vehicle. The outcomes illustrated that above technique was capable of controlling robot in different positions quickly compared to conventional PID control. There is a scope for further improvement of settling time below 5.0 sec by increasing the number of hidden neurons. A real-time stabilisation of double-wheel mutable robotic assembly was proposed by Abeygunawardhana and Murakami (2008). The authors designed a self-tuned PD controller which was capable of adjusting their gains automatically for control of proposed system.

An adaptive fuzzy based approach for regulating motion of two-wheeled standing robot was proposed by Ruan *et al.* (2009). The controller was capable of stabilising the system in large initial angles and provides better stability. As an extension to future work real-time control of proposed system can be achieved for better validation. Goher *et al.* (2010) presented a strategy for stabilisation of a double-wheel robotic manipulator carrying different loads. The study considered a PD and PD-fuzzy controller for control of the proposed system. Results highlighted improved performance of fuzzy-PD approach in contrast to PD controller. The fuzzy controller was designed using five triangular shape memberships and the settling time obtained to control robot position was around 100 sec. The performance can be surely improved by either changing the fuzzy control rules or changing the shape and number of memberships. In a study by Wu and

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Annexure 04

Control Optimisation of Overhead Gantry Cranes via Fuzzy Controllers

Ashwani Kharola (Tulas Institute, India)

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Abstract

This study considers a fuzzy logic-based reasoning approach for control and optimising performance of overhead gantry crane. The objective of this study is to minimise load swing and to stabilise the crane in the least possible time. The fuzzy controllers were designed using nine Gaussian and triangular shape membership functions. The results clearly confirmed the effect of shape of memberships on performance of fuzzy controllers. Performance of overhead crane was measured in terms of settling time and overshoot ranges. The study also demonstrates the influence of varying mass of the load, mass of crane, and length of crane bar on stability of the crane. A mathematical model of the crane system has been derived to develop a simulink model of proposed system and performing simulations.

Chapter Preview

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Introduction

Overhead cranes are extremely nonlinear systems extensively used in industries for carrying materials from one location to another (Solihin and Wahyudi, 2009; Sagirli et al., 2011). These machines are widely used for transportation as they provide faster transportation at a comparatively low cost with minimal safety constraints (Fedtke & Boysen, 2017). The undesirable swing due to external forces may cause unrestrained oscillations and vibrations resulting in stability and safety hazards of these machines (Kaur et al., 2014; Belunce et al., 2014). Therefore, the key objective while operating these machines is to minimise load swing in least possible travel time (Mahfouf et al., 2000; Chen et al., 2012). The overhead gantry cranes are keen source of study and research for researchers in past few decades because of major industrial applications (Santhi and Beebl, 2014). A novel adaptive hierarchical sliding mode control of three dimensional overhead crane was presented by Le et al. (2019). The proposed control has enhanced the robustness of the crane system under uncertainty conditions and was designed using radial basis neural network derived from Lyapunov function. An active disturbance rejection model for the problem of load transportation and oscillation for tower crane was developed by Coral-Enriquez et al. (2019). The authors formulated a disturbance observer for the proposed system which aided in better estimation of system properties and disturbances. Singh and Ha (2019) proposed a finite control time method based on terminal sliding mode for control of underactuated gantry crane system. The authors defined hierarchical sliding surfaces comprising of two layers for underactuated system control. A model predictive control which provided faster transportation of cargo with minimal swing was proposed by Jolevski and Bego (2015). A multi-criteria optimization technique was adopted to create the solution function for the proposed control. Experiments were performed on the laboratory model of the crane system to confirmed the validity of the proposed study. Bara et al. (2009) examined an intelligent fuzzy control for designing a



Advances in Fluid and Thermal Engineering pp 151–161

Annexure 05

Numerical Study of Heat Exchanger Having Protrusion and Dimple Roughened Conical Ring Inserts

Bhanu Pratap Singh, Vijay Singh Bisht & Prabhakar Bhandari



Conference paper | First Online: 22 April 2021

646 Accesses | **2** Citations

Part of the Lecture Notes in Mechanical Engineering book series (LNME)

Abstract

Heat transfer rate augmentation in heat exchangers with least pressure drop is one of the important fields for research in research fraternity. The different types of inserts have been used in the tube to fulfill the objective. In the present model, a conical-ring turbulators with protrusion and dimple roughness from inside has been used as an insert. These turbulators were placed inside the heat exchanger tube, and tube was applied with uniform heat flux condition. A parametric study has been performed


