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PREVENTION IS BETTER THAN CURE:

Malaysia's Fight Against Floods and Landslides Powered by AI

By Simeran Kaur a/p Kalwant Singh, Ampstek

Flooding is consistently the top-ranked hazard in Malaysia's national risk assessments. In 2021 and 2022, floods affected multiple states, resulting in significant economic and human impacts. The damage was estimated at over RM6 billion. This raised a critical question: could these events have been predicted earlier?

Today, a revolution in disaster management is underway. It is no longer driven solely by sandbags or sirens; artificial intelligence (AI) is now playing a key role. *CONTINUED ON PAGE 02 >>*

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/chief editor's note

The end of 2025 is a time for us to pause and reflect on our progress throughout the year. While we assess our personal achievements, we must also consider how these efforts contribute to the greater good of the nation. As members of the Malaysia Board of Technologists, we carry a social responsibility to enhance the quality of life in our society through technical expertise and innovation.

In some parts of our country, the year-end period is often eventful. Many areas in Malaysia are vulnerable to disasters, including floods and landslides. Furthermore, extreme weather patterns intensified by climate change may increase the occurrence of tornado-like phenomena. Throughout the year, fire incidents continue to pose serious threats to building occupants. These disasters exhibit unique characteristics depending on their localities; therefore, they demand customised detection and alert systems to reduce their impact.

Artificial intelligence comprises a set of technologies that can assist in predicting and mitigating the impacts of disasters. In addition to technical expertise and supporting hardware, large volumes of reliable data are essential for generating accurate alerts, effective response plans, and robust post-disaster management. To train and deploy artificial intelligence effectively, both government and private sectors must demonstrate a willingness to form strong and transparent partnerships.

Let us work collectively to build a safer, more resilient, and more glorious nation in 2026.

Assoc. Prof. Dr. Mohamad Asmidzam Ahamat

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How AI learns about disasters

AI can identify patterns that humans might overlook. It all begins with large amounts of data—rainfall, river levels, soil types, past flood locations, and satellite images. AI algorithms then analyse these datasets to identify combinations of conditions that typically lead to floods or landslides.

Once these patterns are identified, AI can make accurate predictions. For example:

"If rainfall exceeds X mm in this area, and the river level rises above Y meters, there is a 60% chance of flooding within six hours."

These predictions are not mere guesses, they are based on rigorous mathematical models trained on real data from agencies such as the Department of Irrigation and Drainage (JPS), MetMalaysia, and satellites that monitor clouds and rainfall.

AI-powered disaster prediction in Malaysia

Researchers in Malaysia are already testing AI-based disaster prediction systems in various regions:

Temerloh, Pahang — Scientists used an artificial neural network to forecast river levels based on historical rainfall and water-flow data. Their model successfully predicted floods several hours in advance.

Kota Belud, Sabah — A hybrid model combining AI with rule-based decision logic was developed to warn residents before floodwaters rise, giving local authorities more time to prepare evacuation plans.

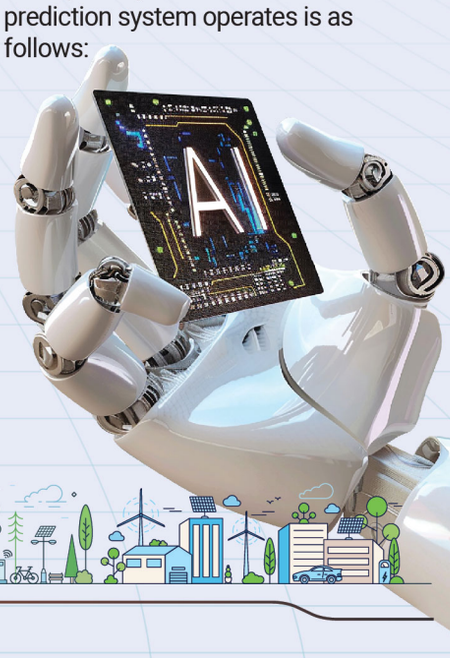
Penang Island — Engineers trained AI systems such as Random Forest and XGBoost (popular machine learning methods) to produce detailed landslide-risk maps, helping planners identify areas where building on steep slopes is too risky.

