

Project Brief

Product-based Capstone Project

StunBy: Indonesian Baby Growth Tracking App

Team ID : C242-PS511

Selected Themes/Case : Health Innovation: Empowering Vulnerable Communities for Hea... ▾

Mentor Name : **Ruben Stefanus**, 23/11/2024
Cynthia Cecilia, 28/11/2024

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BACKGROUNDER:

1. Machine Learning: We have developed a **baby measurement(height) detection model and coin** using a **pre-trained YOLO fine-tuned** with the COCO dataset for detecting **people** and **coins** as reference scales. Additionally, we implemented a **nutrition prediction** model using **TensorFlow with Regression Neural Network** to estimate essential nutrient needs for babies. **Food tracking and recommendation** systems were built with both **Content-Based and Collaborative Filtering** approaches to personalize/user references recommendations. To enhance user interaction, we developed a chatbot leveraging **Retrieval-Augmented Generation (RAG) and Vertex AI**. All models and services are wrapped into **APIs using Flask** for seamless integration.
2. Mobile Development: We have developed with a strong focus on user experience and accurate tracking of infant growth. To visualize the baby's growth progress, we utilized the **MPAndroidChart** library, which allows us to create detailed and interactive growth curve charts. These charts are based on data from the **World Health Organization (WHO)**, providing reliable benchmarks for growth comparison. In addition to displaying the growth curve, we incorporated key indicators, including standard deviations (SD) at levels -3, -2, -1, 0, +1, +2, and +3. These SD markers help visualize how a baby's growth compares to global standards and can alert parents and healthcare providers to any potential growth concerns.
3. Cloud Computing: Our cloud computing team developed a scalable and secure **backend infrastructure** using Google Cloud Platform (GCP). The architecture involves Cloud Run for hosting APIs, ensuring efficient communication between services. Compute Engine was utilized to handle machine learning model operations, integrated seamlessly with Cloud Run. We used Artifact Registry for container storage and version control, simplifying deployment workflows. User and application data are stored in **Supabase**, providing a reliable and fast database solution. The CI/CD pipeline is implemented via GitHub Actions, automating container builds and deployment processes to enhance development efficiency. This setup ensures a robust foundation for our application

PROJECT STATUS (Select One):

1. 100%

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TECH STACK CHECKLIST

A. Main Quest

1) Android stack

- ☒ ~~Implement a basic workflow~~ to access the main feature.
- ☒ ~~Integrate AI/ML capabilities~~ as the app's main feature, either via on-cloud or directly on-device.
- ☒ ~~Implement networking calls~~ to interact with the project's API.
- ☒ ~~Ensure the implementation~~ of the main features you aim to address in the project without causing the application to crash.
- ☒ ~~Add a custom app icon~~ to your application.
- ☒ ~~Provide a downloadable APK~~ file of the app.

2) Machine Learning Stack

- ☒ ~~Utilize TensorFlow architecture~~ for building machine learning models.
- ☒ ~~Vertex AI~~ can only be used if you intend to build Generative AI.

3) Cloud Computing Stack

- ☒ ~~Utilize Google Cloud services~~ to support application needs, such as:
 - Compute services for hosting APIs or other web services.
 - Database services for database applications.
 - Storage services for storing data, etc.
- ☒ ~~Utilize Google Cloud services~~ for the machine learning workflow, including analysis, training, and serving models. For example:
 - Use computer services for hosting machine learning deployments.
 - Utilize data services for data solutions, etc.
- ☒ ~~Build cloud architecture~~ to illustrate all necessary components and technologies required by the applications and machine learning models.
- ☒ ~~Calculate the costs~~ via [Google Cloud Pricing Calculator](#) to avoid sudden credit running out, and use the minimum costs.
- ☒ ~~Manage access~~ to your Google Cloud Project to ensure only the Cloud Computing team has access and can manage the costs.

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B. Recommendation Quest (Optional)

1) Machine Learning:

☒ ~~We have created 3 models including~~

- ~~— Nutritional prediction from scratch with Tensorflow regression neural network~~
- ~~— Baby height detection with finetuned pretrained Yolo,~~
- ~~— Food recommendation with content based & collaborative filtering~~
- ~~— Model for Vertex AI chatbot with RAG approach~~

2) Cloud Computing:

☒ ~~Clean up your team's git repository and its documentation to make your project understandable by judges and audience.~~

3) Mobile Development:

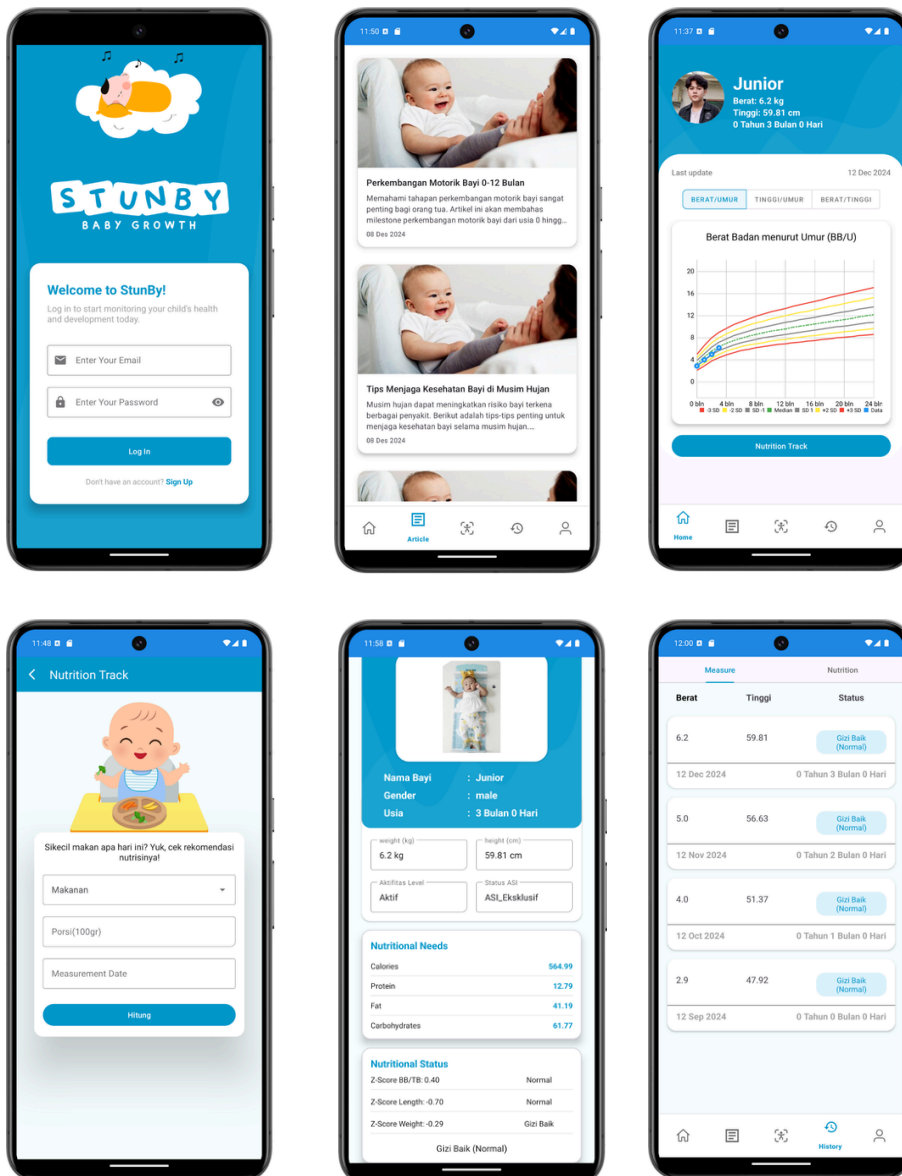
- ☒ ~~App Mockup: Create a visual representation of the app's design and user interface~~
- ☒ ~~Utilize the MVVM (Model View ViewModel) architecture throughout the project.~~
- ☒ ~~Add Login and Registration feature to enhance user experience using services like Firebase or the project's custom authentication API.~~
- ☒ ~~User Experience Enhancements: Develop additional features such as user onboarding, homepage, news/articles, history, and settings.~~
- ☒ ~~Use animation and beautiful assets that suit the app's purpose.~~

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SCREENSHOTS/DEMO VIDEO:

- [Demo Video StunBy App](#)
- Screenshot:



DATASET LINK:

- [Coin Dataset from Roboflow](#)
- [Machine Learning Data \(Predict Nutrisi & Rekomendasi Food Baby\)](#)
- [COCO8-Pose Dataset](#)

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DEPLOYED LINK:

Put your deployed solutions, APK, notebooks link, etc here. (Based on main tech stack)

APK:

[StunBy.apk](#)

Notebook:

- [Machine-Learning/notebook folder](#)
- [vertex-bangkit-stunby.ipynb - Colab](#)

GITHUB REPO LINK:

<https://github.com/StunBy-Bangkit-Capstone>

10-MIN VIDEO PRESENTATION LINK:

[Link Video Presentation Youtube](#)

SLIDE PRESENTATION LINK:

[Slide Presentation](#)

GO-TO-MARKET PROPOSAL

a. TARGET MARKET

- The Target Market: mothers with children under 5 years old.
- Why does your target market need your solutions?

1. Purpose-driven

StunBy addresses the limitations of the current healthcare system by providing a platform that enables **daily growth and nutrition monitoring**, filling the gaps left by infrequent Posyandu visits.

2. Data-driven

Utilizing advanced technology, StunBy offers **real-time data analysis and actionable insights**, empowering parents to detect growth issues like stunting early and make informed decisions.

3. Government Reasoning

StunBy supports Indonesia's national health objectives by reducing stunting prevalence. The app encourages increased parental awareness

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and participation in child growth monitoring, aligning with public health initiatives.