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Advances in Robotic Systems

Design, Modeling, Development and Control Principles

By Priyanka Dhuliyaa, Sunil Semwal, Piyush Dhuliyaa, Diwaker Pant

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Abstract:

This paper focuses on modeling a leading smart charging station for electric vehicles in the UK (EV), suitable for fast charging EVs with DC current while ensuring minimal pressure on the electrical network. The operation of the charging station managed by this type of method provides kilometers both by using photovoltaic (PV) electricity or from the grid, and the automatic grid (V2G) is also applied to improve stability. of the power grid. for the duration of the maximum load hours. PV Interface DC/DC Converters and Grid Interfaces The DC/AC bidirectional converter represents a DC bus. The clear transition from one walking mode to another demonstrates the effectiveness of the manipulation method used. Precision modeling and management of components are defined and applied in MATLAB Simulink. The simulations illustrate the possible behavior of the charging station in all operating modes in terms of the four-way interaction between PV, EV and the grid as well as V2G operation. It is recognized that electric vehicles offer new possibilities in terms of regulatory delivery and flexibility in consumption by varying the energy that recharges at a given time on site. The paper also discusses the financial incentives needed to encourage electric vehicle owners to actively participate in lieu of a response mechanism.

Published in: 2022 3rd International Conference for Emerging Technology (INCET)

Date of Conference: 27-29 May 2022 INSPEC Accession Number: 21865636

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Abstract:

Congestion is a topic that is still mainly unresolved and little addressed in Wireless Sensor Networks. When a mote receives excess data more than it can handle, it must buffer the redundant or duplicate data. Congestion happens when the finite buffer memory gets packed, forcing additional data to be lost. This wastes the sensor nodes' communication and energy resources, as well as lowering the event detection reliability due to packet drops. A congestion control system based on the optimal rate is developed to deliver energy-efficient transmissions. To optimise power usage throughout the system, a rate-based congestion management technique focusing on cluster routing is proposed. The rate regulation technique maximizes the throughput, extending the lifespan of the network over a longer sampling period. The M-GEAR protocol clusters the nodes at first. The rate management is then carried out with the help of the firefly optimization approach, which is designed for the high packet delivery aspect. Ultimately, M-Gear is used to carry out routing process in order to deliver packets with the maximum potential throughput and the optimized energy.

Published in: 2022 International Conference on Wireless Communications Signal Processing and Networking (WISPNET)

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Design and Implementation of Fractional Order Controllers Using Nelder-Mead Algorithm

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The idea of fractional order controller in combination with Nelder Mead algorithm is proposed in this paper for controlling a multivariable industrial scale polymerization reactor. The concept of decentralization is also applied to identify the pairing and decentralization of loops for better performance of the controller. PID controller is tuned using Cohen-Coon (CC) tuning technique. CC tuning technique is more flexible and suitable in comparison to conventional Ziegler-Nichols tuning technique. Using Nelder-Mead optimization technique, the Fractional Order-PID (FO-PID) controller parameters including the special parametric values are calculated which plays a very important role in tuning of FO-PID controllers finely and for optimal performance of these controllers. Simulation results are obtained and dynamic characteristics and performance indices are calculated and analyzed.

Published in: 2021 International Conference on Computational Performance Evaluation (ComPE)**Date of Conference:** 01-03 December 2021 **INSPEC Accession Number:** 21687108**Date Added to IEEE Xplore:** 12 April 2022 **DOI:** 10.1109/ComPE53109.2021.9752014

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Web Crawler based Caching Technique for efficient Downloading

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Abstract—With internet availability in almost all types of devices, downloading has become a widespread activity. Data is consumed when any content is downloaded from the web servers. The effectiveness of any internet service provider depends upon the internet connection speed and the time consumed to download a file. The internet connection speed is not always the same. The speed can sometimes be so slow that downloads are not possible. In a typical organizational setup, different types of files and software applications are downloaded regularly. Downloading the same file multiple times by different people is a wastage of resources. The proposed approach aims to decrease the search and download time. The primary purpose of this study is to ensure the availability of the file for download even if there is poor or no internet connectivity. The paper proposes a Web Crawler-based caching technique that helps resolve the issues mentioned above and makes downloading more efficient.