PROJECT	INSTITUTIONS	FOCUS	REPORTED OUTCOME
ANN Flood Forecasting	UTM and JPS	River level prediction (Temerloh)	~85% accuracy, 6–12h lead time
Hybrid Flood Warning	UMS	Early warning for Kota Belud	Reduced false alarms
AI Landslide Mapping	USM	Landslide susceptibility (Penang)	Supports zoning and evacuation planning
CNN Flood Mapping	UTP	Satellite-based damage detection	Quicker post-disaster response

Table 1: Examples of AI applications in Malaysia's flood and landslide management.

How AI turns data into warnings

A simple way to visualise how a smart prediction system operates is as follows:



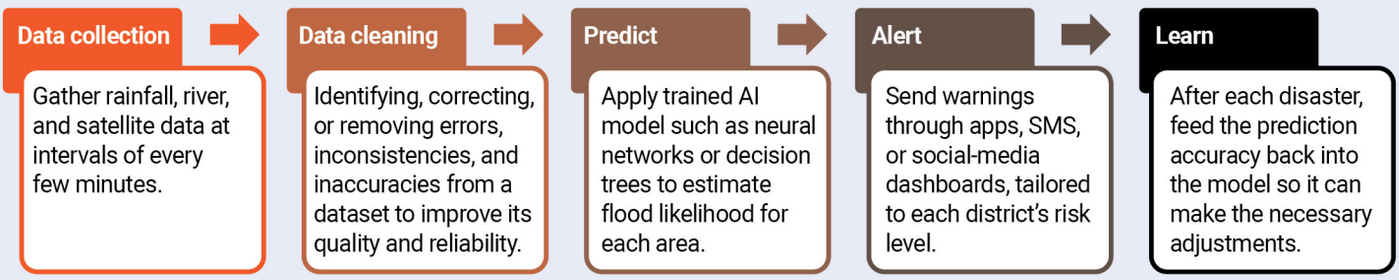


Figure 1: Steps in a smart prediction by AI.

This cycle of data collection, cleaning, prediction, alerting, and learning is what gives AI systems their strength. Rather than producing one-off forecasts, they continually refine themselves.

Availability of datasets and infrastructure

Available data (public/government):

- Agensi Pengurusan Bencana Negara (NADMA) & Pusat Kawalan Bencana Negara (NDCC) reports and the National Risk Register (hazard prioritisation and impact statistics).
- JPS Public InfoBanjir publishes near-real-time rainfall and river water-level network (estimated 200 stations). These data are suitable both as model inputs and for generating near-real-time alerts.
- MetMalaysia shares data on rainfall stations, monsoon season calendars, and weather warnings.
- Department of Statistics Malaysia shares impact assessment reports and special flood impact reports.

Gaps and needs:

- **Labelled historical event databases with consistent damage/impact labels** (fine-grained local loss/damage, time-of-onset, shelter counts) are fragmented across agencies.
- **High-density soil/landcover time-series** and updated landslide inventories at the local scale are limited, which reduces model transferability.
- **Operational data pipelines** (satellite ingestion, gauge QC, model-serving) are often research-grade rather than productionised.

Why AI matters beyond technology

The real goal is not fancy algorithms; the aim is to save lives and livelihoods. Better predictions mean earlier evacuations, fewer losses, and more efficient use of resources. Even a six-hour head start can be the difference between safety and disaster.

AI can also support recovery efforts. For example, satellite-based AI tools can estimate which areas suffered the most damage, helping government agencies deliver aid more quickly and fairly.

