



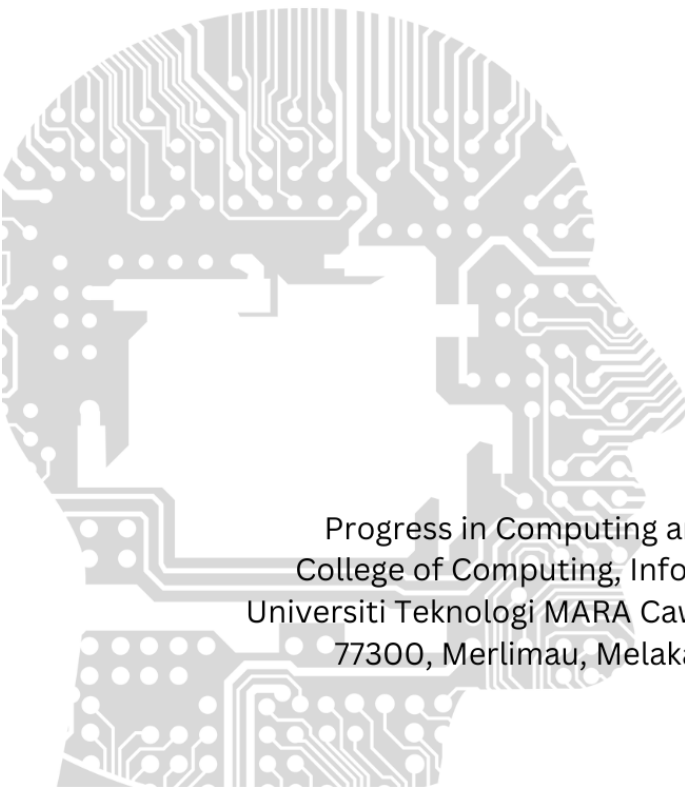
Cawangan Melaka

# PCMJ

Progress in Computing and Mathematics Journal

**volume 1**

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Progress in Computing and Mathematics Journal  
College of Computing, Informatics, and Mathematics  
Universiti Teknologi MARA Cawangan Melaka, Kampus Jasin  
77300, Merlimau, Melaka Bandaraya Bersejarah

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UNIVERSITI  
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# **PCMJ**

**Progress in Computing and Mathematics Journal**

## **volume 1**

# PREFACE

Welcome to the inaugural volume of the **Progress in Computing and Mathematics Journal (PCMJ)**, a publication proudly presented by the College of Computing, Informatics, and Mathematics at UiTM Cawangan Melaka.

This journal represents a significant step in our commitment to fostering a vibrant research culture, initially providing a crucial platform for our undergraduate students to showcase their intellectual curiosity, dedication to scholarly pursuit, and potential to contribute to the broader academic discourse in the fields of computing and mathematics. However, we envision PCMJ evolving into a beacon for researchers both nationally and internationally. We aspire to cultivate a space where groundbreaking research and innovative ideas converge, fostering collaboration and intellectual exchange among established scholars and emerging talents alike.

The manuscripts featured in this first volume, predominantly authored by our undergraduate students, are a testament to the hard work and dedication of these budding researchers, as well as the guidance and support provided by their faculty mentors. They cover a diverse range of topics, reflecting the breadth and depth of research interests within our college, and set the stage for the high-quality scholarship we aim to attract in future volumes.

As editors, we are honored to have played a role in bringing this journal to fruition. We extend our sincere gratitude to all the authors, reviewers, and members of the editorial board for their invaluable contributions. We also acknowledge the unwavering support of the college administration in making this initiative possible.

We hope that PCMJ will inspire future generations of students and researchers to embrace research and innovation, to push the boundaries of knowledge, and to make their mark on the world of computing and mathematics.