Keywords: Web Crawler, Cache, Web Server, Local Server, Download Manager

I. INTRODUCTION

During the 1960s, the Government and Researchers started a service to share information. The service was the internet. Further, this led to the creation of ARPANET (Advanced Research Projects Agency Network)[1]. Ray Tomilson invented the email in the year 1972[2], and since then, the email has gone through multiple changes to become the email that we know today. The internet was officially born on January 1st, 1983[1]. However, during the mid and late 1990s, people started to get used to working on the internet. Over the years, the internet has gone through many changes. The network has expanded, the user base has increased, the day-to-day activities have also migrated to the internet. Today, sitting in one place, one can carry out various functions, be it shopping, socializing, meetings, etc. The pandemic in 2020 has also taught the students that education can also be carried out through the internet. Today, the internet has found its place in the modern-day smartphone, and access to the internet is now available to everyone just at a simple swipe on the screen. Downloading is an essential feature of the internet. These days, many different categories of material can be downloaded, such as Music, Movies, Documents, Software, etc. The system also downloads configuration, settings, etc., from the internet, with or without the user's consent. Downloading uses two critical resources of the internet, i.e., Time and Connectivity Speed. Often, multiple users belonging to the same organization tend to download the

same content numerous times. Multiple users downloading the same content innumerable times waste time and result in an increased number of web server hits. During the year 2020, the average data consumption per user across India was 13462 Megabytes [3]. Downloads have become an integral part of internet connectivity. Since downloading content holds great importance for the users, the internet service providers have made it a part of their strategic business plan. The internet connectivity packages are offered with a certain quantity of data for download at high speed, after which the browsing speed of the internet plan is greatly reduced. This makes high-speed internet connectivity a valuable resource for the users. The problem arises when different people are trying to download the same content. Valuable resources are wasted when multiple users download the same content separately or when the same user downloads the same content numerous times. On a larger scale, there are various files that many users download at the same time. Similarly, the user may find himself in an area or remote working location with poor or no internet connectivity, restricting downloads. The proposed approach is a web crawler-based caching technique that assists in making the downloads more efficient and resolves the problem of resource overutilization. The paper is divided into five sections: Section 1 introduces the importance of the internet and downloads. Section 2 showcases the existing work done on the internet, downloading, and caching. Section 3 gives the proposed approach to the web crawler-based caching technique and elaborates the various components. In Section 4, the survey results were conducted to check the download speed offered by different connectivity methods and validate the proposed approach. Section 5 gives a conclusion of the web crawler-based caching technique.

II. RELATED WORK

While working in any organization, there is a requirement to download the files very frequently. There is a huge amount of data that is available on the internet. Therefore to identify the required result from this huge data set, web crawlers can be used to crawl the searched query [4]. Based on the searched keyword, the data is provided by the web crawlers [5]. Web crawler starts its search from the seed URLs provided and then continues to crawl the links obtained on the seed page and so on [6] [7]. A lot of bandwidth is consumed by the


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Correlation Coefficient Model for Analyzing Effect of Temperature on COVID19 cases in India

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Abstract—During the year 2020, the world witnessed the terror and threat of a new type of infection. The Corona Virus Disease (COVID19) was first identified in Wuhan, China, and spread worldwide. The infection was categorized as an acute respiratory syndrome and can cause causality amongst humans if timely treatment is not available. India is amongst the countries worst hit by COVID19. A country with a dense population and diversified weather conditions in different states is dealing with a highly contagious infection. Irregular ups and downs in the cases can be due to the changing temperature all around the year. This study aims to identify the relation between the temperature and the number of cases. For this purpose, the paper calculates the correlation coefficient between the temperature and the number of cases for different states of India. The study aims to analyze if the temperature of these states impacts the daily cases detected. A null hypothesis is subjected to the Pearson Product Moment Correlation Coefficient test for analysis, and the results are analyzed.

