A Blueprint of Innovation

ID: 130816

Challenge Name	Date Added
Autonomous Contraception Dispensing Stations	18/10/2024

Creator

samin

Team Members

samin

1. Participation Type - Please select how you are participating in this Challenge:

Solver (Organization)

2. Solution Level – Please select the Technology Readiness Level (TRL) of your solution:

Proof of concept (TRL 4-6)

3. Partnering - Are you interested in partnering?

Yes

4. Problem & Opportunity – Please highlight the innovation in your approach to the problem, its point of difference, and the specific advantages/benefits this brings (up to 500 words)

Our innovative solution addresses the critical challenge of providing contraceptive access and health services to migrant women through two key technologies: **Autonomous Contraception Dispensing Stations** and a **Smart Health Bracelet**.

The **Dispensing Stations** offer self-service contraceptive access, medical eligibility screenings (blood pressure, BMI), and diverse payment options, all while maintaining privacy and security. These stations are powered by solar energy and phase change materials for temperature control, ensuring they operate in remote areas without relying on healthcare facilities.

The **Smart Health Bracelet** provides continuous health monitoring (heart rate, blood pressure) through kinetic energy, eliminating the need for traditional power sources. It stores data offline and uses AI to provide personalized health recommendations, ensuring users receive real-time health insights even in low-connectivity environments.

Key Innovations:

- **Autonomy & Privacy**: Women can self-manage their health and contraception discreetly.
- **Energy Sustainability**: Solar-powered stations and energy-harvesting bracelets work in resource-limited settings.
- **Accessibility**: The solution reaches underserved areas, providing critical healthcare where traditional services are unavailable.

Our solution empowers women by offering privacy, autonomy, and real-time health management, improving access to reproductive healthcare for migrant women in challenging environments.

5. Solution Overview – Please describe the features of your solution and how they address the SOLUTION REQUIREMENTS (add supporting data, diagrams, etc. as attachments below) (500 words).

Our proposed solution leverages advanced technology and addresses core challenges migrant women face in accessing contraception and healthcare. The system comprises two main components: Autonomous Contraception Dispensing Stations and Smart Health Bracelets.

The **Autonomous Dispensing Stations** offer privacy-focused, self-service access to contraception, ensuring users can conduct medical eligibility screenings (blood pressure, BMI, etc.) independently. These stations integrate diverse payment methods, such as cash, cards, and OTP codes provided by NGOs. They operate in resource-limited settings using solar power and advanced temperature regulation to maintain product quality. The privacy features, like discreet packaging and secure data handling, ensure women can access contraceptives without social stigma.

The **Smart Health Bracelet**, powered by kinetic energy, monitors key health indicators such as heart rate, blood pressure, and temperature, providing real-time feedback without requiring charging. It can function offline, securely storing and encrypting health data, with seamless integration into the autonomous stations. The AI-driven health monitoring system provides recommendations on contraception based on real-time health data, empowering women to manage their reproductive health autonomously, even in low-connectivity areas.

By addressing the challenges of mobility, privacy, and limited healthcare infrastructure, this solution ensures accessible, discreet, and reliable contraceptive care for migrant women. This innovation not only bridges the gap in service availability but also promotes self-empowerment through technological autonomy.

6. Solution Feasibility - Please provide supporting information and rationale, such as references and precedents, that will help the IRC evaluate and validate the feasibility of the solution (up to 500 words)

Our solution—combining Autonomous Contraception Dispensing Stations and Smart Health Bracelets—relies on proven technologies, validated healthcare models, and robust testing methods. It aims to address healthcare access issues for migrant women by integrating AI-powered health monitoring, autonomous dispensing, and energy-efficient, self-sustaining technologies.

Key Technological Components:

1. **AI-Driven Health Monitoring:** The Smart Health Bracelets utilize AI models like Multilayer Perceptrons (MLP) and Long Short-Term Memory (LSTM) networks to monitor vital health

parameters. These AI technologies have been tested in wearable devices and provide accurate, real-time health insights, even in resource-limited settings.

2. **Kinetic Energy Harvesting:** The bracelet's kinetic energy system generates power from wrist movements, removing the need for charging. This system, validated in commercial products like self-winding watches, ensures continuous operation in electricity-scarce environments.

3. **Autonomous Dispensing Technology:** Our dispensing stations build on established automated healthcare technologies, incorporating medical screening tools (e.g., blood pressure monitors, BMI calculators) to ensure safe and appropriate contraceptive dispensing. Powered by solar energy, these stations are designed for sustainability and efficiency.

Precedents and Supportive Data:

1. **Self-Service Healthcare Models:** Autonomous kiosks for healthcare have been successful in low-resource settings, showing that self-service technologies can increase access to essential services, such as contraception, especially for underserved populations.

2. **Wearable Health Monitoring:** Studies demonstrate that wearable devices enhance health outcomes, especially by enabling early detection and intervention for conditions like hypertension, crucial for determining contraceptive eligibility.