## **Editors**

**Progress in Computing and Mathematics Journal (PCMJ)**  
**College of Computing, Informatics, and Mathematics**  
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# TABLE OF CONTENTS

<b>LIST OF EDITORS</b> .....	<b>iii</b>
<b>PREFACE</b> .....	<b>iv</b>
<b>TABLE OF CONTENTS</b> .....	<b>v</b>
SIMPLIFIED DRONE GAME FOR INITIAL REMEDIAL INTERVENTION FOR DYSPRAXIA AMONG KIDS .....	1
DEVELOPMENT OF STORAGE BOX WITH AUTOMATED AND REMOTE LOCK CONTROL SYSTEM IN WLAN ENVIRONMENT .....	16
COMPARATIVE ANALYSIS OF PASSWORD CRACKING TOOLS .....	29
SPORT FACILITIES FINDER USING GEOLOCATION .....	50
READ EASY AR: INTERACTIVE STORYBOOK FOR SLOW LEARNER .....	60
MATHMINDSET: GAME-BASED LEARNING TO REDUCE MATH ANXIETY .....	87
NETWORK PERFORMANCE ANALYSIS ON DIFFERENT ISP USING ONLINE CLASS PLATFORM ON DIFFERENT DEVICES.....	101
CIVIC HEROES; ENHANCING CIVIC AWARENESS THROUGH GAME-BASED LEARNING.....	115
ENHANCING COMMUNITY SQL INJECTION RULE IN INTRUSION DETECTION SYSTEM USING SNORT WITH EMAIL NOTIFICATIONS.....	124
LEARNING ABOUT MALAYSIA THROUGH GAME .....	138
STUDENT CHATROOM WITH PROFANITY FILTERING .....	150
ARCHITECTURE BBUILD AND DESIGN BUILDING THROUGH VIRTUAL REALITY .....	162
VEHICLE ACCIDENT ALERT SYSTEM USING GPS AND GSM .....	174
MARINE ODYSSEY: A NON-IMMERSIVE VIRTUAL REALITY GAME FOR MARINE LITTER AWARENESS.....	187
GAME BASED LEARNING FOR FIRE SAFETY AWARENESS AMONG PRIMARY SCHOOL CHILDREN.....	207
SIMULATING FLOOD DISASTER USING AUGMENTED REALITY APPLICATION .....	220
CRITICAL THINKER: VISUAL NOVEL GAME FOR BUILDING CRITICALTHINKING SKILLS .....	231
POPULAR MONSTER:.....	239
FIGURE SPRINTER: EDUCATIONAL ENDLESS RUNNING GAME TO LEARN 2D AND 3D SHAPE.....	252
AR MYDREAMHOUSE: AUGMENTED REALITY FOR CUSTOMISING HOUSE .....	265
RENTAL BIKE SERVICES WITH REAL TIME CHAT ASSISTANCE .....	308
IDOBI: IOT INTEGRATED SELF-SERVICE WASHING MACHINE RESERVATION SYSTEM WITH CODE BASED BOOKING TOKEN.....	321

