|  | **Hacettepe University**  Computer Engineering Department  **BBM480 Term Study Plan** |
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**Project Details**

| **Title** | Campus Navigator: Campus-Oriented Smart Assistant for the Visually Impaired | |
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| **Supervisor** | Assoc. Prof. Hacer Yalım Keleş | |

**Group Members**

|  | **Full Name** | **Student ID** |
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| 4 | Doğukan Aytekin | 2200356003 |

**Current State ( / 50 Points)**

Explain the current state of the project at the beginning of the term. Especially, emphasize the changes and development progress since the End of Term Development Report of BBM479. At this point you are expected to include solid evidence that you are making progress, such as screenshots, proofs, experiment results, data outcomes etc.

| In the current state of our project, we have made significant progress in solving the *ATM usage* and *assisting visually impaired individuals while walking on campus* problems, and we are approaching the final stages of these solutions.  We planned to establish the VLM structure as the default mode of the project. While individual modules are running, we are designing a multithreading-based system that continuously listens for transitions between modules. At the same time, we are working on building the overall structure that will manage the project's main loop apart from the modules.  For the ATM module, we have improved the button detection mechanism by categorizing buttons as left and right, allowing the system to guide the user's finger in cases where OCR fails due to finger occlusion. Recognizing the limitations of MediaPipe in fingertip detection, we manually trained a YOLO model, which now enables accurate fingertip detection without issues. Additionally, the module currently processes 75 images in approximately 14 seconds, and our primary goal is to further optimize this speed for real-time processing. Since real-time detection is not yet fully achievable, the system no longer performs continuous detection and response. Instead, it captures and processes a single frame on demand when the user gives the command, “Which button is my finger on?” and then provides the necessary feedback accordingly.  For the *assist visually impaired individuals while walking on campus* problem, we realized that the initial YOLO model we trained, as mentioned in the *End of Term Development* report, did not provide the desired results. We determined that a larger dataset was necessary for better performance. Consequently, we recorded a new video and extracted frames at a rate of two per second to expand our dataset. Using this enhanced dataset, we retrained our YOLOv8 model. As a result, although the model has not yet reached the ideal performance level, we observed that it performs better compared to the previous version. Moving forward, we aim to further improve the model by increasing the amount of data.  Once the model reaches the desired accuracy, we plan to integrate it with our existing distance calculation algorithm. The combined results will then be processed by an LLM model, which will generate outputs in a format that visually impaired individuals can easily understand, effectively alerting them about obstacles. Below, you can see some test results of our object detection model. |
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**Term Plan ( / 50 Points)**

Outline your work plan for the second term of the project. Do you have any changes, worth mentioning, related to the time management of the project? Clearly show who is working on what and the personal responsibilities. Are there any changes in the workload distribution?

| In the second term of the project, the primary focus has shifted from research and data collection to active development, module integration, and performance optimization. The overarching goal during this phase is concept validation—proving that the proposed application and idea can be realistically implemented with a sufficiently designed and integrated system. Rather than delivering a finalized product, the aim is to demonstrate the feasibility of the concept and its core functionalities under practical conditions. To support this, we will develop a functional prototype, integrate key modules such as the ATM Assistant and Walking Assistant, and prepare a live demo that showcases the system’s performance and responsiveness.  Time management for this term has evolved from the first. While the previous term prioritized project planning, literature review, and initial experimentation (e.g., testing VQA models such as BLIP-2 and CogVLM), the current timeline is more development-heavy and features multiple overlapping work packages. Although there have been no significant delays, the increased workload density and concurrency mean that efficient coordination and task management are essential throughout the semester. Optimization and demo preparation tasks are now spread across several weeks, reflecting the shift toward a more hands-on, implementation-focused schedule. |
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| WP  No. | WP Name | WP Description | Assigned to | Weeks | | | | | | | | | | | | | |
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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 1 | Term Planning | Creating project schedule | Team | X |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | Technology Research | Cloud and virtual machine technology research | Team |  | X | X | X |  |  |  |  |  |  |  |  |  |  |
| 3 | Structure Development | Developing the overall structure of system | Buğra, Doğukan |  | X | X | X |  |  |  |  |  |  |  |  |  |  |
| 4 | Backend Development | Implementing service app | Buğra, Doğukan |  |  |  |  | X | X | X | X |  |  |  |  |  |  |
| 5 | Frontend Development | UX/UI Design for visually impaired | Ecem, Ömer Faruk |  |  |  | X | X | X |  |  |  |  |  |  |  |  |
| API/End-point design |  |  |  |  |  | X | X | X |  |  |  |  |  |  |
| 6 | VLM integration | Communication with walking assistant | Ömer Faruk |  |  |  |  |  | X | X | X |  |  |  |  |  |  |
| 7 | Demo | Preparing demo | Team |  |  |  |  |  | X | X | X | X |  |  |  |  |  |
| Real-time performance testing |  |  |  |  |  |  |  |  | X | X | X | X |  |  |
| 8 | Response Time Optimization | Optimizing the time of communication between modules and cloud | Team |  |  |  |  |  |  |  | X | X | X | X | X | X | X |
| 9 | Developing ATM assistant | Performance optimization | Ecem | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 10 | Developing Walking Assistant | Performance optimization | Ömer Faruk, Buğra | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 11 | Simple feature improvement | Searching and applying further improvement | Team |  |  |  |  |  |  |  |  |  | X | X | X | X | X |