How ordinary Malaysians can access AI-based disaster predictions

Currently, most AI-powered prediction tools in Malaysia are used by government agencies, universities, and researchers. However, some of their outputs are already publicly available, often through websites and mobile apps.Here is how everyday Malaysians can stay informed:

1. **Public Info Banjir by Jabatan Pengairan dan Saliran**
   This official website and app display live rainfall and river-level data from hundreds of stations across the country. While it does not explicitly mention "AI", some flood-risk estimates are enhanced by machine-learning models used in pilot projects.
2. **MetMalaysia App and Website**
   The Malaysian Meteorological Department issues weather alerts and monsoon warnings, which are increasingly relying on AI-assisted forecasting to enhance accuracy.
3. **Agensi Pengurusan Bencana Negara (NADMA)**
   NADMA shares real-time disaster updates and evacuation center locations on its official website and social media pages. In the future, the agency plans to integrate predictive alerts from AI systems, enabling the public to receive earlier warnings.
4. **Third-party alert platforms**
   Universities and local tech teams sometimes run pilot dashboards that use AI models to visualise predicted flood zones or rainfall intensity. While not yet official, these tools provide a glimpse of what is coming: community-accessible prediction maps and even chatbots that can answer questions like, "Is my area at risk today?"

The ultimate goal is to make these AI forecasts open and easy to understand, rather than hidden behind technical dashboards. The government should focus on integrating these systems into a single public early-warning platform, accessible via apps, SMS, and even WhatsApp alerts in multiple languages.

Conclusion

AI cannot stop the rain, but it can help Malaysia stay one step ahead of it. By combining local expertise, open data, and smart algorithms, the country can transform how it prepares for floods and landslides, shifting from reactive to preventive.

As climate risks rise, investing in AI for disaster prediction is not just about technology.

It is about protecting families, safeguarding infrastructure, and ensuring that when the next storm comes, Malaysia is ready and informed.

Eyes in the Sky:
How Drones and Robotics are Transforming Disaster Response in Malaysia

By Ts. Norhazli Abu Hassan, Sky-Futures Malaysia

When floods hit Kedah in late 2022, the police turned to an unexpected ally: drones. With roads cut off and limited visibility, drones provided aerial footage that guided rescue teams to stranded families and helped assess the most affected areas. Similar stories have repeated across Malaysia in recent years: from monitoring forest fires in Sarawak to managing flood emergencies in Terengganu.

These small flying robots are fast becoming critical tools in disaster management. They extend human eyes to the places that are too dangerous, remote, or vast for ground-based assessments.

From Response to Resilience

In Malaysia, disasters such as floods, landslides, and forest fires are increasing in both frequency and severity. Climate change has made rainfall patterns unpredictable, while rapid urbanisation adds further complexity to managing disaster-prone areas.

A conventional disaster management relied heavily on ground assessments and helicopters for annual data collection. These methods are time-consuming, costly, and sometimes risky for responders. Drones, or Unmanned Aerial Systems (UAS), offer a faster, safer, and data-driven alternative.

The Ministry of Science, Technology and Innovation (MOSTI) recognised this potential years earlier. In 2022, MOSTI activated the Pasukan Tindakan Khas Kecemasan Dron (PTK2DRON), a national task force for drone-based disaster response [MOSTI, 2022]. Supported by NADMA and local drone operators, this initiative has since evolved into an organised framework for deploying drones during floods and other emergencies [NADMA, 2024].

Aerial view captured by a drone during a flood in Terengganu – Photo BERNAMA 28 Nov 2024.

How do Drones Make a Difference?

1. **Rapid Aerial Assessment for Disaster Response**

   The first few hours of a disaster are crucial. Drones can be deployed within minutes to map the affected area. Equipped with high-resolution cameras and thermal sensors, they capture detailed imagery that enables real-time decision-making.

   In Kedah, the police used drones to monitor flood zones that were inaccessible to vehicles. [Astro Awani, 2022]. This allowed them to identify stranded victims and plan safe routes for rescue boats. Similarly, in Terengganu, the Fire and Rescue Department deployed drones to monitor water levels and identify safe areas for evacuation [Bernama, 2024].

2. **Monitoring Forest Fires and Haze**

   Sarawak's Natural Resources and Environment Board (NREB) has recently turned to drones to detect and monitor forest fires across vast areas with challenging terrain [Harian Metro, 2025]. Equipped with thermal imaging and gas detectors, drones can locate hotspots long before they become visible from the ground.