TRADITIONAL POETRY OF UPPER SECONDARY STUDENTS VIA MOBILE APPLICATION .....	332
A MOBILE TECH HELPER RECOMMENDATIONS APPLICATION USING GEOLOCATION WITH AUTOMATED WHATSAPP MESSENGER.....	347
TURN-BASED ROLE-PLAYING GAME BASED ON MUSIC THEORY .....	370
FADTRACK: DEVELOPMENT OF VEHICLE TRACKING SYSTEM USING GPS .....	384
MENTALCARE: GAME-BASED LEARNING ON MENTAL HEALTH AWARENESS .....	397
HALAL INTEGRITY INSPECTOR:.....	411
MOBILE APPLICATION FOR REAL TIME BABY SIGN LANGUAGE RECOGNITION USING YOLOV8.....	434
TRAVEL TIME CONTEXT-BASED RECOMMENDATION SYSTEM USING CONTENT-BASED FILTERING .....	448
DETECTION SYSTEM OF DISEASE FROM TOMATO LEAF USING CONVOLUTIONAL NEURAL NETWORK .....	460
VIRTUAL REALITY (VR) FOR TEACHING AND LEARNING HUMAN ANATOMY IN SECONDARY SCHOOL.....	471
LEARNING KEDAH’S DIALECT VIA GAME-BASED LEARNING .....	490
AUTOMATED FACIAL PARALYSIS DETECTION USING DEEP LEARNING .....	504
ENHANCING CRIMINAL IDENTIFICATION: SVM-BASED FACE RECOGNITION WITH VGG ARCHITECTURE.....	517
WEB BASED PERSONALIZED UNIVERSITY TIMETABLE FOR UITM STUDENTS USING GENETIC ALGORITHM.....	528
SMART IQRA’ 2 MOBILE LEARNING APPLICATION .....	545
ANIMAL EXPLORER: A WALK IN THE JUNGLE.....	557
FOOD RECOMMENDATION SYSTEM FOR TYPE 2 DIABETES MELLITUS USING CONTENT-BASED FILTERING .....	569
WEB-BASED PERSONAL STUDY HELPER BASED ON LESSON PLAN USING GAMIFICATION .....	580
DIETARY SUPPLEMENT OF COLLABORATIVE RECOMMENDATION SYSTEM FOR ATHLETE AND FITNESS ENTHUSIAST.....	596
AUTOMATED HELMET AND PLATES NUMBER DETECTION USING DEEP LEARNING .....	611
VIRTUAL REALITY IN MATHEMATICAL LEARNING FOR SECONDARY SCHOOL.....	622
VIRTUAL REALITY (VR) IN CHEMISTRY LEARNING FOR SECONDARY SCHOOLS STUDENTS .....	634
GOLD PRICE PREDICTION USING LONG SHORT-TERM MEMORY APPROACH .....	651
ARTQUEST: A VIRTUAL REALITY ESCAPE ROOM FOR LEARNING ART HISTORY LESSONS.....	664
FIRE SURVIVAL: A FIRE SAFETY GAME USING GAME- BASED LEARNING.....	675
ANIMALAR: AN INTERACTIVE TOOL IN LEARNING EDUCATIONAL ANIMAL KINGDOM THROUGH AUGMENTED REALITY .....	690

## READ EASY AR: INTERACTIVE STORYBOOK FOR SLOW LEARNER

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### Article Info

### Abstract

This project aims to enhance the reading experience for slow learners through the integration of augmented reality into a storybook. The project is designed to address issues faced by slow learners, such as a lack of interest in traditional storybooks and a deficiency of tools for slow learners in schools. The main objective is to design 3D modelling for the AR storybook, to develop an interactive storybook for a slow learner by using augmented reality technology and to evaluate the usability of the application. The development approach uses an agile technique to accomplish these goals, and the AR type that was selected is marker-based on the Android mobile platform. This choice is made for its flexibility and cost-effectiveness in producing high-quality goods. To assess the success of the project, usability testing is conducted among educators and parents of slow learners in several schools. The testing successfully demonstrates that the interactive storybook can assist slow learners in reading, achieving results of 70% and higher. This indicates that the project's objectives have been successfully attained. Moving forward to the future work that the interactive storybook will be able to across various platform and offer language option in multiple languages.

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**Keywords:** Augmented Reality, Slow Learner, Reading

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## INTRODUCTION

Slow learners take longer to learn and may struggle with tasks like reading and math due to weaker working memory, processing speed, and attention skills (Singh & Bhalla, 2019). Traditional paper storybooks can be boring and inaccessible for slow learners (Roberts, 2017).

To help them, educators can use specialized tools like augmented reality (AR) storybooks, which offer interactive elements and engaging content (Saaidin, 2015). AR technology has been shown to improve reading comprehension and vocabulary development in students with learning difficulties (Journal of Computer Assisted Learning). Using technology like tablets and apps tailored to their needs can also benefit slow learners (Khan, 2014).

