

METU CENG491 2015 FALL

START-UP DOCUMENT

G27P51

Group Name: *Visiondary*

Project Name: *BeFriend*

1. System Architecture

- *Draw the overall system architecture diagram. This should include (but it is not limited to) the components of the system, the interactions among the components and their dependencies.*
- *Identify and describe each component (including subcomponents if any), their interactions and dependencies clearly.*
- *Specify the user interaction model.*

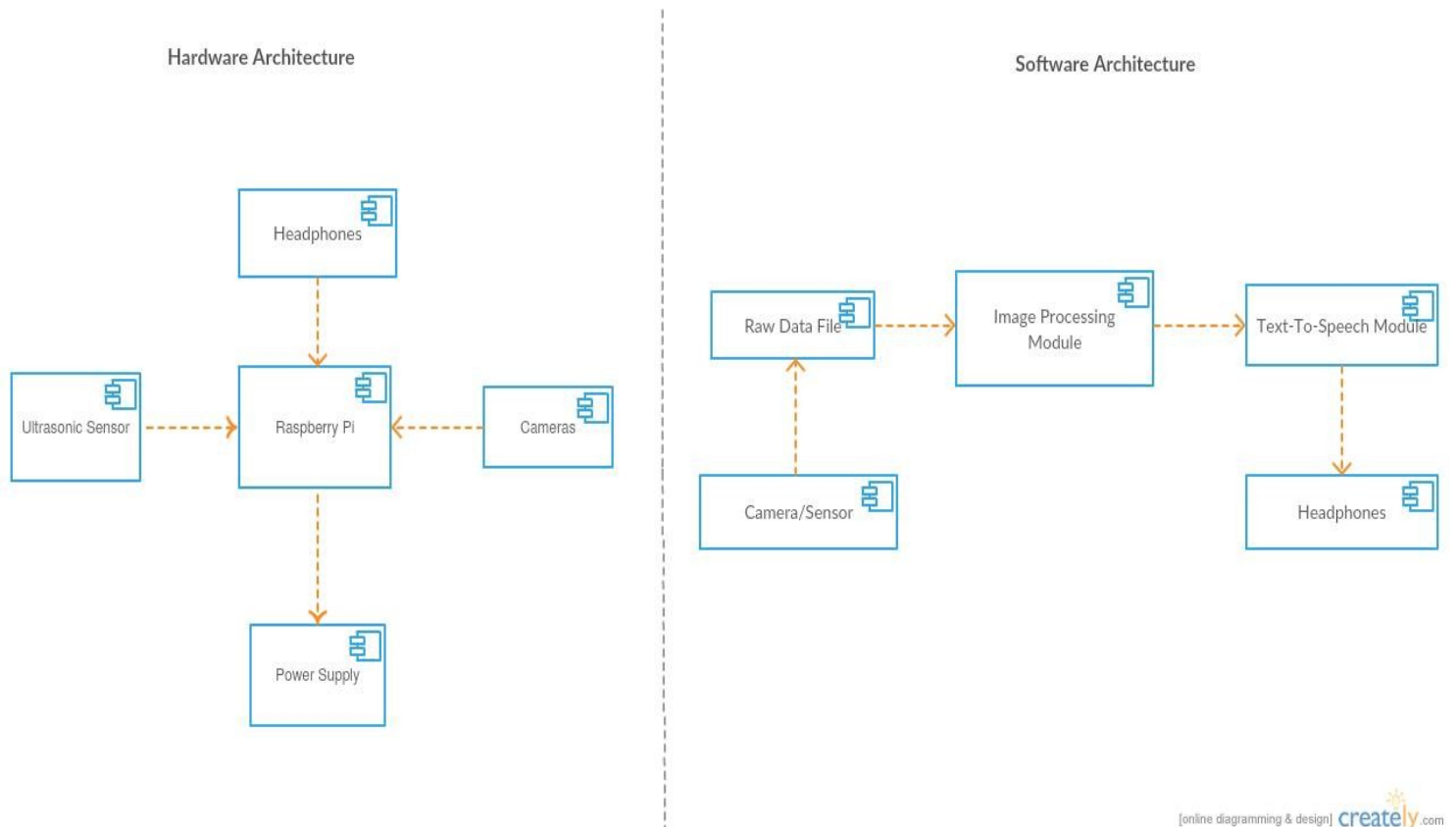


Figure 1: Overall System Architecture

Hardware Component

1) Raspberry Pi b+/2

The Raspberry Pi is a series of single-board computers developed in the United Kingdom by the Raspberry Pi Foundation.

