

Research Article

Teaching and Learning Innovation in Management of Technology and Innovation: Ringgy

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Abstract: Ringgy is an AI-powered wearable ring designed to monitor users' physical and emotional well-being in real time. Equipped with advanced biometric sensors, including PPG and IMU technology, it tracks heart rate, stress, fatigue, inactivity, and emergency incidents such as falls or fainting. Ringgy provides discreet feedback through gentle vibrations and LED indicators, reducing digital fatigue with its screen-free design. The device also features emergency hand signal recognition, enabling automatic SOS alerts and live location sharing via smartphone connection. With water-resistant, energy-efficient, and gender-neutral features, Ringgy supports daily use for professionals, elderly individuals, and wellness-focused users while promoting proactive health and safety management.



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1. INTRODUCTION

To facilitate real-time monitoring of physiological signals and improve personal health and safety among various populations the use of wearable technology is an essential device in contemporary healthcare systems (Cutrona & Rozanec, 2024). The authors mention that the most pragmatic usage is through the encouragement of emotional and mental wellbeing through continuous monitoring of physiology and intelligent feedback systems. The widely of smart devices currently available, such as smartwatches and fitness bands are likely to use screen-centric interaction, constant manual input and sophisticated user interfaces (Shalawadi, 2025). This not only causes digital exhaustion but also lessens their ability to provide smooth, non-disruptive health care.

Moreover, as cultures become more cognizant of mental health conditions like anxiety, burnout and emotional stress, demand for easy-to-use and user-friendly wellness products has never been greater. Most traditional wearables tend to ignore the psychological element of well-being by tracking mostly physical activity or global health markers (Dehankar & Das, 2025). Further, their bulkiness, price and absence of design sophistication may discourage others who anticipate both usability and form in design from accessories. Large form factors, high price tags, and low design sensitivity also restrict their uptake, especially among consumers who wish for functional utility as well as aesthetic appeal in daily accessory products (Sekhri & Ranawat, 2024).

To fill these voids, we introduce Ringgy, a smart ring that's AI-enabled and a wearable tech phenomenon. Differently from its screen-greedy peers, Ringgy is slim and low-key, invisibly integrating itself into life's fabric. Ringgy provides real-time biometric tracking with photoplethysmography (PPG) and inertial measurement unit (IMU) sensors to track heart rate variability, recognize stress patterns and decipher emergency gestures (Venugopal & Kamalakhannan, 2025). Ringgy is a pioneering product for those who want to monitor and care for their emotional well-being and security without sacrifice in terms of comfort, privacy, or fashion. Finally, Ringgy introduces emotional intelligence into the wearable platform, enabling users to track, respond to and enhance their mental health in real time (Panadés & Yuguero, 2025).

2. LITERATURE REVIEW

Despite such fast developments in wearable technology, existing technology continues to be marred by lacking adequate emotional intelligence, real-time safety and simplicity of design in one seamless with compact unit. Most of the commercially acceptable wearables, smartwatches and fitness trackers are based on screens. These require constant user interaction, split attention and generate digital fatigue, the ironic price tag for those wanting to enhance their mind acuity and health (Shalawadi, 2025).

Additionally, the design of today's wearables favors technological might above fashion or wearability. Wearables become heavy, cumbersome or simply complicated, reducing their attractiveness to those preferring understated, refined accessories. This is especially so among business users or those within social settings where overt health monitoring devices may be perceived as intrusive or inopportune (Chisi, 2019). In addition, high-end prices discourage most potential users from even looking at premium wearables, particularly in developing economies or budget-constrained markets.

Passivity of the majority of wearables towards emotional and safety conditions is yet another critical locus of concern. While they might monitor simple parameters like heart rate or steps, the majority of them fail to provide proactive intervention once distress cues, fatigue or emergencies unfold. There is not enough significant feedback from biometric patterns like heart rate variability (HRV) to measure stress or anxiety (Wu, Ching, Wang & Liao, 2022). Moreover, most devices these days do not detect emergency gestures or sudden atypical movement patterns that will signal falls, panic attacks or physical injury.