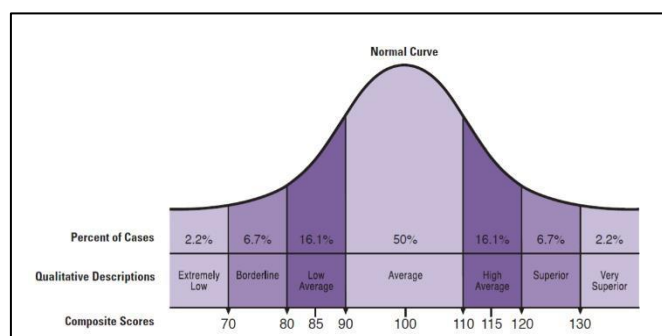


Figure 1: Graph of IQ level

## LITERATURE REVIEW

In this literature review, a deeper examination of the concept of slow learners has been undertaken, distinguishing it from intellectual disabilities. Subsequently, the utilization of augmented reality (AR) technology in an approach to aid slow learners in becoming independent readers has been explored. The approach implemented in this book will incorporate interactive elements such as animation, sound effects, and interactive features. To enhance the learning abilities of slow learners, an explanation of personalized and multisensory learning approaches has been provided. Additionally, methods to improve their learning capabilities through the use of technology, such as interactive games, sensory materials, and audio-visual aids tailored to their preferences and learning capacities, has been discussed.

### Improve Learning Capabilities

Improving learning capability is essential for children who are slow learners. They can catch up with normal children if they can be identified at an early stage. As mentioned above, they do not need special classes; they just need the right techniques to improve their learning performance. Traditional teaching methods are ineffective for training slow learners (Aqsa



Batool, Israr Ahmed, Muhammad Rehan and Gul E Zahra, 2023). Below are techniques that can improve learning capability.

### ***Supply Of Necessary Book***

Slow learners benefit from customized books that cater to their interests and reading proficiency (International Journal of Applied Research, 2017). Instruction should move away from traditional printed materials and offer a variety of engaging resources such as reference books, picture books, and journals (Dasaradhi et al., 2016). To keep slow readers engaged, exposure to tangible elements in the learning environment is essential (Ediger & Marlow, 2002). Reading materials should make sense to aid in improving their reading skills.

### ***Reading Techniques***

Children who read slowly benefit from specialized methods to improve their reading skills. Teachers should consider their students' interests and reading pace, using techniques like clear instructions and multisensory learning (Vasudevan, 2017). Incorporating sight, hearing, and touch enhances understanding and memory. Teaching self-correction skills and establishing a routine of re-reading are important strategies for both teachers and parents (Dasaradhi et al., 2016).

### ***Audio Visual Aids***

Audio-visual aids, combining sound and images, create a lively learning environment, aiding slow learners in vocabulary development (Teachmint, 2023). Research by Alabi et al. (2021) shows significant academic improvement in students exposed to audio-visuials, particularly in social studies. Visual aids like pictures and movies enhance comprehension and memory (Dwiyana et al., 2021), benefiting slow learners in their academic pursuits.

### ***Approach Used in Storybook***

In this subtopic, it discuss approaches that used to develop an interaction storybook for slow learners, to improve their reading.

## *Repetitive Word*

Slow learners benefit from repetition of assignments (Kid So Genius, n.d.). This storybook will include sound elements that require repetition to help children who are slow readers due to short-term memory. According to Widodo et al. (2020), slow learners are more likely to have short-term memory; therefore, repeating material by specialised teachers throughout the learning activity is quite beneficial.

A repetition of a word should follow (Kid so genius, n.d.) at least five times. This is because repetition as a repeated activity to understand important information from the instructor that deepens, expands, and strengthens the student's understanding may be a technique to improve learning and It is suitable for slow learners and students with special needs because it requires the teacher to repeat what he says until the students understand it (M. S. Indarsari & Arief Cahyo Utomo , 2023). Figure 2.6 shows the example of repetitive word for slow learner storybook.

