

Parking Lot Management System

parkinglotmgmt@gmail.com

Progress Report #5

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Team Members

Natasha P. Kholgade
npk5496@rit.edu
 585-413-6306

Nientzu Kuan
nxk9863@rit.edu
 646-645-0118

Joseph A. Rodrigo
jar0668@rit.edu
 972-415-9865

NPK for Natasha P. Kholgade, NXX for Nientzu Kuan and JAR for Joseph A. Rodrigo.

Major Milestone Chart:

ID	Activity	Description	Expected Completion Date	Responsible	Modified Completion Date/Comments	Deliverables / Checkpoints
1	License Plate Extraction					
1.1	Learn how to use MATLAB	Use the MathWorks site to run some image processing functions	3/9/2008	All	COMPLETED	- Small test program with image processing functions
1.2	Research plate extraction	Perform extraction on test images taken by a digital camera. Use MATLAB to perform image processing and neural network	3/14/2008	NPK/NXX	COMPLETED	- Sample car image - Resulting state image - License plate character section - Recognized characters as text
1.3	Purchase cameras		3/21/2008	JAR	COMPLETED	- Place order for 2 cameras - Get software if not with camera - Receive cameras - Receive software
1.4	Learn how to use IDE	Understand coding in C/C++ using Visual Studio and use of openCV functions	3/13/2008	All	COMPLETED	- Simple test program with GUI - Test program with openCV functions showing image processing
1.5	Test cameras and software	Use Visual Studio, C/C++ to make sure that software functions work correctly to control the camera	4/14/2008	JAR	95% COMPLETED 4/18/2008	- Simple program that demonstrates interfacing with cameras - Correctly controlled cameras
1.6	Purchase prototype cars		3/9/2008	JAR/NXX	COMPLETED	- Place order for 3 cars - Receive cars - Make prototype license plates and stick them on the rear of cars
1.7	Test actual plate extraction	Use Visual Studio and openCV to develop software for extraction, test using cases outlined in Table 4	4/18/2008	NPK/NXX		- Camera capture - Extracted state image - Extracted plate characters - Recognized characters as text
2.	Sensor circuitry and control					
2.1	Purchase sensors	Get sensor with appropriate operational	3/19/2008	JAR/NPK	COMPLETED	- Place order for 4 sensors + 2 backup

		ranges and outputs				- Receive sensors
2.2	Test sensors	Design circuit with resistors and sensor, and examine output to make sure all sensors work correctly	3/21/2008	JAR	COMPLETED	- Circuit with correct voltage output
2.3	Design sensor circuit	Make 2 circuits with sensor and resistors	3/26/2008	All	COMPLETED	- Circuits with correct output
2.4	Learn how to use IDE	Understand assembly programming in CodeWarrior, use of ADC, PWM, SCI	3/12/2008	All	COMPLETED	- Simple test program with input from a function generator to the ADC and PWM, observe output
2.5	Interface sensor with microcontroller	Connect each circuit's output to two ADC inputs respectively on microcontroller, with proper calibration	4/4/2008	NXX	COMPLETED	- Test program showing correctly calibrated digital output
2.6	Test circuits and microcontroller	Define high and low light quantities, and use these trigger microcontroller	4/6/2008	NXX	COMPLETED	- Test program showing response of microcontroller to different light levels.
3.	Gate design and control					
3.1	Interface PWM of microcontroller with motor	Define 'open' and 'close' positions, calculate duty cycles, design control program	3/31/2008	NPK	COMPLETE	- Test program showing controller motor at 'open' and 'close' positions
3.2	Design gate arm	Construct an arm, attach to motor, attach balance weight	4/4/2008	JAR	COMPLETED	- Motor with gate controlled by microcontroller
4.	Microcontroller-computer interface					
4.1	Test SCI channel using microcontroller		3/25/2008	NPK	COMPLETED	- Assembly test program showing sent and received bytes with microcontroller
4.2	Test SCI channel with PC	Get dll with SCI control functions, use Visual Studio, C/C++ to test them	3/25/2008	NXX	COMPLETED	- Test program in Visual Studio showing sent and received bytes with computer
4.3	Complete microcontroller to computer interface with gate and camera control	Send pre-defined byte codes between microcontroller (refer to Table 1) , test gates and cameras in response to sent/received bytes	4/14/2008	JAR	COMPLETED	- Test program on microcontroller showing sending byte, receiving byte, and gate control - Test program on PC showing receiving byte, camera control and sending byte
5.	Database design and Update					
5.1	Create the database with proper headers		4/20/2008	NPK	4/14/2008	- Suitably indexed 2-D array in C/C++
5.2	Test database update	Make sure computations involving entry time, exit time and costs are correct	4/21/2008	NXX	4/15/2008	- Test program in C/C++ showing update of database, and computation of costs if any
6.	GUI Design					
6.1	Design GUI for the operator as shown in figure 4(a) and car		4/23/2008	JAR	COMPLETED	- GUI with all the camera outputs, extracted plates, text, database and override buttons

	driver					- GUI with signs for driver shown in figure5
6.2	Create and test override functionality	Design four functions for each of the four overrides in Table 2.	4/25/2008	JAR		- Test program showing operation of all overrides
7.	System Integration and Test					
7.1	Integrate sensors, microcontroller, computer, cameras, gates, and cars	At each stage of integration, test interface between subsystems	4/30/2008	All		- Well tested subsystem interfaces
7.2	Test entire system for different license plates		5/1/2008	All		- Operation as expected in the system tests list in Table 7
8.	Website and Presentation					
8.1	Project Write-up and Demo		5/6/2008	All		
8.2	Website design		5/5/2008	All		- Website with updated documentation, code, and resources used
8.3	Poster design		5/5/2008	All		- Summary of project, with design details, results and practical usage

To be completed by 4/15/2008:

ID	Activity	Description	Expected Completion Date	Responsible	Modified Completion Date	Comments
4.3	Complete microcontroller to computer interface with gate and camera control	Send pre-defined byte codes between microcontroller (refer to Table 1) , test gates and cameras in response to sent/received bytes	4/14/2008	JAR	COMPLETED	
5.1	Create the database with proper headers		4/14/2008	NPK	4/19/2008	
5.2	Test database update	Make sure computations involving entry time, exit time and costs are correct	4/15/2008	NXK	4/20/2008	

To Be Completed for 4/22/2008:

ID	Activity	Description	Expected Completion Date	Responsible	Modified Completion Date	Comments
1.5	Test cameras and software	Use Visual Studio, C/C++ to make sure that software functions work correctly to control the camera	4/14/2008	JAR	95% COMPLETED 4/18/2008	Image is captured by camera. Needs correction for resolution.
5.1	Create the database with proper headers		4/14/2008	NPK	4/19/2008	
5.2	Test database update	Make sure computations involving entry time, exit time and costs are correct	4/15/2008	NXK	4/20/2008	

Comment/Question/Difficulty:

Implementing an open source Optical Character Recognition (OCR) engine, instead of training our own neural network to recognize characters.