   Early detection not only prevents the spread of fires but also supports enforcement against illegal open burning, a persistent problem during the dry season.

3. **Tracking environmental pollution**

   Drones have also proven useful for tracking hazardous emissions and chemical spills. During the Kim Kim River pollution incident in 2019, drones equipped with air-quality sensors were used to trace the movement of toxic plumes. They provided quick updates while keeping responders out of harm's way. Equipped with sensors for methane, volatile organic compounds (VOCs), and particulate matter, drones can detect and quantify air pollutants in real time.

How Sky-Futures Malaysia Fits In

Sky-Futures Malaysia (SFM), a company specialising in drone-based industrial inspections, has been at the forefront of introducing these technologies into disaster and emergency response.

Our experience operating in hazardous environments, such as offshore oil and gas facilities, has built a strong foundation for safe drone operations under challenging conditions. This same expertise translates effectively into disaster response.

For example, during emergency response exercises and collaborations with partners such as the Selangor Drone Center of Excellence and international payload manufacturers, SFM has demonstrated how airborne gas sensors can detect leaks and pollutants. Similar payloads can be used to identify gas build-up in flood-affected industrial zones or to detect fire hazards in damaged infrastructure.

SFM's platforms, comprising various industrial-grade drones and gas-leak detection payloads, can operate in dangerous zones to collect critical data and provide accurate, actionable information without risking the lives of responders.

In collaboration with national agencies, SFM has also contributed to capacity building by conducting training sessions for government officers on integrating drone data into disaster-response workflows.

Sky-Futures Malaysia is conducting drone-based methane leak detection and measurement – Source: SFM.

Integrating Drone Technology into Malaysia's National Disaster Framework

The formation of the Pasukan Tindakan Khas Kecemasan Dron (PTK2DRON), led by MOSTI and NADMA, is an example of how Malaysia is institutionalising the use of drones in disaster management.

During the MTL 2024/2025 coordination sessions, stakeholders from multiple agencies discussed how drones can support real-time situational awareness, data sharing, and logistics during flood operations [NADMA, 2024].

The uniqueness of Malaysia's approach lies in its emphasis on multi-agency collaboration, bringing together the expertise of public authorities, local drone service providers, and technology partners. This ensures that drone deployment is not ad hoc but fully embedded within operational plans.

Moving forward, integrating robotics and AI-based analytics could further enhance these processes. For example, autonomous drones for night-time monitoring or AI tools for analysing flood maps can help predict which areas are most at risk.

Robotics Beyond Aerial Systems

While drones dominate aerial response efforts, ground and underwater robots are beginning to play an important role.

Unmanned ground vehicles (UGVs) can be deployed for debris inspection or for delivering critical supplies in areas where human access is blocked. Similarly, remotely operated underwater vehicles (ROVs) can assist in inspecting bridges, dams, and other submerged structures after floods.

Sky-Futures Malaysia has explored similar systems in offshore inspections, using robotic crawlers and underwater drones for asset-integrity checks. This technology can be readily adapted for disaster-related infrastructure assessment, helping engineers determine whether a bridge or jetty is safe after a flood event.

A drone operator team participating in a PTK2DRON coordination meeting – Source: NADMA.

Members of the Drone Unit, Air Division of the Malaysian Fire and Rescue Department (JBPM) use drones to monitor flooding along Sungai Kelantan. Source: NSTP/Nik Abdullah Nik Omar.

Challenges and Opportunities

Despite the many benefits of using drones, several challenges remain:

- **Regulatory coordination:** Drone operations during disasters often involve restricted airspace and multiple agencies. A unified national framework is essential for faster, safer deployment.
- **Data management:** Drones generate large volumes of imagery and sensor data. Without proper systems for analysis, storage, and sharing, valuable information may be overlooked.
- **Skilled operators:** Disaster response requires trained pilots who can operate safely under intense conditions. This is where certification programmes and collaboration with drone training centres become important.

