UNLEASHING THE POTENTIAL:
Empowering Artificial Intelligence (AI) with Misty II Robot

By Ts. Dr. Che Ku Nuraini Che Ku Mohd, Universiti Teknikal Malaysia Melaka (UTeM)

Misty II Robot is a programmable personal robot platform for developers. It is a new category of robotic platform that integrates computer vision, sensors and Simultaneous Localisation and Mapping (SLAM). It is specifically designed for human-robot and robot-robot interactions, vision algorithm, supervised or autonomous control, and voice recognition. Misty can easily create an empathetic link with students with disabilities such as autism and other emotional and behavioral disorders, inspiring them to develop social and emotional skills through physical and intellectual exercises. Users can add different sensors and accessories to make the robot more capable. The development platform is intended to make it easier for developers, educators, and researchers to develop software and accelerate robotics adoption. This article explores the Misty II robot standard edition, features, software and Misty robot for education. The technology represents a significant leap forward in research and development.

Robotic technologies allow educators use the latest technological breakthroughs, helping students learn while also engaging them in exciting activities and social experiences that enrich their minds. According to Bernstein, Founder and Head of Product, Misty Robotics, there are more than 23 million developers around the world, and they are the key to unlocking the future of robots, previously only available to the world of roboticists. Users now have the freedom to develop new skills or behaviors for Misty by utilising programming languages such as JavaScript and Python. Furthermore, the robot's potential can be expanded by incorporating various sensors and accessories to enhance its capabilities and usefulness. Due to its advanced features, Misty is used by the world's leading researchers, innovators and educators.

/chief editor's note

Future living and society

Hello! It is an absolute pleasure to welcome you to the 21st edition of TECHIES, which is also the last edition of the year.

In this edition, we cover some insights relating to artificial intelligence and living with a robot. Robotic technologies allow humankind to learn while engaging in activities and social experiences that create new minds. Today's robots can interact, visualise, supervise, and more. While they will not replace human learning specialists, they add so much value to the human experience, particularly in education, which then leads to unprecedented advancements in industries and the world at large.

To add, we also explore the importance of environmental sustainability and the role that technology plays in resolving today's critical environmental issues. From awareness to action, we see how learners are empowered to do their bit in protecting the environment. For example, we read about how raw plastic bottles are reprocessed into Eco Fabric and Eco Products, and how multifunctional plastic beds are constructed to be used during disaster events. We know that a recycling process is a tedious operation, but it can be simplified using technology. With image processing capabilities in a home-grown sustainability app, the effort required to carry out the recycling process is reduced, making it more efficient.

We hope you enjoy our content curation. Thank you for your continued support, and we look forward to connecting with you again in 2024. Happy reading!

Zuraidah Mohd. Zain

MISTY II ROB STANDARD EDITION

The Misty II robot is designed and built by the Misty Robotics team. The Misty Standard Edition is the original Misty II model. It provides developers with a professional-grade platform robot that can take on a wide variety of assignments including cases that benefit from SLAM, 3D images for AI and/or CAD, and full robot autonomy made possible through auto charging. Users can charge Misty using a wireless charging station, or it can be plugged directly into the port on her base.

The robot can autonomously move around a room avoiding obstacles. It also detects and recognises people with an expansive field of view. To add, it responds to touch on her head or chin. The user can customise Misty by changing her arms, add a trailer, and a host more changes and expansions.

SOFTWARE

Misty is a great platform for beginners or advanced programmers who want to work with a fun, fully-programmable and expandable social robot. For beginners, Misty can be programmed

Figure 1: Meet Misty, the world's most lovable social robot.

using Blockly, a block-based visual programming language editor that runs in the user's browser. The Misty App is a mobile app for iOS devices that can be used to set up the robot's Wi-Fi connection.

Misty also supports student learning to code with age-appropriate, easy-to-use tools - from graphical block programming to simple APIs in standard programming languages. For more advanced users, Misty is fully-programmable in Python, JavaScript and ROS. It is able to create 3D maps and moves autonomously and dynamically in response to its environment. Misty can recognise faces and objects and understands voice commands. Purposely built for developers, Misty has the tools needed to easily build up her skills, and is readily extensible via third-party APIs, hardware modifications and additional sensors. For those with an interest in Human Robot Interaction and critical topics like Alzheimer's, Autism, Learning Disabilities and Aging in place, Misty is ready to play a central role.