3. **Energy-Efficient Healthcare Systems:** Solar-powered technologies and energy-harvesting methods have been successfully implemented in rural health projects, ensuring uninterrupted healthcare services in areas with limited electricity.

Field Testing & Validation: We plan rigorous field testing with local NGOs and healthcare providers to validate the system in real-world conditions. This will ensure the AI models deliver accurate health recommendations, kinetic energy harvesting provides sustainable power, and the dispensing stations function effectively across different environments.

By integrating AI, autonomous dispensing, and renewable energy, our solution is feasible, scalable, and capable of improving healthcare access for migrant women.

7. Do you have further relevant information you could disclose, consisting of IP rights you would only grant the Seeker subject to an acceptable award offer? If yes, you will be asked to capture the IRC's interest (up to 500 words).

Our solution, Autonomous Contraception Dispensing Stations and Smart Health Bracelets, is highly feasible due to its foundation on proven, scalable technologies, autonomous functionality, and privacy-focused design.

1. **Proven Technologies**: The solution uses TRL 4-6 technologies, such as health monitoring sensors and solar-powered systems, ensuring reliability. The Smart Health Bracelet utilizes kinetic energy harvesting, making it power-independent and ideal for remote areas.

2. **Autonomous and Self-Sustaining**: The dispensing stations operate without human intervention, offering self-service screenings, multiple payment methods (including NGO-issued codes), and autonomous energy systems. This reduces operational costs and allows deployment in remote, underserved regions.

3. **Privacy and Security**: The solution emphasizes privacy with encrypted data storage, offline functionality, and unmarked packaging, ensuring women can access contraception without fear of stigma, a key factor for success in culturally sensitive areas.

4. **Scalability**: The modular design and partnerships with local NGOs make the solution scalable and adaptable to different contexts. Real-time inventory tracking and local manufacturing further enhance scalability and operational efficiency.

5. **Supporting Data**: WHO reports and academic research support the use of mobile and remote technologies like ours, highlighting their effectiveness in low-resource, low-connectivity settings.

In summary, the solution is built on mature technologies, offers autonomy, ensures privacy, and is scalable, making it a practical and impactful tool for addressing healthcare needs among migrant women and girls.

8. Experience – Please describe expertise, use cases, and skills you or your organization may have in relation to your proposed solution, and state your interest in potential partnership (up to 500 words)

Our team at I SMILE brings extensive expertise in AI-driven health technology and innovative product development, with a proven track record in delivering impactful solutions for vulnerable populations. We have successfully developed and patented advanced technologies that leverage AI, IoT, and health monitoring systems, positioning us as a leader in addressing complex healthcare challenges. Our multidisciplinary team, with members across the Netherlands, UK, US, Denmark, and Finland, provides a diverse range of skills, from biomedical engineering to data security, ensuring we tackle all aspects of this challenge comprehensively.

Expertise and Use Cases:
Our prior success in developing AI-powered health systems has been demonstrated through various projects, including AI-driven predictive health tools for early stroke detection, which have been deployed in hospitals and clinics. We have also received recognition for our innovative solutions, having won the AI Entrepreneur Award at the Women in AI Benelux Awards 2025. Additionally, our involvement in IRC's previous disaster risk reduction challenge for Afghanistan and Somalia showcases our ability to work in humanitarian settings, where our technology effectively addressed critical needs in remote, resource-limited areas.

Our experience working with AI health models, kinetic energy harvesting technologies, and real-time health monitoring through wearables, such as the Smart Health Bracelet, demonstrates our capability to design self-sustaining, power-independent solutions for areas with limited connectivity. This experience directly aligns with the proposed solution, ensuring we deliver a feasible and impactful system.

Interest in Partnership:
We are eager to partner with IRC and other humanitarian organizations to bring our solution to scale. Our commitment to addressing healthcare disparities through innovative, culturally sensitive technology drives our desire for collaboration. We are well-positioned to provide the necessary technological expertise, and through partnerships with organizations like IRC, we can ensure that the solution reaches the populations that need it most, empowering migrant women and girls with accessible, autonomous healthcare solutions.

In summary, our expertise in health technologies, experience in remote settings, and commitment to innovation align perfectly with the needs of this challenge, making us an ideal partner for the successful implementation and scaling of this solution.

9. Solution Risks – Please describe any risks you see with your solution and how you would plan for this (up to 500 words)

Our solution presents several key risks, both technical and operational, which we have addressed with comprehensive mitigation strategies:

Technical Risks:

1. **Sensor Accuracy**: In extreme environments, sensors could malfunction, affecting health readings.
   Mitigation: Use ruggedized, tested sensors with redundant systems for accuracy.
2. **Power Reliability**: Remote areas may lack sufficient sunlight or movement for power generation.
   Mitigation: Combine solar panels, backup batteries, and kinetic energy harvesting for resilience.
3. **Data Security**: Sensitive health data must be protected from breaches.
   Mitigation: Employ advanced encryption and offline storage with secure sync for privacy protection.

