Project Plan for Bangkit 2023 Company-based Capstone

Team ID: C23-IT01

Team Member:

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Company:
WOWRACK

Case:
1. Object Detector
2. Person Detector

Title of the Project:
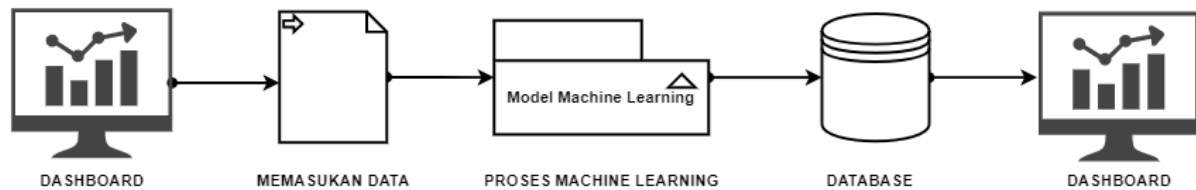IoT Machine Learning

Executive Summary/Abstract:
The use of cameras instead of sensors in some cases in the world of IOT automation is very popular. Our team has found a solution to work on this project. The idea that we offer for the manufacture of capstone base company completely follows the instructions previously informed during the presentation by Wowrack Company. However, we added some additional components and features for this capstone product. We use ESP32CAM, ESP32, Raspberry Pi 3B, 12 Volt and 5 Volt Switching Power Supply, MySQL database, MQTT Protocol, and output visualization through the website dashboard.

Wowrack Company offers three main cases, namely detection of the amount of RAM in the RAM storage tray, detection of volume from the trash can, and facial recognition with the provision that facial data will be updated following changes in the face of the person you want to recognize. We will adapt machine learning algorithms and modeling to the needs of the company. However, due to time constraints in working on this project according to the initial plan using mutually agreed hardware, the plan was canceled based on directions from the company.

We do our best to come up with ideas that don't change the original concept too much, that's why we offer several solutions. First, we will create a machine learning model, and then the model will be integrated into a website that can receive new input

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data from users through the website. The results will be visualized simultaneously when the user has provided input data which will be analyzed according to the existing case. To facilitate understanding of our design, we attach a block diagram as follows:

The explanation of the block diagram that has been attached is as follows:
1. Users need to access the main dashboard link that is already available, in the main dashboard the user will select the machine learning model that will be used for the object analysis process.
2. After the user has selected a machine learning model, the user can enter image data or turn on the front camera to take photos of the object to be analyzed.
3. When the data has been received by the system, the data will be processed by the machine learning model that was created before, then the data that has been processed, the data will be sent to the database for data storage, besides the data sent to the database, the data will also be displayed on the dashboard that has been available.

How did your team come up with this project?
Team processes produce projects based on project management practices:

1. Project Planning: Project planning stages include determining the goals and objectives of the project, searching literature related to existing problems (problem identification), designing ideas related to existing problems and developing a project schedule. At this stage, our team has to ensure that all the necessary aspects for the project have been clearly defined and the project plan has been agreed upon by all parties.
2. Project Implementation: The stages of project implementation involve searching datasets, building models using CNN deep learning, and creating websites that are integrated with databases to produce results from modeling. At this stage, the team must ensure that the project is executed according to plan.
3. Monitoring and Controlling: The monitoring and control phase includes monitoring and reporting on project progress, ensuring that the project is

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running according to plan, and taking corrective actions if necessary. At this stage, the team must ensure that the project stays on track and ensures that any issues or changes are addressed as quickly as possible.

4. Project Completion: Project completion stages include completing all required work, completing all project documents, and submitting project results to the project owner or customer. At this stage, the team must ensure that all work is completed according to established standards.

Project Scope & Deliverables:

No	Date	Activity	Description	Role	PIC
1	05/03/2023	Searching for literature and github repository related to existing problems	The team searched literature and repositories related to the project to be made in the form of journals, website reading, Kaggle and GitHub.	ML / CC	Asnan Sabil / Luthfi Fadhlurrohman
2	05/04/2023	Determine the goals and objectives of the project	The team implemented project management in the form of initiation to achieve the goals and objectives of the project.	ML / CC	Iis Ismail / Luthfi Fadhlurrohman
3	05/05/2023	Design ideas related to existing problems	After the team searches for existing problems, then designs ideas in the form of	ML / CC	Arif Hidayat / Luthfi Fadhlurrohman

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No	Date	Activity	Description	Role	PIC
			problem formulation and objectives.		
4	05/06/2023	Do research on the problem at hand	The team conducted research on existing problems by understanding and studying every literature used.	ML / CC	Asnan Sabil / Luthfi Fadhlurro hman
5	05/07/2023	Looking for datasets	Looking for datasets that are deemed lacking, in the form of datasets of human faces, trash cans, and RAM.	ML / CC	Iis Ismail / Luthfi Fadhlurro hman
6	05/08/2023	Python connectivity experiment with SQL	Python connectivity experiment with SQL is an activity that involves using the Python programming language to connect with a relational database management system (RDBMS) such as MySQL, PostgreSQL, or Oracle.	ML	Arif Hidayat
7	05/09/2023	Xampp connectivity with	Trying to connect to the database	CC	Luthfi Fadhlurro