Users can use the Misty App to drive Misty and see information about Misty's software. The Misty App can be downloaded from the App Store (iOS) or Google Play (Android). Once the app is launched, Misty is connected via Bluetooth. There is an SDK (Beta) such as Misty's REST API, JavaScript SDK, or .NET maintained by the Misty Robotics organisation to get started. It is not recommended for multiple users to each use a separate instance of the Misty companion app to connect and send commands to a single Misty robot. If more than one person connects to Misty at the same time, as in a class or in a group development environment, they will need to take turns sending commands, or Misty may respond unpredictably.

MISTY FOR EDUCATION AND RESEARCH

The use of robots spans across various research topics and applications. These range from exploring human-robot interaction to gathering samples in harsh and challenging environments, and to the development of novel commercial uses for robotics and artificial intelligence. Misty is designed to optimise learning and engagement, and has both an attractive and rich design, and very advanced sensors and hardware, making it unique in the market today. In this era of advanced technology, ensuring quality education, particularly special needs education, has become a crucial responsibility for numerous specialists. If robots are used now, by the time the next generation arrives, many of the common challenges facing today's children with disabilities will be things of the past.

The new paradigm of teaching will involve robotic innovations that will profoundly affect education, technology, and society. Personalising techniques to fit each student's communication, social, and learning needs will be used. Educators will undergo comprehensive training and continuously update their skills and resources to deliver effective intervention for children with special needs. Robotic technology enables educators to leverage the latest technological advancements and engage students in stimulating activities and social experiences that contribute to their cognitive growth and development.

Robots cannot replace teachers and learning specialists, but the digital age has certainly paved the way for incredible advancements in all sorts of industries, including education. Robotics in education can be used to support, assist and augment the teaching professional. Thus, it gives more opportunity for the professional to assess, observe and analyse children's performance. Education is such a high priority because, unlike many other fields, it is tough to predict what the requirements of tomorrow might be.

PERFORMANCE OF MISTY II ROBOT

Misty Robotics teamed up with Intrinsyc Technologies, a wholly owned subsidiary of Lantronix, Inc. – a global provider of hardware and software solutions for the Internet of Things (IoT) and Out of Band Management (OOBM). As an innovator in product development services and edge computing modules, Intrinsyc helped Misty Robotics work with solutions from Qualcomm Technologies, Inc. (QTI) to create Misty II, an open robotics development and learning platform based on Misty the robot. Misty II Robot is ready for developers to build skills that take full advantage of her capabilities such as detecting and recognising people. Misty's high-resolution camera and object detection capabilities enable her to detect faces and other visual information. Her far-field microphones and audio processing capabilities give her the ability to hear speech while filtering out background noise. Misty can record video and audio data and share it with other devices, or use screen and speakers to stream data shared by other devices.

In February 2020, a pilot test was supposed to be carried out in Barcelona on the elderly, in order to study how far the robot could improve the quality of life of people with some kind of dependency, who lived at home by themselves. With the pandemic, the plans had to be delayed and, at the moment, the robot is being tested in three different homes to see if the robot could help reduce the isolation of the elderly, whether it is used to monitor their health, or if it is useful to improve patient-adherence to medication or attendance to medical visits.

In Japan, the development of elder care robots is given priority in order to help fill a projected shortfall of 380,000 specialised workers by 2025. The UK is similarly facing acute shortages of staff. In 2021, the country's social care workforce shrunk for the first time in almost a decade, while reports estimate that there are approximately 165,000 job vacancies in the sector.

This staff shortage is also set to deepen in the years to come as more than one in four care workers are aged 55 or over and nearing retirement.

BENEFITS OF MISTY II ROBOT

Misty has an impressive array of capabilities and gives developers the opportunity to build the skills of robot applications. Its straightforward software development kits and hardware customisation can provide an engaging opportunity for students to learn programming, robotics, and more. Meanwhile, her more sophisticated technology can assist with research and learning in universities. Educational robots help children develop one of the basic cognitive skills of mathematical thinking at an early age. Misty is able to create 3D maps and moves autonomously and dynamically in response to its environment. It can also recognise faces and objects and understand voice commands. Dozens of other use cases are being explored and built, including greeter, receptionist, delivery agent, security monitor, and more.