Keywords: COVID19, Pearson Product Moment Correlation Coefficient, SARS-CoV-2, Daily Cases, Temperature

I. INTRODUCTION

In December 2019, the Corona Virus Disease (COVID19) caused due to severe acute respiratory syndrome (SARS-CoV-2) was identified in Wuhan, China. To control the spread, a lockdown was imposed in Wuhan and other cities in the Hubei Province. However, the lockdown failed to prevent the spread, and the virus spread rapidly to other provinces of China and around the world[1]. COVID19 was declared a Pandemic on 11th March 2020 by the WHO. Before being declared a pandemic by WHO, COVID19 was declared a Public Health Emergency of International Concern on 30th January 2020. Since the first cases with symptoms ranging from mild fever to severe respiratory distress were reported in Wuhan, the COVID19 spread rapidly worldwide. The spread was reported through contaminated droplets released from the human body while coughing and sneezing. The infection spread as people close to each other would breathe these droplets in. In the Indian context, the first case of COVID19 was reported on 29th January 2020 in Kerala, and soon, a second case followed[2]. Within a month, the virus spread rapidly across the country, and by the second week of March 2020, cases were being reported in other parts of India. Since the spread was due to human contact, the only way to stop the spread was to reduce human contact, which was promptly done by imposing lockdown across the country. However, this just slowed down

the rate of spread, not the spread of the virus. By April 2020, some of the worst-hit countries like Italy faced immense distress over the daily cases and deaths. Italy reported over 38000 active cases as of 23rd April 2020[2]. The rising-rate and the graph were much steeper than expected, and soon the entire world seemed to be infected. During March - April 2020, the spread of the infection in India was slower than in other western countries. One of the main reasons was the imposition of the lockdown immediately and effectively. However, it was not too late when even India witnessed the cases rising at an alarming rate. Since the whole world was witnessing the spread of the Corona Virus for the first time, no one could confidently claim the behavior. India is one of those countries that has a tropical climate and experiences all four seasons distinctly. The summers are hot, and the winters can be chilling. India has a desert in the state of Rajasthan, and Cherrapunji ranks amongst the top wettest places. The change of the seasons is gradual and can be felt. With the Himalayas on one side and the sea on three sides, the Indian climate makes it one of the best countries to live in. During the spread of COVID19, this climate was believed to be the biggest enemy of India. At this stage, the steep rise in daily cases was attributed to India's weather and climate. It was anticipated that the warmer temperatures would aid in the reduction of the spread rate of the virus[3]. The purpose of the study is to verify if increasing temperature aids in the decrease in the number of cases. For the analysis, India is considered as India has a diversified temperature in different parts and all around the year. Based on the analysis of the 9 states, the main focus of this study is to identify the effect of temperature on the number of cases.

During the year 2020, India's GDP went down by 8.0% [4]. Most of the fall can be attributed to the lockdown imposed due to the spread of COVID19 pandemic. All economic activity, unless emergency services came to a complete stop. Airlines were grounded, railways came to a complete halt and roads were barricaded. A similar lockdown was imposed in the year 2021. The future is still not clear, and there are expectations of the third wave of infection. Amidst such uncertainties, the study will help to identify the time when the number of cases can rise. Imposing the lockdown only during the duration with high expectations of the rising cases will help both in controlling the peaking of the COVID19 cases and will also


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Annexure 12

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Annexure 13

Slope Instability Detection Using IoT with the Help of Ecological Indicators

Priyanka, Sunil Semwal, Piyush Dhuliya, Vikalp Joshi & Diwaker Pant

Conference paper | First Online: 28 July 2021

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Abstract

Land sliding is a common problem of hilly areas; the problem is very critical when land sliding occurs at road side which leads serious damages. The slope instability detection is a sort of prediction which tells us the conditions which can make the slope fail resulting in land slide. It involves movement of the entire debris from the slope. Internet of things (IoT) gaining popularity nowadays and detection of slope instability using Internet of things (IoT) have the capability to quickly capture, process and transmit data for effective damage control. This in turn can save precious lives and huge economic losses. In this paper, the detection of slope instability is materialized with the help of Internet of things (IoT) using a combination of pore pressure and moisture sensor. Detection system involves a sensor column consisting of pore pressure & moisture sensor and data logger with an antenna. A data logger (Mote) collects the field data by the sensors. Real-time software (visual basic) represents the quantity of the soil parameters of the slope in the form of an online graph.