This reveals an obvious market opportunity for a product that is not only intelligent and proactive but also discreet, screen-less and accessible. Users need something that learns to adapt to their emotional and contextual state, one that fosters awareness of mental health, cultivates mindfulness and responds to emergencies in real-time while being pleasant and beautiful (Alsubhi, Anaraky & Babatunde, 2024). Ringgy was specifically designed to fill that gap. It integrates biometric detection, gesture-based protection functions and AI-based mood sensing into a ring-sized package. Screen-free of distractions and with emphasis on gentle, vibration and LED-based communication,

Ringgy presents a new paradigm in wellness technology. According to Collewijn (2024), it designed to bring emotional awareness and protection without compromise on style, comfort or price and therefore represents an affordable solution to wearable innovation's next wave.

3. METHODOLOGY

Ringgy is a pioneering intelligent wear device designed as a sleek, diminutive ring. It functions as an advanced personal health coach through a union of pioneering biometric sensors and native artificial intelligence to continuously monitor physical and emotional well-being measures. Ringgy provides an effortless combination of form and function, providing critical health information and security functions, also can be wear daily.

Ringgy's design is the low-power microcontroller which selected due to its power-conserving dual-core processing, built with Wi-Fi and with function of Bluetooth Low Energy (BLE) and power-saving features, which it can save the power of Ringgi in four days without charge. The microcontroller interprets real-time data from onboard sensors of the ring in order to make the ring capable of recognizing gesture patterns, which monitor the irregularities in physiological and also activating associated feedback mechanisms. BLE connectivity provides Ringgy the ability to sync data safely and effectively with a companion smartphone application without battery drain, but still its provide emergency communication capabilities like location sharing to link families' device and auto-alerts.

Ringgy has two main sensors which are a photoplethysmography (PPG) sensor and an inertial measurement unit (IMU). The PPG sensor measures heart rate and heart rate variability (HRV), vital parameters to monitor states of emotions like stress, anxiety or tiredness in people's body and mental. In contrast, the IMU with the accelerometer and gyroscope measure motion and orientation such that Ringgy can sense physical activity, unexpected falls in hidden place, panic movement or even excessive inactivity. These are processed by lodge AI algorithms that filter trends and provide feedback in exact time.

Instead of visual alerts, which are distracting or inconvenient in most contexts, Ringgy alerts with a soft LED ring and a tiny vibration motor. The LED shifts color based on biometric feedback, red for tension or blue for calm and the vibration motor gives gentle taps for reminders, inactivity notifications or SOS verification. This non-intrusive mode of communication makes the users conscious of their physical and mental state without being flooded with data or notifications.

Ringgy is designed for ease and comfort to wear through a range of environments and activities, from the workplace to the gym. Plain and unisex in design, Ringgy suits both men and women of all ages. Ringgy is really an intelligent and complete answer to personal health and safety, offering real-time awareness, comfort and security in one small finger-sized unit.

4. FINDINGS

4.1. Functional Specifications of Product Innovation

Ringgy's innovation is in its unobtrusive integration of hardware parts and artificial intelligence code to conduct real-time biometric tracking, gesture detection and emergency notification. All of the system is optimized to provide significant, proactive feedback while being energy-aware, intuitive and also secure information.

The core of Ringgy is the microcontroller unit (MCU), which is a low-power dual-core processor and the central part of the device. Here, embedded sensor inputs are received, the noise is filtered out, the physiological activity and motion patterns are decoded and the actions based on logic are performed based on the state detected. For instance, in case of an abnormal sudden increase in heart rate without any movement, a precursor to a panic attack, the MCU cross-checks the information against the motion inputs that are received via the IMU and initiates a silent haptic vibration to let the user know that he or she must perform relaxation exercises. In contrast, if the condition continues, it heightens the response by sending an SOS signal to a programmed emergency contact via the smartphone connectivity.

The MCU is augmented by the Bluetooth Low Energy (BLE) module that facilitates secure and power-efficient communication between the ring and a paired mobile. BLE not only synchronizes activity history and vital signs to the mobile app but also has a primary function in emergency responses. For example, if the ring senses a fall using the IMU accelerometer and gyroscope and the user does not respond for a while, Ringgy alerts authorities with an emergency notice via phone, transmitting the user's GPS coordinates and most recent biometric data to set contacts or caregivers. All transmitted data is encrypted according to AES standards to maintain confidentiality and keep unauthorized parties out.