Misty's most promising applications may have yet to be invented. It has the potential to tap into the imagination of millions of developers who aspire to work with robots, helping to shape the future of the industry.

Overall, the benefits of robots in future education holds the potential to revolutionise the way students learn and interact with educational content. Robots can be used to teach science, technology, engineering, and mathematics (STEM) subjects in an interactive and hands-on way. It can conduct experiments, solve complex problems, and provide practical demonstrations. However, it is important to note that while robots can enhance the educational experience, they cannot replace the vital role of human teachers in education. Therefore, the integration of robots should be seen as a complementary tool to support educators and students rather than a replacement for human educators.

By Ts. Chan Ler-Kuan, Assoc. Prof. Ts. So Yong Quay and Ts. Yang Chee Beng, Southern University College

From Awareness to Action:
Empowering Students to Drive Environmental Sustainability through Technology

In March 2023, during Earth Hour Day, forty-eight students from Southern University College Faculty of Engineering and Information Technology visited the TzuChi Eco Awareness Gallery. The group came to a better grasp of the importance of environmental sustainability and the role that technology plays in resolving today's critical environmental issues. With the goal of making Johor the safest, cleanest, and most attractive state in Malaysia, 'Johor Bersih' - a government programme under the Fifth Core of Johor's Agenda, places a premium on safety, cleanliness, and the environment (Mohd Razib, 2023; Nordin, 2023). The people of Johor have shown the programme a great deal of support, and trips like the one the students took help teach the value of cleanliness and the importance of protecting the environment.

One of the features shown in the gallery was the 'Ten Finger Formula', where, each of the human fingers represented a distinct environmental product, namely, plastic bottle, glass bottle, aluminium can, tin/iron can, paper, electricity, fabric, electronic/technology product, hardware/ironware product, and 'others'. Students learned about recycling, including how plastic bottles were reprocessed into products such as Eco Fabric and Eco Product. The most interesting item on display was a multifunctional plastic bed used for disaster assistance. Made predominantly of used plastic bottles, it was lightweight and portable, and could be used as a chair. During rescue operations at times of disaster, the bed would come in handy. The bed costs approximately RM700 in Malaysia.

Figure 1: Ten Fingers Formula explained by TzuChi volunteer, Mr. Chong Hai Fang.

As a result of the visit to the TzuChi Eco Awareness Gallery, a growing number of students now work in adding gamification features in their app projects for sustainability. These tech-savvy students no longer seek standard classroom-based awareness lectures, preferring instead interactive and immersive experiences. By utilising the power of gamification, they now see sustainable behaviours attractive and rewarding, hence promoting their widespread adoption. Not all students are, however, interested in the gamified part of app creation. Some students are more interested in the potential of image processing to solve real-world problems. They know that the recycling process is a tedious operation and hence simplify it using technology. By integrating image processing capabilities into their sustainability app, they reduce the effort required to carry out the recycling process, making it more efficient.

Students are now embracing the simplicity and adaptability of low-code platforms to bring their ambitious concepts to life. The term "low-code platform" refers to an application that offers a Graphical User Interface (GUI) for programming and, as a result, accelerates the development of prototypes while reducing the effort traditionally required to do the job. Using the Microsoft Power Platform, students create basic mobile applications that provide user-friendly environments that enable novice programmers to design robust apps without delving deep into difficult programming languages. Using their ingenuity and foresight, the students merge gamification features with image processing capabilities to create sustainable apps that are rich in functionality. In doing so, they equip themselves with essential skills and at the same time make substantial gains toward a greener and more environmentally conscious world. As these innovative student-led projects continue to develop, they will no doubt contribute to a brighter and more sustainable future for us all.

Figure 2: The process of turning plastics bottles into different plastics materials.

Some applications developed by students:

Figure 3: Gamification and informative app.