Operational Risks:

1. **User Acceptance**: Cultural stigma around contraception may hinder adoption.
   Mitigation: Educational campaigns and privacy-focused design will encourage use.
2. **Theft or Vandalism**: Public installations may face theft or damage.
   Mitigation: Use tamper-resistant materials, monitored locations, and alarms.
3. **Supply Chain & Maintenance**: Managing supply and maintenance in remote areas could be challenging.
   Mitigation: Establish local partnerships and remote monitoring for timely interventions.

These strategies ensure the solution's technical reliability, user acceptance, and operational sustainability.

10. Timeline, capability, and costs – Please describe what you think is required to deliver the solution, including estimated time and cost to total up your summary, capital, and operating costs and add as an attachment (up to 500 words).

The solution's development will proceed in structured phases, each critical to ensure operational success. The timeline spans **24 months** with specific milestones for R&D, prototyping, field testing, and mass deployment.

1. **Phase 1: Research & Development (Months 1-3)**
   - Design hardware and software components for both the Autonomous Contraception Dispensing Stations and the Smart Health Bracelet.
   - AI algorithms for health monitoring and eligibility screening will be finalized.
   - Prototype development will be initiated.
2. **Phase 2: Testing & Simulation (Months 3-6)**
   - Perform lab tests for blood pressure, BMI calculation, and temperature regulation.
   - Test kinetic energy harvesting for the bracelet.
   - Simulate AI-driven health recommendation systems using real medical data.
3. **Phase 3: Field Trials & User Validation (Months 6-9)**
   - Conduct pilot installations in collaboration with NGOs in high-need areas, followed by collecting user feedback to refine the system.
4. **Phase 4: Certification & Compliance (Months 9-12)**
   - Obtain medical device certifications and ensure regulatory compliance (e.g., GDPR).

5. **Phase 5: Full-Scale Production (Months 12-15)**
    - Partner with local manufacturers for production.
    - Initiate the mass production of bracelets and distribute the first 50 dispensing stations.
6. **Phase 6: Deployment & Monitoring (Months 15-18)**
    - Deploy the systems in key regions and monitor performance metrics, including device uptime and user adoption.
7. **Phase 7: Post-Launch Support & Scaling (Months 18-24)**
    - Scale deployment to additional regions based on impact assessments and provide ongoing technical support.

Costs

- **Dispensing Stations**: Estimated cost per station is **$16,900** in the first year, including hardware, software, and operational expenses.
- **Smart Health Bracelets**: Each bracelet costs around **$20,085** for hardware and software, covering production for the first batch of 100 units.

This detailed timeline and cost breakdown ensure that our solution is feasible, scalable, and capable of delivering significant healthcare benefits in underserved regions.

11. Online References – Please provide links to any publications, articles or press releases of relevance (up to 500 words)

Only a limited number of our references

1. Wearable Technologies in Reproductive Health: Wearable technologies are becoming essential in monitoring reproductive health and contraceptive management.
   Wearable Technologies in Women's Health: Monitoring Reproductive Health and Contraceptive Management. PMC6518171. Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC6518171/.
2. Remote Health Monitoring in Resource-Limited Settings: Technologies like wearable devices can help bridge gaps in healthcare accessibility, particularly for migrant women.
   Providing Contraceptive Services for Refugees and Migrants: Challenges and Opportunities. PMC8367154. Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC8367154/.

Digital Health Innovations in Low-Resource Settings: WHO's report outlines the role of digital technologies in improving health access for underserved populations.
WHO Digital Health Report. Available at: https://cdn.who.int/media/docs/default-source/digital-health-documents/en_who_digitalhealth_summary-(1).pdf?sfvrsn=e491ac50_5

12. How did you find this Challenge? – please indicate what drew you to this Challenge, including any relevant advertising or marketing that you followed to this Challenge.

Our team came across the Autonomous Contraception Dispensing Stations Challenge through our continuous engagement with global health and humanitarian initiatives. We

regularly monitor opportunities aligned with our mission of leveraging technology for social impact, particularly in addressing the healthcare needs of vulnerable populations. What truly drew us to this challenge was its focus on empowering migrant women and girls—a cause that resonates deeply with our ongoing work in health technology for underserved communities.

Moreover, the challenge's emphasis on innovation in autonomous health solutions aligns perfectly with our expertise in AI-driven health monitoring systems, energy-efficient devices, and autonomous health technologies. We believe that the intersection of technology and healthcare can drive transformative change, and this challenge offers the ideal platform to implement and scale solutions that have real-world impact.

Additionally, the promotion of the challenge through platforms like the International Rescue Committee's outreach and networks in global development highlighted its importance in tackling critical healthcare access issues. The well-defined goals and potential to create a lasting impact in the lives of women and girls facing migration-related challenges were key motivating factors that compelled us to participate.