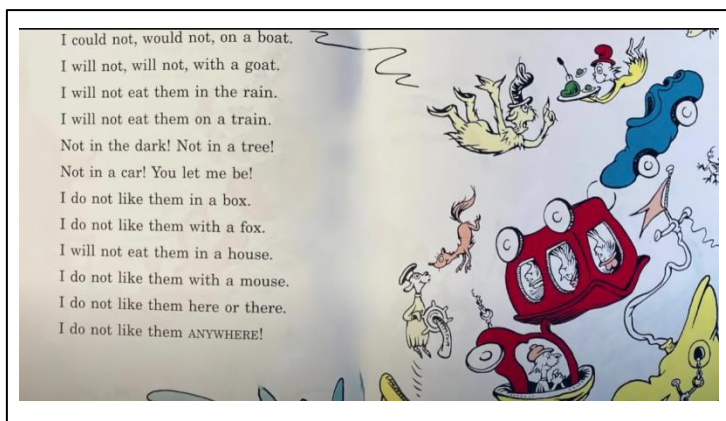


Figure 2: The Cat In The Hat

## *Concrete Learning*

According to Steven R. Shaw (2010), slow learners often struggle with abstract topics. In contrast to merely depending on reading, slow learners typically learn more successfully through tactile, sensory, and visual experiences. They are uninterested in learning strategies that rely primarily on books since these strategies cannot hold their interest (Noraini Ahmad, 2018). For slow learners, using concrete learning strategies and learning aids is crucial

(Saritarani Mahanty, 2023). Visualisation and the growth of reading abilities can be aided by the inclusion of real-world elements like audio, visual, and 3D materials. The more closely related the experiences of slow learners are to concrete and semi-concrete materials, the more inclined they are to enjoy reading. This is due to the fact that concrete or semi-concrete materials provide a wealth of background information for readers.

For example, when a child is reading a book on cats, it is very necessary for them to have visual aids, tactile items, or images to study and touch, since this will increase their level of comprehension. According to Ediger (2002), a multimodal strategy like this one gives children who learn slowly the opportunity to participate in meaningful learning experiences.

### ***Phonics Approach***

The phonics approach is the approach that used in reading. Phonics is a way of learning by blending the sounds of letters to help decode familiar words by sounding them. As stated by the National Literacy Trust, phonics is one of the ways of learning in terms of reading and writing.

This approach is particularly beneficial for slow learners as it assists them in reading and decoding words by recognizing and associating the sounds of individual letters or groups of letters. This, in turn, helps them recognize words and pronounce them more fluently.

In accordance with Violetta Hasan Noor (2022), children classified as slow learners often face challenges related to fluency and reading comprehension. The study highlights that students who receive additional practice with phonics skills are likely to witness significant improvements in reading fluency. The research underscores that automaticity is achieved through constant repetition.

### **Augmented Reality**

Augmented reality (AR) is a type of technology that adds virtual items or information to the real world (Rabia M. Yilmaz, 2018). AR can typically be viewed through devices such as cameras, screens, smartphones, computers, smart glasses, and wearables. The AR app tracks the user's position and direction by utilizing the device's camera and sensors. This technology

enables the user to interact with the virtual model in real time. There are two main categories of augmented reality.

The interactive storybook was developed by using marker-based augmented reality, due to the fact that this app needs to develop a physical book in order to provide children who are slow learners, with the opportunity to experience both a conventional book and an interactive version of the book. This interactive storybook is used just to help them read alone, as these children require more time to understand something that they read and attract their attention on reading.

### ***Markerless Augmented Reality***

The technology is frequently associated with the visual effect created by combining computer graphics and real-world imagery. Markerless augmented reality, sometimes referred to as location-based augmented reality, uses the GPS on mobile devices to record the device's position and then displays information related to that location.