Ringgy is designed to prioritize user safety and health in the first instance even under extended use, such as sleep. Ringgy utilizes Bluetooth Low Energy (BLE), a commonly used ultralow-power communication protocol that reduces electromagnetic exposure and, in general, is rated as safe for extended use, such as sleep (Soh et al., 2015). Furthermore, Ringgy also provides users with the option of turning off Bluetooth during sleeping hours but maintaining functionality as a biometric sensor. Core activities like pulse rate monitoring by photoplethysmography (PPG) are local device operations and without constant wireless data streaming. Real-time stress analysis and heart rate variability can be achieved, facilitating understanding of well-being without invading user peace of mind and sleep patterns.

Ringgy's heart condition tracking ability is support by its photoplethysmography (PPG) sensor. It uses light intensities in tracking the persons' real-time heart rate, heart rate variability (HRV) and circulatory rhythms. These are fed into light AI algorithms that calculate degrees of emotions such as stress, relaxation or fatigue. For example, if the ring detects a consistent reduction in HRV during work along with unsteady body movement, it would classify the state as stress overloading. The system also initiates a gentle vibration and a colour change of one of the LED rings to red, requesting the engage with mindfulness activity.

The inertial measurement unit (IMU), which includes an accelerometer and a gyroscope, is also the center of motion sensing and gesture interaction. The IMU allows Ringgy to identify a user gesture that is personalized based on the individual, as the example, double wrist flick or clenched fist to trigger specific functions like silencing notifications or turning SOS mode on. In a real-world situation, when an individual on his own in a strange area is threatened, then he can easily execute a pre-configured panic gesture. Ringgy will detect this activity with in-built AI, vibrate to verify the action and prompt the smartphone to send distress signals without having to touch or unlock the device.

The haptic motor and LED display are critical for user feedback. The haptic motor offers soft tactile feedback, as in reminding to walk upon a prolonged sitting time, or that a gesture has been detected. The LED band employs color-coded notification for expressing emotional states, blue for calm, red for stressed, green for active and white for idling. This form of non-verbal communication elicits emotional sensitivity without necessitating screen interaction.

Ringgy's power solution is founded on a rechargeable lithium-polymer battery able to manage 1 to 3 days' use depending on sensor polling frequency and gesture activity. Power usage is manageably handled through dynamically adapted sensor activity dependent on context. For example, sleeping or when idle, the system enters low power mode in order to prolong battery life but continues to offer base-level monitoring. Housed in water-proof and ergonomic casing, every component is shielded from water, dust and wear, making Ringgy perfect for long-term use such as while washing hands, working out or outdoors. Its small, unisex design brings comfort and fashion to customers of any age or profession.

Altogether, Ringgy's functional requirements include a considerate integration of sensor technology, resident intelligence, safe communication and considerate design. Its petite, unisex shape provides comfort and style to customers of all ages and professions. In combination, Ringgy's potential demands smart and sensor technology integration of resident intelligence, safe communication and thoughtful design. Its possible use in the real world, from workday anxiety relief to alerts to medical emergencies, taps into the promise of an enhanced life wear that purrs and hums quietly but insistently in service to emotional and physical health.

Ringgy features secure multi-user capability, with maximum four users able to have access to the same device via their own unique username and password. In contrast to the factory reset normally required for consumer wearables when switching users, Ringgy's sophisticated profile management system makes switching users possible without sacrificing custom data or settings. Because of confidentiality along with avoiding unauthorized use, biometric authentication as the examples, fingerprint reading or pulse signature identification which is incorporated alongside standard login credentials (Irshad et al., 2023). This two-layered authentication process not only protects sensitive health information but also against fraud or incorrect access.

Furthermore, Ringgy's data protection system conforms to Malaysia's Communications and Multimedia Act (CMA), which enjoys strict legal safeguards against loss of data, identity theft and also surveillance threats (Yuniarti & Ariyanti, 2022). All that user's input is encrypted and kept locally or secure cloud servers subject to stringent data safeguards. This means that even in public user homes, all individuals' health insights and emergency configurations are private and secure. User-friendly and accessible, Ringgy provides digital well-being without sacrificing security or control. For use by a family, health care providing team or multiple individuals sharing the device, users can be confident their information is protected, their identity verified and their experience seamless.

4.2. Details of the Product Innovation



Figure 1. Minimalist Design.



Figure 2. Mood Detection Color.



Figure 3. Smart Nudges.



Figure 4. Finger Use.