To address these challenges, agencies such as NADMA, MOSTI, and MRANTI are working closely with industry partners to develop a clearer operational structure and a more comprehensive training pipeline.

Conclusion

Drones and robotics are no longer futuristic concepts in Malaysia's disaster response. They are already actively flying over flood zones, scanning forests, and supporting first responders on the ground.

From Kedah's flood missions to Sarawak's fire monitoring and the Kim Kim pollution incident, drones have demonstrated their ability to provide the eyes, reach, and precision needed in times of crisis.

With the collaborative efforts of national agencies and technology partners like Sky-Futures Malaysia, our country is steadily building a smarter, safer, and more resilient disaster management ecosystem.

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AI That Protects Lives: Rethinking Disaster Response Through Intelligent Buildings and Communities

an interview with

Ts. Dr. Leong Yee Rock
Founder and AI Solution Architect, VYROX AI

Having started your professional journey in academia and research before founding VYROX AI, what are the factors that prompted your shift into entrepreneurship? Additionally, how has your training and experience as a Professional Technologist influenced your choice of problem domains?

My father, Leong Kai Chew (Elvis), was also an engineer. He ran a company in Ipoh, Perak, specialising in insecticide and pesticide pneumatic manufacturing, consulting, and factory operations, with products distributed worldwide. His work as both an engineer and an entrepreneur deeply inspired me. I grew up believing that building a business was one of the coolest things one could do.

After graduating with a degree in civil engineering from UPM, I founded VYROX while pursuing my MBA at the UPM Business School. My brother(Leong Yee Luck (Max)) and I initially started the company as a website design and internet marketing firm, and later expanded our work into software development.

Our company eventually evolved from being solely a software development firm into a full systems engineering company, providing both building management software and hardware. This transformation began after we met Au Sek Howe (Patrick) and Teh Hon Kee (Peter), who operated a property security company specialising in Extra-Low-Voltage (ELV) structured cabling and biometric security solutions. Through our collaboration, we combined our knowledge, experience, products, and research to develop a smart home system. By significantly reducing costs, we created a solution that became highly attractive to property developers in Malaysia at the time.

About 15 years ago, smart home systems were considered high-end and prohibitively expensive. Most available software and hardware were imported from the US, UK, and Germany. We conducted an in-depth study of these systems and built our own solution to reduce costs. In the end, we achieved cost reductions of up to 90% compared to the prices offered by overseas smart home technology providers.

Thanks to this innovation, we successfully convinced more than ten property developers in Malaysia to adopt our solution across multiple housing projects, making smart home technology far more accessible, practical, and appealing to the local market.

At that time, KNX and C-Bus were the most popular smart home systems. We developed a similar solution, less comprehensive, but sufficient to meet the needs of typical Malaysian homes. We named it V-Bus. V-Bus is built on RS-232 and RS-485, complemented by RF-433, RF-315, Ethernet, and Wi-Fi connectivity, allowing seamless integration with modern networks and enabling remote control and monitoring of home systems.

People often view VYROX as a smart home or smart community company, but its technology is capable of much more. How can your platforms be repurposed to assist during disasters such as floods, fires, or emergency-related security situations?

While VYROX is often recognised for its smart home and smart community solutions, our AIoT platform, the Very Intelligent Platform (VIP), is highly adaptable and plays a critical role in disaster management and emergency response.

VIP integrates artificial intelligence, computer vision, and Visual Language Models to analyse real-time data from sensors, cameras, and connected devices. Deep neural networks are trained on historical incidents and environmental patterns to detect early warning signs of floods, fires, or security threats. Visual Language Models enable the system to understand and interpret complex visual information in context, such as detecting rising water near electrical equipment, increasing smoke density, or abnormal human movement, and correlate these observations with natural disaster or security risk patterns.