4. Stakeholders Related to and Benefitted from Our Solutions

- **Parents:** Gain an easy-to-use tool for tracking and improving their children's growth and nutrition, fostering better long-term health outcomes.
- **Healthcare Providers (e.g., Puskesmas):** Access reliable, real-time data to optimize intervention strategies for stunting and other growth-related concerns.
- **Government and NGOs:** Leverage a scalable and cost-effective tool to achieve public health targets, complement existing programs, and increase engagement in stunting prevention campaigns.
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b. MARKETING STRATEGY

- **Awareness Campaigns or Socialization:**
Partner with healthcare providers, Posyandu, and NGOs to raise awareness about stunting and promote the app's benefits.
- **Social Media Outreach:**
Leverage platforms like Instagram and Facebook to engage with young mothers and share educational content.
- **Collaborations with Doctor:**
Work with pediatricians and nutritionists to endorse the app as a reliable growth tracking and nutrition solution.
- **Referral Programs and Free Program for those who have BPJS**
Encourage existing users to recommend the app to others by offering rewards such as free premium features and can provide free applications for those who have BPJS

c. COMPARISON WITH SIMILAR SERVICE/APPS (if any)

- Aplikasi PrimaKu - Cek Pertumbuhan Anak
 - **Similarity percentage: 30%**
There are similar features in child growth tracking, and stunting education articles.

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- Aplikasi AECAS Edukasi Cegah Stunting
 - **Similarity percentage: 10%**
There are similarities in the child stunting z score calculator.
 - Analysis of the different or unique

In StunBy, our application offers several advanced features that set it apart from existing solutions:

 1. **Machine Learning for Stunting Detection:**
Unlike other apps, StunBy utilizes Machine Learning to detect stunting using images captured via the camera, allowing for more accurate and real-time diagnosis.
 2. **Comprehensive Growth and Nutrition Tracking:**
StunBy provides a holistic solution that not only tracks physical growth but also monitors nutrition levels, which is essential for preventing stunting.
 3. **Nutrition Prediction with Neural Networks and Food Recommendation with Machine Learning**
Our app features a Neural Network Regression Model to predict the nutritional needs of children based on their age, weight, and other variables. This is coupled with personalized food recommendations using Content-Based Filtering to ensure optimal nutrition for each child.
- d. **SWOT Analysis of the project**
- **Strengths**
 1. **Innovative Solution:** The app combines daily baby growth tracking with automatic machine learning-based analysis to detect stunting early.
 2. **Accessibility:** By using a mobile device, the app can be accessed by parents throughout Indonesia, including remote areas, making it easier to monitor baby growth.
 3. **Parental Education:** Provides educational content to increase parents' knowledge about stunting prevention, helping them better understand their children's nutritional needs.

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4. **Technology Integration:** Utilizes cloud technology and machine learning to provide quick and accurate analysis, allowing for early detection and more precise nutritional recommendations.

- **Weaknesses**

1. **Machine Learning Model Limitations:** The accuracy of the model depends on the quality of images and the data used, which could result in errors in measurement and analysis.
2. **Data Limitations:** Limited or non-representative datasets may affect the quality of predictions and recommendations regarding stunting and baby growth monitoring.
3. **Dependence on Internet Connectivity:** The app relies on internet connectivity to access cloud-based analysis, which could be an issue in areas with poor internet access.

- **Opportunities**

1. **Raising Public Health Awareness:** The app can serve as an educational tool to raise awareness about the importance of growth monitoring and stunting prevention among parents.
2. **Collaboration with Healthcare Services:** The app could be integrated with Posyandu or community health centers to enhance the effectiveness of child health monitoring nationwide.
3. **Expansion to Additional Features:** There is potential to add new features, such as tracking motor development or other health indicators, to expand the app's scope.
4. **Government and Healthcare Support:** There is potential support from the government or healthcare organizations to combat stunting by using this app as an efficient health monitoring tool.
5. **Lack of Similar Apps:** There are currently few applications offering comprehensive baby growth tracking and stunting prevention features, giving this project a unique position in the market.
6. **Token Redemption Business Model:** The integration of a redeem token system for BPJS users provides free access to the app, making it more accessible to low-income families and expanding the potential user base.

- **Threats**

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1. **Competition from Similar Apps:** The emergence of similar apps from other developers offering baby growth monitoring solutions could reduce the app's market competitiveness.
2. **Changes in Healthcare Policies:** Changes in healthcare policies, such as modifications to **Posyandu systems** or stunting monitoring practices, may impact the app's relevance.
3. **Technology Disruptions:** Issues related to system maintenance, bugs, or cloud service disruptions could affect user experience and app functionality.
4. **Public Awareness and Adoption:** Low awareness and reluctance among parents to adopt new technologies could hinder the app's widespread adoption.

MENTORING REMARK(S), IF ANY:

1. **Machine learning - Ruben Stefanus**
 - The Mentor asked to check and improve the accuracy of the Machine Learning and also commented if the Generative AI was lacking.
2. **Business - Cynthia Cecilia**
 - The mentor is asked to define a business model such as an app premium or something that generates profit.

Did the implemented capstone project differ from the original plan, and if so, how did these changes impact the project's success and outcomes?

- There is a difference in ML features from growth child prediction to child nutrition prediction.
- There is a difference in timeline expectations on the gantt chart for the ML integration timeline with the Application, because it turns out to take a long time. And makes the timeline with the deadline disrupted.