5. DISCUSSION

5.1. Novelty and Uniqueness of Product Innovation

Ringgy introduces an innovative and ground-breaking paradigm shift in the wearables category with its unmatched deployment of emotional intelligence, gesture sensing interaction, affordability, and minimalism. Ringgy uses a screen-free and low-distraction design philosophy that frees individuals to engage with their emotional and physical lives more authentically, thereby differentiating it from other app-based and screen-based wearables.

Real-time emotion tracking and light AI algorithms of advanced biometric sensors are just some of the characteristics that set Ringgy apart. Ringgy categorizes mood states such as stress, relaxation and fatigue based on heart rate variability (HRV) and photoplethysmography (PPG) signals. These are represented on an internal LED color-coded band as blue relaxed, red stressed, green exercising and white idle or neutral. This subtle but effective feedback process enables users to sense their mind and emotions without information burden or signals.

Gesture-based safety feature is another innovative feature of Ringgy which is an innovation model of wearable ring space. Because Ringgy has an inertial measurement unit (IMU) internally, Ringgy can identify pre-defined gestures for emergency situations such as quick double-twist of wrist or fist clench and also can automatically move ahead to send an SOS alarm in the phone. Such functionality is particularly required for life-threatening situations where acquiring access to a phone could be inconvenient, for instance during physical altercations, accidents or medical attacks. The system offers prompt response while not sacrificing user judgment.

The capability of Ringgy also to provide smart nudges for physical and mental health. For instance, if the system recognizes too much stress without any activity, it provides a soft vibration reminder to make the user go for a short walk, some breathing exercises or just sit for a while. These are light, not cumbersome and nudge positive behavior in the long term, unlike blinding alerts.

From a physical design perspective, Ringgy is sophisticated and accommodating. Since it comes in various ring sizes, it accommodates many users. Women's ring sizes are usually between size 3 (14 mm) and size 9 (19 mm) and men's rings between size 8 (18.2 mm) and size 14 (23 mm). The product is ergonomic in design and lightweight, water-resistant, and long-lasting. It is ideal for day-to-day use at home and outdoors.

One of the most compelling things about Ringgy is its modular pricing and flexibility system that optimizes access across socioeconomic levels. The product is also modifiable with features ranging from a stripped-down version with only PPG-based heart rate monitoring and LED feedback to an elite version with emergency notification through gestures, Bluetooth syncing and complete AI processing. The modularity is such that users can select a version that is appropriate for their needs and their budget.

To offer an inclusive market to a significant degree, Ringgy is quite competitively priced. The basic version will be priced between RM 150 and RM 180 and the more affluent feature version between RM 250 and RM 300. This rate offers a tremendous degree of accessibility benefit over standard smartwatches or health bands, for which they are priced between RM 800 and over RM 1,500. Interestingly, Ringgy has been designed particularly with the B40 income bracket in mind and thus is a viable and reasonable choice for poorer groups in Malaysia. Besides that, since Ringgy is intuitive and portable without a screen, it is also capable of reaching out to individuals who reside in rural regions as well as urban regions, including the elderly, youths, working adults and digitally less-informed individuals.

Finally, Ringgy's innovation is technological, yet also culturally adaptable and socially inclusive. It is an industry-leading wearable that combines emotional intelligence with accessibility, providing wellness support to consumers regardless of age, income, and geography. Whether he or she is a young working professional in the city, a senior citizen in a rural town or a student coping with stress, Ringgy is an innovation designed to reach where people are at, quietly, economically and effectively.

5.2. *Benefits to Mankind*

The increasing worldwide emphasis on mental health, personal safety, and digital well-being has made value-for-money and smart wellness technology highly desirable. Ringgy, being a wearable ring that is AI-driven, is a socially disruptive product by fulfilling this requirement through unobtrusive, real-time assistance that is proactive, equitable and also reactive to someone who wears it. Its advantages do not only apply to individual consumers but also to families, communities and healthcare systems and thus it is a socially disruptive product.

One of the most important social impacts of Ringgy is that it is able to assist in proactive mental care. Using the latest biometric monitoring heart rate variability (HRV) and stress-level sensing, Ringgy detects emotional highs and lows and physiological signs of mental fatigue before they progress to drastic health complications. Through LED signals and gentle haptic reminders, Ringgy prompts users to pause, step back or engage in relaxation techniques. These brief interventions reduce chronic stress, anxiety and burnout by as much as in career professionals, students and caregivers.