In flood scenarios, VIP can detect rising water levels, predict at-risk areas based on past events, and trigger automated alerts or preventive actions, such as shutting off the electricity supply or securing vulnerable zones. In fire-related incidents, the system identifies smoke, abnormal heat signatures, and rapid fire spread, enabling immediate alerts, automatic unlocking of emergency exits, and providing guidance for safe evacuation. During security incidents or emergencies, VIP monitors unusual movement patterns, unauthorised access, or crowd behaviours, sending real-time notifications to property managers and emergency responders.

The platform continuously learns from every event, improving its predictive accuracy and response time. By integrating AI, deep learning, Visual Language Models, and real-time connectivity, VIP transforms ordinary homes and communities into intelligent and resilient, not only automating daily tasks but also protecting lives and property during disasters and emergencies.

When discussing disaster management, the technology can sometimes sound abstract. In simple terms, what types of sensors, data, and AI models make the biggest difference in providing early warnings and enabling real-time, on-the-ground decision-making?

In simple terms, disaster management with VIP combines multiple types of sensors, real-time data, and advanced AI models to provide early warnings and support rapid decision-making during emergencies.

For flood scenarios, VIP integrates water-level sensors in basements, rain gauges on rooftops, soil moisture and drainage sensors in landscaped areas, and river or drainage monitoring sensors in the surrounding areas. These inputs enable the system to detect rising water levels, predict at-risk zones based on historical patterns, and automatically trigger preventive actions such as shutting off the electricity supply in affected areas, closing floodgates, or sending targeted alerts to residents and property managers.

For fire scenarios, VIP uses smoke detectors, temperature sensors, thermal cameras, and gas leak sensors to monitor critical points such as kitchens, electrical rooms, and common areas. Deep neural networks analyse real-time sensor readings to identify abnormal heat signatures, smoke density, and rapid fire spread patterns. Combined with Visual Language Models, VIP can interpret video feeds and environmental data together, for instance, detecting smoke near an overloaded circuit and correlating it with human activity patterns, to send instant warnings, guide safe evacuation, and even automatically unlock emergency exits.

In security and emergencies, VIP uses motion sensors, surveillance cameras, smart access control systems, and crowd density sensors. AI and Visual Language Models detect unusual movement patterns, unauthorised access, or abnormal crowd behavior, allowing immediate alerts to be sent to security teams or first responders. For example, during a sudden power outage or natural disaster, VIP can identify the most vulnerable area and prioritise emergency responses accordingly.

By combining diverse sensors, deep learning, computer vision, and Visual Language Models, VIP transforms raw data into actionable insights. It continuously learns from every incident, improving predictive accuracy and enabling proactive, real-time decision-making. This ensures that residents, property managers, and emergency teams can act quickly to reduce damage, protect lives, and maintain safety during disasters.

Paint us a picture: if a VYROX-enabled building or neighbourhood experiences a disaster, how would its response differ from that of a conventional building? What would people see, feel, or be alerted to during the event?

In a VYROX-enabled building or neighborhood, the response to a disaster is intelligent, coordinated, and proactive. This is very different from a conventional building, where alerts are often delayed, information is limited, and most actions depend entirely on human reaction.

Imagine a heavy rainstorm approaching. In a conventional building, residents usually notice flooding only when water has already entered the car park or basement. By then, cars, electrical rooms, and storage areas may already be damaged. In a VYROX environment, the VIP platform monitors water level sensors, rain gauges, soil moisture, and drainage flow in real time. Artificial intelligence compares this live information with years of historical rainfall and flood patterns. If the system predicts that water will soon overflow into a basement, residents receive notifications on their phones and building screens. The system can shut off electricity in vulnerable areas, activate pumps, and alert property managers before any water has even entered the building. People see immediate warnings, hear automated announcements, and witness preventive actions take place around them.

Now, consider a fire situation. In a conventional building, fire may trigger a smoke alarm, leaving residents unsure of the fire's location, severity, and nature. In a VYROX-enabled building, the VIP platform integrates smoke detectors, temperature sensors, gas detectors, and thermal cameras. Visual Language Models analyse live video from the corridor and lobby, identifying smoke formation, heat signatures, or unusual glow patterns. The system pinpoints the exact origin of the fire. Residents receive clear, actionable instructions, such as "Fire detected in Level Four Electrical Room, evacuate via Staircase Two." Emergency exits unlock

automatically, ventilation adjusts to reduce smoke spread, and first responders receive precise updates about which rooms or equipment are at risk. Residents feel guided, supported, and informed at every step.