- 700MHz Broadcom BCM2835 CPU / 512 MB SDRAM @ 400MHz / 10/100 Ethernet RJ45 on-board network
- Full size HDMI / 4 USB ports / Micro SD slot
- More energy efficiency (less power required) / Improved power management: manage more devices from your Pi

- GPIO header expanded (40 pins vs. 26)
- New 4-pole connector replaces the existing analogue and composite video port on the Model B

In our system, this component will be the core processor and hardware interface. It will interact with all the other components.

2) Power Supply

5000 MAH, 5V, 1-2 A Powerbank or 7.4V Lipo Battery 1350mAh 25C will be used as a power supply.

3)2 Cameras

Two USB Cameras will be integrated into the Raspberry Pi to capture the image. Image data will be passed to Raspberry Pi and will be processed.

4)Ultrasonic Sensor Subsystem

Sensor Subsystem consists of one or many Ultrasonic Sensors. Subsystem will pass a raw distance data to Raspberry Pi.

5) Headphones

Headphones will be connected to audio output of Raspberry Pi.

Software Component

1) Image Processing Module

This module will get input from the Sensor Subsystem and the cameras. The input will be processed by using OpenCV library on Python. Output will be a text file to Text-to-Speech module.

2) Text-to-Speech Module

This module will get input from the previous module. By using Espeak Text-to-Speech library.

Target user, blind people, will not provide any input to the system except the start and stop commands. Output will be given to the user via headphones.

2. Tentative Time Plan

- Identify and itemize all tasks to be performed as a team in the first semester. Assign a unique TaskID for each task. Give a short name and brief description for each identified task.

TaskID	Short Name	Description
T1	Raspberry Pi configuration	Operating System configuration, development tools and Python library setup
T2	OpenCV setup and configuration	Virtual environment configuration and identifying dependencies
T3	Image Processing Research	Learning Image Processing methods and techniques for Object Detection and Recognition, Learning Advanced Image Processing Techniques
T4	Edge and Color Detection implementation	Using OpenCV, working on a predetermined image to successfully conduct edge and color detection
T5	Edge and Color Detection Test	Inspect the results of edge and color detection and determining possible failures
T6	Camera resolution/performance Test	Testing frame rate of the camera
T7	Power consumption Test	Testing the battery or powerbank life time and recharging time
T8	Text-to-Speech Research	Researching TTS techniques, methods and commands
T9	Text-to-Speech library setup and configuration	Setting up the TTS environment and requirements
T10	Dummy Data Generation	Generating dummy data for OpenCV and Espeak TTS modules to work separately
T11	Sensor Test	How the sensor works, what it measures, how to combine the multiple sensors, what data type it passes

- Construct your time plan as a simplified Gantt chart, as shown in the following table.

	Iteration1	Iteration2	Iteration3
T1	*		
T2	*		
T3	*	*	*
T4	*	*	*
T5			*
T6	*	*	
T7			*
T8	*		
T9	*		
T10			*
T11		*	

3. Deliverables

- *Identify and list all deliverables of your project for the first 3 sprints.*
- *A deliverable is some component or sub-component, which is running and demonstrable to your assistant and your supervisor. That deliverable is of course subject to improvement over time.*
- *Fill in the following table:*

Deliverable	Description	When? (Sprint#)
D1	Integrated Hardware System	1
D2	Portable Text-to-Speech prototype	1
D3	Primary Sensor-based navigation prototype	2
D4	Primary Image Processing tool with color and edge detection feature	3

4. Workload Distribution

Fill in the following table to distribute the workload for the first semester among your team members.

	Sprint - I	Sprint - II	Sprint - III
İlkyaz Yasal	T8, T9	T3, T4	T3, T4, T5
Okan Altungövde	T1, T2	T3, T6	T3, T7
Sema Köse	T3, T4	T3, T4	T3,T4, T5
Mehmet Avaroğlu	T6	T3, T11,T6	T3, T10