Second, Ringgy also supports work-life balance through protection against overwork. Its intelligent activity tracking reminds the user after periods of prolonged inactivity or excessive tension to stretch, hydrate or provide their eyes with a break from screens. These advantages are beneficial in pressure work settings or telework staff who can lack formalized wellness activities. Corporates should take into consideration the potential of including Ringgy in company wellness programs, where anonymized assessment can also aid in improving employees' health and well-being.

Ringgy is also presumed to be a vital aspect of personal safety gadgets particularly for individuals vulnerable to medical emergencies or physical harm. Ring's SOS gesture recognition allows individuals to discreetly alert alarms without the need to unlock a phone or press a screen, a life-saving functionality in perilous conditions like domestic violence, bullying or sudden health emergencies like fainting or panic attacks. Its real-time sending of the user's location and biometric information to his or her respective contacts can prove to be lifesaving and reduce response time for emergencies.

Notably, Ringgy's vibration- and gesture-based, screen-less interaction is also enabled for visually disabled users, physically disabled users or cognitively disabled users. Compared to menu-overloaded or visually prompted conventional devices, Ringgy is able to give feedback as more natural and uncomplicated vibrations and color-coded lighting, which reduce cognitive load and render the device easier to navigate. It makes it extremely apt for neurodiversity user profiles, older users or stroke or trauma patients.

Ringgy's value for money and versatility also make it adoptable across socio-economic strata. It is priced between RM150 and RM300 depending on the environment, affordable to Malaysian B40 families. Its small size and low-energy parts make it a cheaper option for urban and rural consumers. NGOs and community health centers can incorporate Ringgy as a component of public health interventions where there is a lack of access to mental health professionals. With advance warning signs of emotional distress, it encourages self-access to support before concerns become escalated.

Schools also gain. Ringgy may be an adjunct to school well-being initiatives to help young people deal with worry and stress caused by school pressures or peer relations. For example, if a student is becoming too anxious before a presentation or test seated, the ring can prompt a calming reminder, which will cause relaxation or breathing exercises. Educators and advisors can also access compiled anonymous data and view patterns of stress so that they can modify related scheduling in school accordingly or offer counseling services.

5.3. Potential of Commercialization

Ringgy is positioned for strong commercial success in consumer and institutional markets on the basis of growing global demand for affordable, low-cost, and smart health-focused wearable technology. With public awareness increasing about mental well-being, stress relief and personal safety, especially in the post-pandemic period, Ringgy meets several growing needs with one handy, easy-to-use, and low-cost device. With its low cost, versatility and creative capabilities, it is positioned with competitive advantage in home and international markets.

5.3.1 Consumer Market Potential

Consumer-oriented, Ringgy has the potential to be a next-generation lifestyle accessory that brings wellness support into the lives of individuals. Differ from traditional smartwatches that might need constant interaction, Ringgy's screenless, discreet character will appeal to those who favour minimalist technology without compromising on looks. With its real-time stress detection, smart nudges, emergency gesture alert also biometric trend feedback features, Ringgy is best suited for young professionals, students, seniors and mental health-aware individuals. Ringgy's unisex nature and ring size adjustment also increase its mass-market appearance.

On the other hand, competitively priced RM150 to RM300 which is approximately USD 30 to USD 65 is affordable even for lower-income households. That provides Ringgy with a niche hold in markets like Malaysia's B40 income group, where cost has been a deterrent to embracing wellness technology for decades. By providing functions needed by different consumers in modular packages (such as Basic and Pro versions), Ringgy can serve the needs of different consumers and different levels of income and thus enhance product penetration and stickiness.

5.3.2 B2B and Institutional Market Opportunities

In the business-to-business (B2B) market, Ringgy is wide in scope in corporate wellness programs, specifically among medium and large companies with issues related to employee burnout, stress-based absenteeism, and lost productivity. Ringgy can be provided by employers as a wellness incentive, where employees receive biometric-driven prompts encouraging them to take breaks, drink water, or be aware. Aggregated and anonymized workforce wellness trend analysis can also be accessed from Ringgy data to inform HR decision-making, with rigid adherence to privacy laws.