During a security incident, a conventional building might only send a simple alarm or rely on security guards to notice unusual activity. With VIP, motion sensors, access control data, and surveillance cameras are analysed using artificial intelligence and Visual Language Models. The system can detect abnormal crowd movement, unauthorised entry, or suspicious behaviour long before it becomes dangerous. For example, if a crowd unexpectedly forms in a lobby during an evacuation, VIP can identify congestion, recommend alternative escape routes, and instantly notify on-site security. Residents see updated evacuation guidance on their mobile phones and building screens, keeping them calm and directed even in confusion.

Overall, a VYROX-enabled building or community responds to disasters with precision, prediction, and automation. Residents experience faster alerts, clearer instructions, and real-time protection. Property managers and emergency teams receive accurate data that helps them take immediate action. This intelligent ecosystem reduces risk, minimises damage, and safeguards lives in ways that traditional buildings simply cannot match.

You work closely with developers, corporates, and regulators. From your perspective, what is slowing the widespread adoption of AI and IoT for disaster risk reduction? Are the main challenges technical, financial, regulatory, or a combination of these?

From my experience working closely with developers, corporates, and government agencies, the slow adoption of AI and IoT for disaster risk reduction is driven by a combination of financial, technical, and regulatory challenges.

From the financial perspective, discussions usually begin positively, with strong interest in the potential of predictive systems and AI-driven safety solutions. However, once proposals reach top-level decision makers, priorities often shift. In the private sector, many prefer to allocate budget to areas that generate immediate revenue rather than long-term risk reduction. In the government sector, limited budgets and strict procurement processes slow down decision-making, even when the technology is clearly beneficial.

From the risk management perspective, many stakeholders still do not consider preventive systems as essential assets. Technologies powered by AI and IoT are still new to them, and there is a common misconception that automation is simply a matter of sensors responding to pre-programmed conditions. Modern systems are very different. Today's solutions are driven by data, real-time analysis, and intelligent decision-making using AI and large language models. They help reduce maintenance costs, prevent equipment failures, and avoid major losses caused by disasters, yet this value is often not fully recognised.

Another barrier is the lack of awareness and technical understanding. Many decision makers are unfamiliar with how AI, computer vision, or Visual Language Models can detect early warning signs of floods, fires, or security threats. Without clear knowledge of these capabilities, they tend to rely on traditional methods that make them feel safer and more familiar.

There are also integration challenges. Many buildings, especially older ones, were not designed with IoT connectivity, digital infrastructure, or sensor networks in mind. Upgrading them requires coordination among multiple stakeholders, which can slow down progress. Developers worry about disruption to construction schedules, corporates worry about compatibility with existing systems, and regulators must ensure safety and compliance.

Modern systems are very different. Today's solutions are driven by data, real-time analysis, and intelligent decision-making using AI and large language models. They help reduce maintenance costs, prevent equipment failures, and avoid major losses caused by disasters, yet this value is often not fully recognised.

In summary, the barriers to widespread adoption are not caused by a lack of technology. They come from financial priorities, limited budgets, low awareness, and the complexity of integrating new systems into existing environments. As understanding improves and success stories continue to grow, we expect AI and IoT to become essential elements of disaster risk reduction in the near future.

For young engineers and technologists in Malaysia who want to work at the intersection of AI and disaster management, what skills or mindsets should they be developing? And if you could give them one message about using AI for disaster management in Malaysia, would it be one of hope, caution, or something in between?