In summary, the trip to the TzuChi Eco Awareness Gallery was a formative experience for the 48 students from the Faculty of Engineering and Information Technology at Southern University College. Witnessing first-hand the impact of sustainable technologies and environmental activities has encouraged the students to apply creativity and ingenuity to today's pressing problems. The mix of gamification and image processing techniques in app development displays their enthusiasm to making sustainability accessible and entertaining for all. By leveraging low-code platforms, they design user-friendly and effective solutions, bringing Johor, Malaysia, and the world closer to the vision of a cleaner, safer, and more sustainable future. Engagement with sustainable technologies and environmental initiatives during the trip has left a lasting impact on the students' academic and personal growth. They now carry a profound sense of responsibility to be agents of positive change, committed to contributing their expertise and skills towards a greener and more resilient world. As they polish their sustainable technology initiatives, their passion and dedication will no doubt play a key role in crafting a brighter and greener tomorrow.
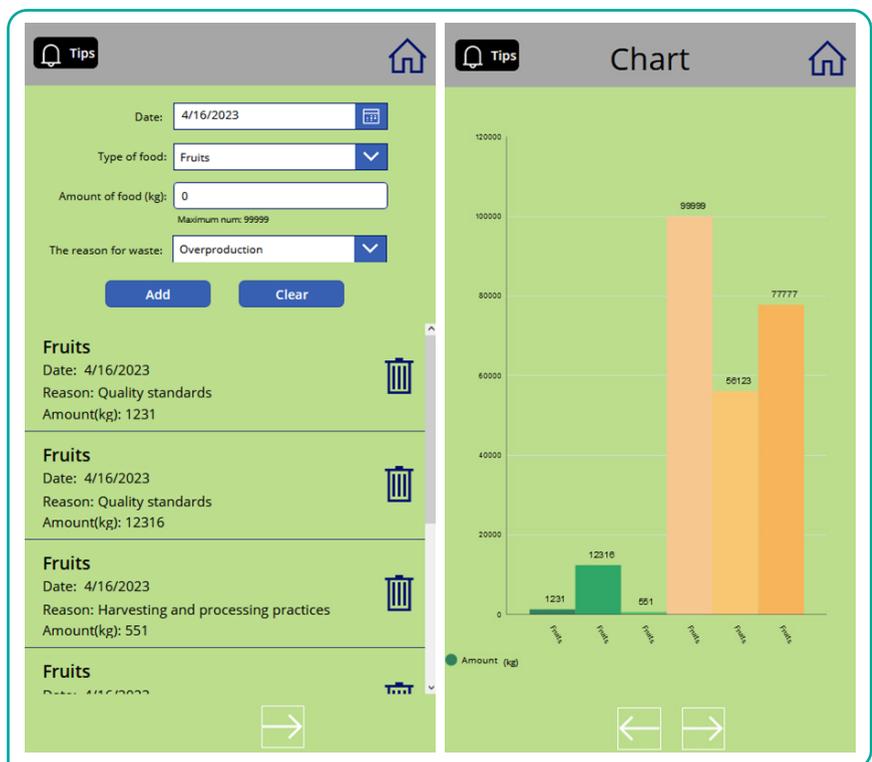
Figure 4: Food waste calculation app.

SUSTAINABLE VISIONS:
A Journey through Academia and Advocacy

An Interview with
Ts. Dr. Irina Safitri Zen
Assistant Professor at Department of Urban and Regional Planning, Kuliyyah Architecture and Environmental Design, International Islamic University Malaysia (IIUM)

Can you briefly introduce yourself and your background?

Certainly! I am a lecturer and researcher at the Urban and Regional Planning Department, Kulliyyah of Architecture and Environmental Design, International Islamic University Malaysia. Currently, I am the chairperson for the Technology and Technical Working Group (TTWG), MBOT, for the field Atmospheric Science and Environmental Technology (AC). In this working group, I promote greenhouse gas calculations for low-carbon development planning & governance, and climate governance.