Additionally, premium levels can be offered for advanced features like cloud-based mood trend monitoring, productivity classes, or customized mental health reports through the companion smartphone app. This recurring revenue stream not only would enable continued R&D but also would enable scalable service to those who want more sophisticated wellness information. Subsequent plans can also enable integrations with business platforms like Slack, Microsoft Teams or Google Workspace to integrate real-time health notifications and concentration support during work hours.

5.3.3 Public Sector and NGO Partnerships

Ringgy is also available in collaboration with public health ministries, NGOs and schools. Ringgy can be applied in aged care programs, school emotional health tracking systems, or emergency alert systems where emotional distress and aberrant health need to be identified early. Non-government agencies dealing with women's safety or children's emotional welfare could also utilize Ringgy as a community-installed platform that equips vulnerable populations with non-intrusive SOS capabilities and emotional self-tracking.

Integration in Malaysia on the MySejahtera digital health platform would allow Ringgy to scale up towards national health records and offer initial mental wellbeing screening tools for at-risk

populations. Partnership with government agencies such as the Ministry of Health or Ministry of Education also would assist further in adoption of this product.

5.3.4 Global Commercialization Outlook

Ringgy has tremendous potential globally, especially in nations where awareness of mental wellness, digital health and also personal security sits atop all agendas. In European, North American, South Korean, and Japanese markets, wearable technology adoption is already widespread, and individuals are poised for simplified, AI-based health solutions. In emerging economies in regions of Southeast Asia, India and Africa, Ringgy's price point makes it an attractive contender for public sector and community health initiatives.

On the other hand, Ringgy's functionality would be further expanded in subsequent releases with other functionalities such as GPS chips, NFC payment, air sensors or menstruation tracking to make it even stronger and competitive. Such module expansions would allow Ringgy to be capable of coping with innovation streams globally without sacrificing its affordability using phased release.

6. CONCLUSION

As the conclusion, Ringgy is a forward-thinking solution where emotional well-being meets wearable technology and universal design. Responding to the intrinsic shortcomings of existing wearable technology, dependence on screens, exorbitant expense, unemotional nature and poor contextual awareness, Ringgy transforms proactive and subtle monitoring of health. As attested through the course of the innovation, Ringgy has emerged from a design idea to an advanced prototype, backed by working sensor integrations, AI-driven biometric evaluation and real-time gesture responsiveness.

All these features are underpinned in a form factor that not only speaks to a minimalist and ergonomic design but is socially acceptable through all ages, gender and socioeconomic levels. Ringgy is an innovative bit of smart wear technology, where sleek simplicity meets rock-solid practicality to meet the most important mental health monitoring, security and wellness needs. Its screen-free, AI-driven platform with real-time emotion sensing and gesture-touched distress notification is a digital health product user-interaction revolution without being loud, obtrusive or on purpose. The use of the sensors in wearables for noninvasively health monitoring systems characterized as extremely scalable, cheap and also non-intrusive, suitable to track mental and emotional health in wearable devices (Tran, 2021).

Ringgy's value proposition is the emotional intelligence engine developed using biometric sensors like PPG and IMU supported by ESP32 MCU and BLE communication. Such a smart brain enables real-time mood identification and stress categorization using heart rate variability (HRV), motion data and contextual algorithms. Ringgy not only answers with passive information but with active interventions in the form of color-coded LEDs and calming haptic vibrations, kindly nudging individuals in the right direction.

This is a radical departure for wellness wearables, from simple step-tracking or fitness metrics towards a more profound sensing of mental states and emotional health. It is an open product and transparent pricing model render it affordable to all socioeconomic levels, particularly Malaysia's B40 segment, Chieng & Mustapa (2021) discusses digital inclusivity and affordable smart wearables as the example is smartwatches for healthcare, especially targeting the M40 and B40 income groups in Malaysia, thus socializing access to wellness technology.

Ringgy is not just a finger-wearable device, it's also a wellness platform that has the potential to change paradigms in human life. Furthermore, it brings together emotional well-being and the convenience of technology in a smart, fashionable, secure and accessible product. For a burned-out college student, a businessperson who has to navigate burnout or an older person looking for security and emotional responsiveness, Ringgy offers a fun, also people-friendly alternative. With strategic rollout plans, social impact applications and suitability for the global market, Ringgy can become an unprecedented driving force for global digital health innovation nowadays and in the future.

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