For young engineers and technologists in Malaysia entering the field of disaster management, the primary technical requirement is to master the intricacies of modern neural network architectures, specifically the self-attention mechanisms found in Transformers. While foundational knowledge of machine learning is necessary, the current frontier lies in Multimodal AI capable of synthesising heterogeneous data streams. A disaster event in Malaysia, whether a monsoonal flood or a landslide, generates a chaotic mix of signals, ranging from satellite radar imagery and seismic telemetry to unstructured social media reports. To be effective, engineers must develop deep competence in Large Language Models and Visual Language Models that can ingest these vast datasets to identify non-linear dependencies. This capability enables the detection of subtle precursory patterns, such as early ground deformation or thermal anomalies, that traditional statistical models often fail to recognise.

Beyond algorithmic proficiency, these technologists must cultivate a rigorous mindset focused on systems engineering and edge deployment. In the context of disaster response, relying solely on cloud-based inference is a vulnerability because connectivity is often the first system to fail during a crisis. Therefore, engineers should focus on developing skills in Internet of Things integration and edge computing. The ability to deploy lightweight and quantised models directly onto sensor nodes or drones is essential. This ensures that data from water level transducers, soil moisture sensors, and gas detectors can be processed in real time to generate alerts within milliseconds. This focus on low-latency data engineering transforms a theoretical model into a functional safety instrument that can operate independently of central infrastructure.

It is also crucial for technologists to adopt a multidisciplinary approach known as Physics Informed Machine Learning. A purely data-driven mindset is often insufficient when dealing with the physical forces of nature. Engineers must learn to embed domain-specific physical laws, such as fluid dynamics for flood modeling or geological constraints for seismic activity, directly into the loss functions of their neural networks. By understanding the specific topography of Malaysia and the physics governing our environmental systems, technologists can design models that are not only statistically accurate but also physically consistent. This ensures that the AI does not merely memorize training data but actually understands the underlying mechanics of the potential disaster.

MALAYSIA'S GEOPOLITICAL NEUTRALITY AND GLOBAL RESHORING OPPORTUNITIES FORUM

On 25 November 2025, the Malaysia Board of Technologists organised a forum titled "How Should Malaysia Navigate Geopolitical Neutrality While Still Attracting Reshoring from Western and BRICS Firms?" at the Northern Corridor Implementation Authority Auditorium, Penang Science Park. The forum was attended by professionals from various sectors who gathered to explore Malaysia's strategic position in a rapidly evolving global landscape. One of the key issues discussed was the risk of multinational corporations relocating their supply chains.

The forum commenced with a welcoming speech by Dato' Mohammad Haris Kader Sultan, Chief Executive Officer of the Northern Corridor Implementation Authority (NCIA). This was followed by an opening address by Dr. Md Fauzi Md Ismail, Registrar of the Malaysia Board of Technologists.

The topic of the first panel discussion was "Defining Malaysia's Economic Identity Amid Global Power Shifts". The session featured Dato' Mohammad Haris and Prof. Dato' Ts. Ir. Dr. Mohamed Ibrahim Abdul Mutalib, Advisor to the President of Universiti Teknologi PETRONAS. The discussion was moderated by Dato' Ts. Dr. Shanmuganathan Palanisamy, CEO of Ectrons Sdn Bhd.

After a networking break, the forum resumed with the second session, which focused on "Balancing Foreign Investment with Local Empowerment". The topic was discussed by Dato' Seri Abdul Halim Hussain, Advisor to SMEs and Dr. Vishanthini A/P Kanasan from the Penang State Secretary's Office. Ts.

Ng Kwang Ming, the CEO of Digital Penang, served as the moderator. The session highlighted that foreign investments must deliver tangible benefits to local industries, including technology transfer and opportunities for SMEs.

Overall, this forum underscored Malaysia's potential to maintain geopolitical neutrality while positioning itself as an attractive investment destination for both Western and BRICS firms. MBOT extends its gratitude to all speakers, panelists, and participants for their valuable contributions and support in making the event a success.

/mbot registration

64,553	14,853	27,107	3,892
Graduate Technologists	Qualified Technicians	Professional Technologists	Certified Technicians

110,405 Total MBOT Registrants (As of December 2025)

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