When I embarked on my journey in the Ecology and Conservation program at the Faculty of Science and Technology, Universiti Kebangsaan Malaysia (UKM), sustainability was not the widespread focus it has become today. Despite its developing popularity, the program laid a robust foundation for my understanding of sustainability. Transitioning into my master's degree marked a shift from hard to soft science, specifically in environmental management. Specialising in Environmental Impact Assessment and minoring in Urban Environment, the one-year interdisciplinary master's program brought together esteemed professors from diverse fields such as environmental science, management, social science, and economics at UKM. This exposure broadened my perspective by delving into the intricate connections between ecological issues and sustainability's social and economic dimensions.

My doctoral research explored the critical realm of solid waste management, where I meticulously examined policies and environmental economics. This endeavour also involved conducting a comprehensive household survey to understand recycling habits. Preceding my doctoral studies, I was with a regional planning firm for four years before transitioning into academia at the Sustainability Research Alliance and Faculty of Built Environment, Universiti Teknologi Malaysia, in 2010. During this period, I realised that the comprehensive nature of my educational background - encapsulating all three pillars of sustainability, namely environmental, social, and economic – provided a holistic perspective in the way I viewed the world. This perspective continues to guide my endeavours to contribute to a sustainable future.

What inspired you to pursue a career in sustainability academia?

My inspiration to pursue a career in sustainability academia stemmed from a convergence of personal convictions, professional experiences, and a profound appreciation for the interconnectedness between the environment, social, and economic aspects of sustainability. I definitely love nature. However, the most intriguing part is learning how people interact with nature and how nature responds to that. Sustainability as a field provides an opportunity for me to contribute to solving some of the most pressing global challenges, including climate change, biodiversity loss, and social inequality. As a professional in this field, I often feel a sense of purpose and fulfilment, knowing that my work, to a certain extent, has the potential to make positive impact on society and the planet. My interdisciplinary background allows me to have a broader perspective on understanding complex issues in sustainability and to engage with diverse fields of study, as well as fostering a more holistic understanding of multifaceted issues. Indeed, sustainability offers never-ending knowledge exploration and learning opportunities from other people and their experiences.

Another attraction to sustainability academia is the opportunity to teach and mentor the next generation of leaders to become change agents. Since current work demands the ability to understand the complexity of sustainability, guiding students in their academic and research endeavours is such a rewarding aspect of my career.

Can you describe a specific sustainability project or program you have led or have been involved in? What were the key outcomes and impacts?

My first research project was on a low-carbon campus, a part of the low-carbon cities framework led by the Malaysia Green Technology Corporation in 2013. A carbon calculator was established by using the campus as a test bed, mimicking a small city. The project gathered experts from various disciplines and won the Diamond Award from the Ministry of Environment, Water and Green Technology in 2017. Three sustainability leadership projects were conducted in Cambodia (2013), Bali (2017), and Tanjung Piai, Johor (2019), to test the participatory interdisciplinary sustainability science approach involving higher education institutions in Malaysia and ASEAN countries. The material was used as a UNESCO Sustainability Science Master Class via the School of

Internet Asia and won several invention awards locally and internationally. From this research, I have been invited to share it at the UNESCO Meeting for several biosphere reserve networks in Palembang, Indonesia 2016, Tokyo 2017 and at the Huangshan Dialogue, China, in 2016.

Since then, I have been involved in several sustainability research projects, such as the no plastic bag initiative, a sustainable lifestyle from a consumer behaviour study, the potential of imposing economic instruments for plastic bag, low carbon society of Iskandar Malaysia, the smart government for Melaka state and developing a climate action plan for Melaka. This included translating and evaluating some climate change policies via a multi-level climate change governance approach and developing big data policy for Melaka. The result helped the Melaka State Government align its climate action initiative through Melaka Green Tech and four local government offices. The same analysis was conducted on a country level and published in a book titled 'Governing Climate Change in Asia'.

My project with Dr Hiroko Shibakawa of Okayama University examined the Okayama Model of Education for Sustainable Development by using a quintuple helix framework to sustain a model recognised as a sustainable society by UNESCO in 2017. The research was backed by the Sumitomo Foundation. The discovery improved our understanding of using a city-wide approach to social innovation and knowledge co-creation. The framework won the award at the Seoul International Invention Fair (SIIF) 2022 and was published in Frontiers Sustainability following an invitation to present a public talk at

> **To engage students, I emphasise their responsibility to get involved in university and community activities, particularly in sustainability-related issues."**

Okayama University and Okayama City, as well as the Okayama Education for Sustainable Development (ESD) Promotion Commission.