Keywords

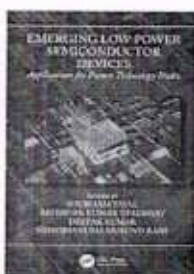
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Chapter



Annexure 14

Memory Designing Using Low-Power FETs for Future Technology Nodes

By Young Suh Song, Shiromani Balmukund Rahi, Chandan Kumar Pandey, Shubham Tayal, Yunho Choi, Bijo Joseph, Tripuresh Joshi, Daryoosh Dideban, Suman Lata Tripathi

Book [Emerging Low-Power Semiconductor Devices \(<https://www.taylorfrancis.com/books/mono/10.1201/9781003240778/emerging-low-power-semiconductor-devices?refId=4cb49c80-e686-4848-a111-8ba518fa8afb&context=ubx>\)](https://www.taylorfrancis.com/books/mono/10.1201/9781003240778/emerging-low-power-semiconductor-devices?refId=4cb49c80-e686-4848-a111-8ba518fa8afb&context=ubx)

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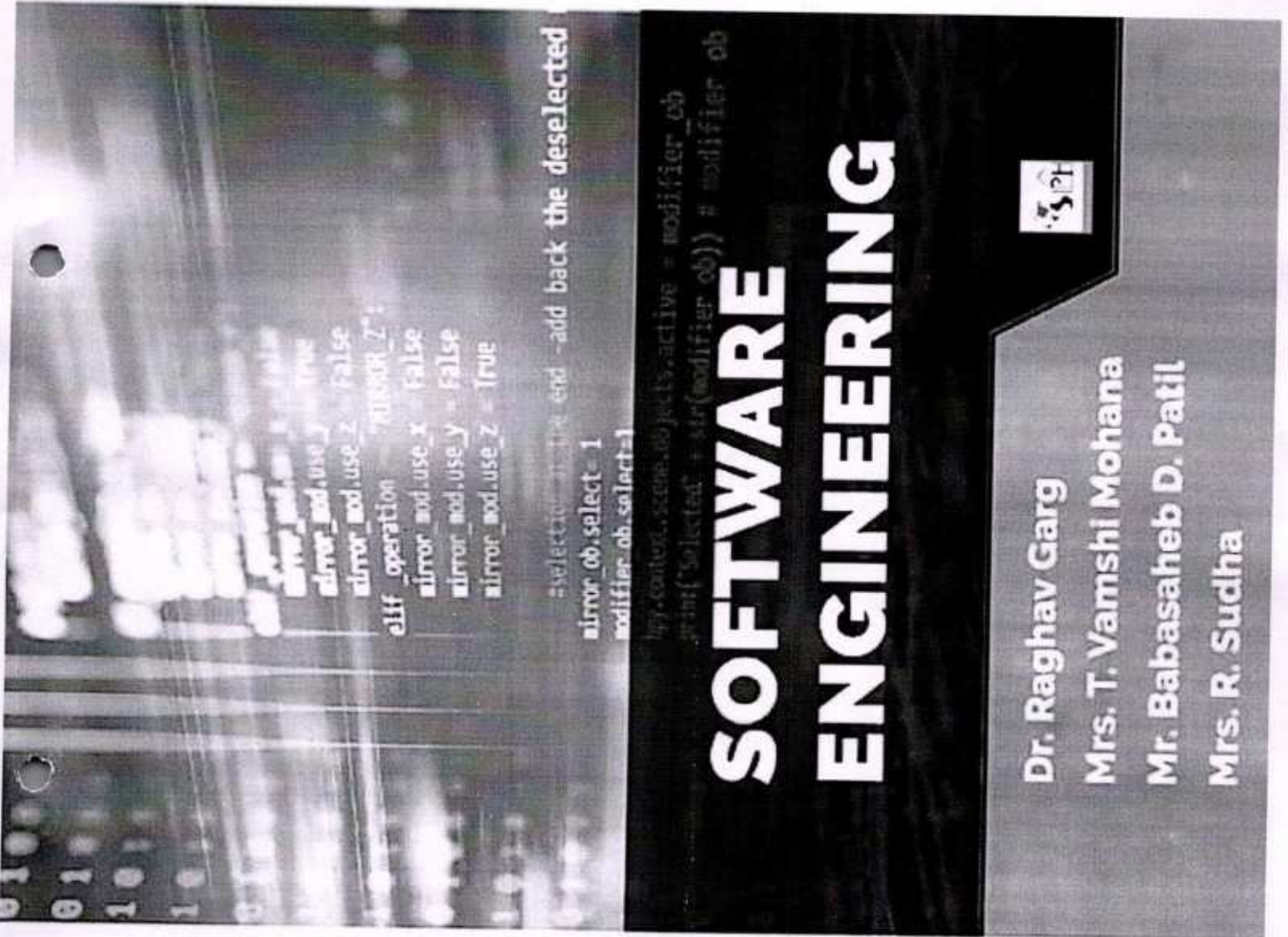
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