### ***Marker-Based Augmented Reality***

Marker-based augmented reality uses recognizable patterns like QR codes or vibrant images to trigger virtual overlays on a screen, enhancing learning experiences (Umar et al., 2023; Bouaziz et al., 2023). This technique has become widely used in modern learning environments.

## **METHODOLOGY**

The methodology used in this project is agile. Agile is able to maximize efficiency with small projects when developing applications. This is because the project development is small and has a fix timeline to complete it. Therefore, to complete the project in a short time, agile methodology is able to help the development process with a guarantee of good task quality and help the development process faster. In addition, the cost plays an important role in the use of this methodology. The chosen methodology is able to reduce the cost of producing goods with a good quality guarantee. Agile is also very good in flexibility. This agile methodology allows for responses from stakeholders and enables changes to be made quickly. The project that was developed needed feedback from stakeholders for improvement to help these children. With the agile feedback methodology obtained, it is possible to solve problems quickly.

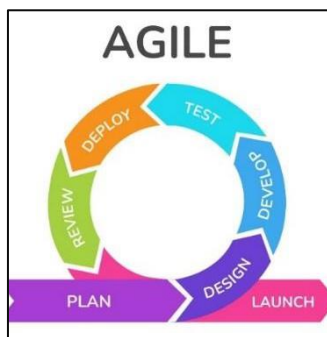


Figure 3: Agile Phases

## RESULT AND DISCUSSION

The evaluation for the augmented reality storybook project was carried out to assess the degree of usability of this product, as a learning tool it also to accomplish the third objective of this project performed, which to evaluate the usability of this application by teachers and parents. The usability factors were scaled using the System Usability Scale (SUS) questionnaire. The SUS contained two factors, which are usable and learnable, that will be used in order to measure the level of usability in this project.

$$\text{Average SUS} = (\text{Total SUS Score}) / (\text{Total Number of Respondents})$$

As below are the result, respondents R6 to R20 received an 'excellent' adjective rating, while respondents R1 to R5 and R18 received a 'good' rating. All final scores in the table are 75% and above, which is considered good. A high SUS score implies a decent level of usability. Consequently, it can be concluded that this application can provide user satisfaction and can be used as a valuable learning tool for slow learner children, assisting them in reading.

Respondent	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Sus Raw Score	Sus Final Score
R1	4	2	4	2	4	4	3	4	4	1	32	80
R2	4	4	4	2	1	4	4	4	3	2	32	80

R3	3	3	3	3	4	3	1	4	3	3	30	75
R4	4	2	4	2	4	4	3	4	4	1	32	80
R5	3	4	3	2	3	3	4	4	4	2	32	80
R6	4	4	3	2	3	4	3	4	2	4	33	82.5
R7	3	4	4	2	4	3	3	4	3	3	33	82.5
R8	4	4	3	3	3	4	4	4	3	4	36	90
R9	3	4	4	2	3	4	3	3	4	4	34	85
R10	3	4	4	4	3	4	4	3	4	4	37	92.5
R11	2	4	4	4	3	4	3	4	2	4	34	85
R12	3	4	4	2	3	4	2	4	4	4	34	85
R13	4	4	4	4	2	4	4	3	4	4	37	92.5
R14	4	3	3	2	3	4	4	4	2	4	33	82.5
R15	4	3	4	3	4	4	4	4	3	4	37	92.5
R16	4	4	4	2	4	4	3	4	3	4	36	90
R17	2	4	4	4	3	4	3	4	4	4	36	90
R18	2	4	4	1	3	4	4	4	3	3	32	80
R19	4	3	4	1	3	3	4	4	4	4	34	85
R20	3	4	4	3	3	4	3	4	3	4	35	87.5