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No	Date	Activity	Description	Role	PIC
		localhost	with localhost and with the help of xampp software		hman
9	05/10/2023	Make a website display design (Dashboard)	Make a website display design in the form of a dashboard that will be used to display results in the form of predictions of detected objects or humans. Designs created in the Figma App.	CC	Luthfi Fadhlurro hman
10	05/11/2023	Preparation tools for making modeling	Preparation tools for making modeling activity are a set of resources that are essential for planning and executing a modeling project. These tools may include software applications, data gathering and analysis tools, documentation templates, project management tools, and communication tools.	ML	Asnan Sabil

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No	Date	Activity	Description	Role	PIC
11	05/12/2023	Data preparation for modeling	Data preparation for modeling activity involves the process of collecting, cleaning, and organizing data to be used in a predictive modeling project. This activity is critical because the quality of the data used in modeling has a significant impact on the accuracy and effectiveness of the model.	ML	Iis Ismail
12	05/13/2023	Create a simple website to display modeling results	Create a basic website using HTML, CSS, and possibly JavaScript to display the modeling results.	CC	Luthfi Fadhlurrohman
13	05/14/2023	Model creation uses CNN deep learning	The activity of model creation using CNN (Convolutional Neural Network) deep learning is a process of building a neural network model that is specifically	ML	Arif Hidayat

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No	Date	Activity	Description	Role	PIC
			designed to process and analyze image data.		
14	05/15/2023	CRUD implementation on websites	Tried creating, reading, updating, and deleting sample data in the websites	CC	Luthfi Fadhlurrohman
15	05/16/2023	Test Connection Website with Database	Trying to connect to the database provided by the company	CC	Luthfi Fadhlurrohman
16	05/17/2023	Testing whether the Website and Database are connected properly	Database testing by sending dummy data from the website to an existing database	CC	Luthfi Fadhlurrohman
18	05/18/2023	Linking Website with hosting	Connecting websites and dashboards that have been made to hosting	CC	Luthfi Fadhlurrohman
19	05/19/2023	Conduct training with the model that has been made	The conduct training activity with the model that has been made is the process of using the trained model to make predictions on new data. This activity involves	ML	Asnan Sabil

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No	Date	Activity	Description	Role	PIC
			testing the accuracy and effectiveness of the model by comparing its predictions to actual outcomes.		
19	05/20/2023	Analyze graph accuracy and overfitting	Analyze the graphs generated by the model	ML	Iis Ismail
20	05/21/2023	Project monitoring and adjustment	Project monitoring and adjustment activities are an ongoing process of tracking the progress of a project, identifying any deviations from the original plan, and making necessary adjustments to ensure the project stays on track.	ML	Arif Hidayat
21	05/22/2023	Evaluation and improvement	Evaluate and improvise models and dashboards if bugs still occur	ML/CC	Asnan Sabil / Luthfi Fadhlurrohman
22	05/23/2023	Deploy models to the system	Adding ready-made models to the system or dashboard	ML/CC	Iis Ismail / Luthfi Fadhlurrohman

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No	Date	Activity	Description	Role	PIC
23	05/24/2023	File archiving project documentationon	Archive all documentation files, code and other things that are needed	ML/CC	Arif Hidayat / Luthfi Fadhlurrohman
24	05/25/2023	Report generation	Making the final report of this capstone project	ML/CC	Asnan Sabil / Luthfi Fadhlurrohman
25	05/26/2023	Making PowerPoint for presentation	Create powerpoint files using Google Slides	ML/CC	Iis Ismail / Luthfi Fadhlurrohman
26	05/27/2023	Making video presentations	Record a video presentation and upload it to YouTube	ML/CC	Arif Hidayat / Luthfi Fadhlurrohman

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Project Schedule:

1. Machine Learning Role

Tanggal	Progres	Minggu I	Minggu II	Minggu III	Minggu IV	Minggu V
05/03/2023	Searching for literature and github repository related to existing problems	▓				
05/04/2023	Determine the goals and objectives of the project	▓				
05/05/2023	Design ideas related to existing problems	▓				
05/06/2023	Do research on the problem at hand	▓				
05/07/2023	Looking for datasets		▓			
05/08/2023	Python connectivity experiment with SQL		▓			
05/11/2023	Preparation tools for making modeling		▓			
05/12/2023	Data preparation for modeling		▓			
05/14/2023	Model creation uses CNN deep learning			▓		
05/19/2023	Conduct training with the model that has been made			▓		
05/20/2023	Analyze graph accuracy and overfitting			▓		
05/21/2023	Project monitoring and adjustment				▓	
05/22/2023	Evaluation and improvement				▓	
05/23/2023	Deploy models to the system				▓	
05/24/2023	File archiving project documentation				▓	
05/25/2023	Report generation				▓	
05/26/2023	Making PowerPoint for presentation				▓	
05/27/2023	Making video presentations					▓