Currently, I am conducting research for MASA on multi-level climate change governance and policy for Malaysia towards a net zero-emission country by 2050. I am also looking into climate change education with Okayama University, Japan, and sustainable village tourism development with Universiti Pertahanan National, Indonesia.

What courses related to sustainability have you developed or taught, and how do you engage students in critical discussions in the field?

Sustainable Development is a compulsory university course developed to promote an interdisciplinary platform where students from various kuliyyah or faculty interact to address current issues related to sustainability. It covers governance issues, which include government, corporate social responsibility, and ethical aspects. It promotes balance between three pillars of sustainability, namely, the environmental, social, and economic aspects, all within an Islamic context.

The delivery of the course uses the Socrates method and inquiry-based learning (IBL). 'I' includes students in current and emerging trends in sustainable development, such as climate change and low carbon pursuits. Students solve problems via problem-based learning projects. The method has secured a Bronze Award during the Invention, Innovation and

Design Exposition, Iidex 2022. The course also includes Islamic principles such as equity issues and the role of Islamic green finance in encouraging low-carbon development, planning, and governance. It adopts a sustainability teaching method and a student-centred learning approach rather than the traditional teacher-centred approach.

To engage students, I emphasise their responsibility to get involved in university and community activities, particularly in sustainability-related issues. I always portray them as future leaders and agents of change in society, and when they graduate, I advise them to use what they have learned continuously.

To add, I encourage my post-graduate students to align their research with current sustainability concerns. One of my students calculated the greenhouse gas emission in Melaka and came up with the planning implications for developing low-carbon states. Another master's student mapped SDGs goals in certain localities. During the recent COVID-19 outbreak, a PhD student developed several planning tools to evaluate health disaster risks, resulting in a new form of disaster governance to be used in future urban planning.

What advice would you give to students interested to pursue a career in sustainability?

Students interested in pursuing careers in this exciting field must be familiar with the complexity and dynamic interactions between various entities within the sustainability-related realm. The entities include the government, the community, the private sector, the education sector, and the natural environment. The student also needs to have a broad perspective concerning the global challenges that must be translated into local actions. No matter their field, they must align their respective perspectives towards sustainability, underscoring a global mindset without compromising local sensitivity.

WTC Red LIPS Mentorship Program

PUTRAJAYA, 15 DECEMBER 2023 – The Malaysia Board of Technologists (MBOT) is continuing its commitment to empowering and uplifting women in technology by organising a WTC Red LIPS Mentorship Program. This initiative aligns seamlessly with MBOT's Woman Technologist Chapter (WTC) initiative.

The mentorship program, a key component of the WTC initiative, brings together eight prominent figures and women members of MBOT. Its primary goal is to address the unique challenges faced by women in the tech industry while providing a supportive platform for networking, mentoring, and knowledge-sharing.

The mentors for the program include Ts. Sharifah Zaida Nurlisha Syed Ibrahim, CEO of MMC Oil & Gas Engineering Sdn Bhd (MMCOG), Ms. Grace Chan, Head of Human Resource at Hengyuan Refining Company Berhad (formerly known as Shell Refining Company Berhad), Dato' Roslina Zainal, Independent Non-Executive Director of Tenaga Nasional Berhad, and Prof. Ts. Dr. Massila Kamalrudin, Vice Chancellor of Universiti Teknikal Malaysia Melaka (UTeM) and Ts. Annaliz Abu Bakar, Chief Executive Officer, PETRONAS Global Technical Solutions Sdn Bhd.

Additionally, Ts. Dr. Mahaletchumy Arujanan and Assoc. Prof. Ts. Dr. Ruslinda binti A. Rahim, Board Members of MBOT, were also playing their roles as mentors.

The event attracted a hundred participants from diverse technology fields in both government and private sectors.

Date ▶ **15th December 2023**

Time ▶ **2.00 pm – 5.00 pm**

Venue ▶
Malaysian Space Agency (MYSA) Kuala Lumpur