1

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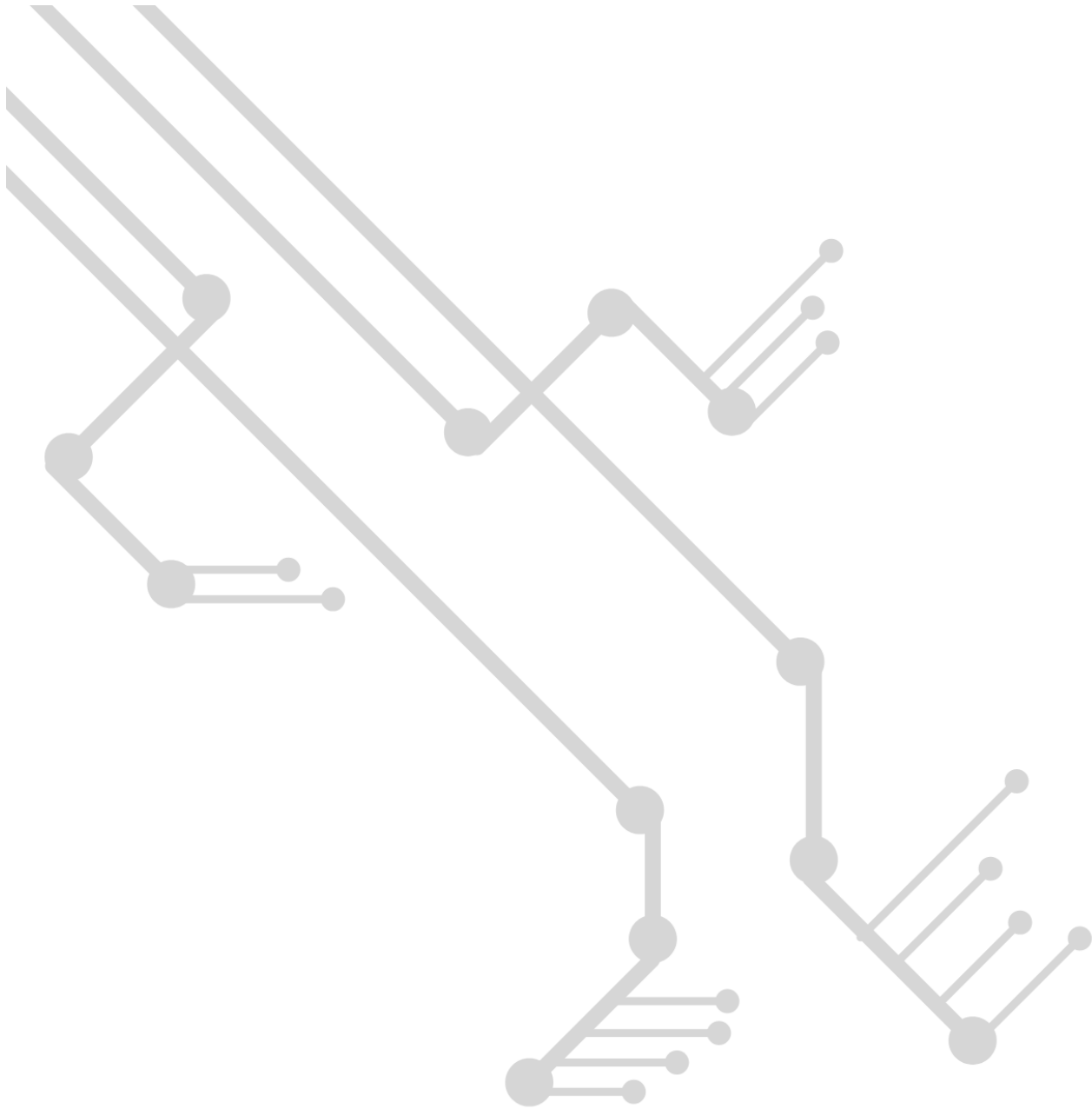
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