2. Cloud Computing Role

Tanggal	Progres	Minggu I	Minggu II	Minggu III	Minggu IV	Minggu V
05/03/2023	Searching for literature and github repository related to existing problems	▓				
05/04/2023	Determine the goals and objectives of the project	▓				
05/05/2023	Design ideas related to existing problems	▓				
05/06/2023	Do research on the problem at hand	▓				
05/07/2023	Looking for Datasets		▓			
05/09/2023	Xampp connectivity with localhost		▓			
05/10/2023	Make a website display design (Dashboard)		▓			
05/13/2023	Create a simple website to display modeling results		▓			
05/15/2023	CRUD implementation on websites			▓		
05/16/2023	Test Connection Website with Database			▓		
05/17/2023	Testing whether the Website and Database are connected properly			▓		
05/18/2023	Linking Website with hosting			▓		
05/22/2023	Evaluation and improvement				▓	
05/23/2023	Deploy models to the system				▓	
05/24/2023	File archiving project documentation				▓	
05/25/2023	Report generation				▓	
05/26/2023	Making PowerPoint for presentation				▓	
05/27/2023	Making video presentations				▓	

Based on your team's knowledge, what tools/IDE/Library and resources that your team will use to solve the problem?

1. **Modeling**

To create a CNN program for RAM storage classification, Human Detection, and Recycle bin classification. can use various tools, IDEs, and libraries. Here are more detailed descriptions of the previously mentioned options:

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- TensorFlow: TensorFlow is an open-source library for large-scale numerical computing and machine learning. It is widely used in the deep learning community because of its flexibility, scalability, and excellent support for building and training CNNs. TensorFlow has a large and active community, which means you can find lots of tutorials, code samples, and resources online. It also has an easy-to-use Keras API that simplifies the process of building and training CNNs.
- Keras: Keras is a high-level neural network API written in Python that can run on top of TensorFlow, CNTK, or Theano. It is known for its ease of use and is a great choice for beginners looking to quickly build and train CNNs for RAM storage classifications. Keras provides a simple and intuitive interface for building models and lets you easily visualize and analyze your results.
- OpenCV: OpenCV is an open-source computer vision library that provides a wide range of image processing and analysis functions. This can process images before entering them into CNN for classification. OpenCV has various image processing functions, such as image filtering, thresholds, edge detection, and feature detection. It is also widely used for object detection, tracking, and recognition tasks.
- Jupyter Notebook: Jupyter Notebook is an open-source web application that allows you to create and share documents containing live code, equations, visualizations, and narrative text. It is a popular tool among data scientists for prototyping and experimenting with machine learning models, including CNNs. Jupyter Notebook provides an interactive environment that allows you to quickly iterate through your code, visualize your data, and analyze your results.

2. **Dashboard Creation:**

- PHPMyAdmin - MySQL
- Bootstrap 5
- ReactJS
- HTML
- Laravel
- Figma
- CSS
- API

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Based on your knowledge and explorations, what will your team need support for?

1. Mentors
2. Hardware availability whenever possible
3. Flexible work time
4. Dataset object from the company
5. Hosting with PHPMyAdmin

Based on your knowledge and explorations, tell us the Machine Learning Part of your Capstone!

Some of the work carried out by machine learning paths such as searching for datasets according to needs, making machine learning models and deploying machine learning models that are in accordance with the cases to be resolved into the system.

Based on your knowledge and explorations, tell us the Mobile Development Part of your capstone.

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Based on your knowledge and explorations, tell us the Cloud/Web/Frontend/Backend Part of your capstone.

Some of the work carried out by the Cloud Computing path includes creating websites that are integrated with databases to produce modeling results. make the website dynamic and responsive which can carry out control structures, performing hosting maintenance, and ensuring the face-up or result of the project has good output.

Based on your team's planning, is there any identifiable potential Risk or Issue related to your project?

In solving this company capstone, we have several problems which include:

1. Problems: Hardware configuration and integration with the software that will be used for this capstone project
    Solution: the use of hardware is canceled, considering the processing time provided is very short. therefore, the analyzed data will be input manually, it is likely that this project will continue after this program is completed if possible.
2. Problem: Communication for sending data that has been captured by ESP32CAM, in this case, the company recommends using the MQTT protocol
    Solution: As with time limitations, the use of the MQTT protocol is cancelled
3. Problem: The dataset for each case is difficult to obtain, especially the Ram tray dataset and trash conditions

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Solution: Using a combination of datasets from the Kaggle website and datasets from Wowrack company

4. Problem: Dashboard that can not be connected to the database
   Solution: try using another integration between the dashboard and the database

Any other notes/remarks we should consider on your team's application.

In working on this company capstone, we got concept changes that had previously been given by the company, this was due to limited time in working on this capstone, the new concept is that we don't need to use hardware and simply implement machine learning modeling and visualize it on the dashboard that has been made.