PROGRESS REPORT

IMPAIRED DRIVING PREVENTION SYSTEM

ALCO SHIELD

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Project team

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Submitted to

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Issue date

March 24, 2014

Introduction

Almost 50% of motor vehicle accidental deaths are caused due to driving under the influence of alcohol. The team at Alcoshield is dedicated to making the streets safer and sober through their innovative impaired driving prevention system. The SoberJack device is a unique system which is committed to addressing this issue by preventing intoxicated individuals from operating their motor vehicle. A breathalyzer test determines the drivers Blood Alcohol Content and takes the respective action of either allowing the driver to start the vehicle or not. The design provides an authentication feature which eradicates any possibilities of cheating the system. A facial detection algorithm combined with an image comparison strategy provides efficient user detection and averts any chances of drunk driving.

Schedule

As depicted in Figure 1, the project currently stands at Task 10 in which the individual components are now being integrated into the final design.
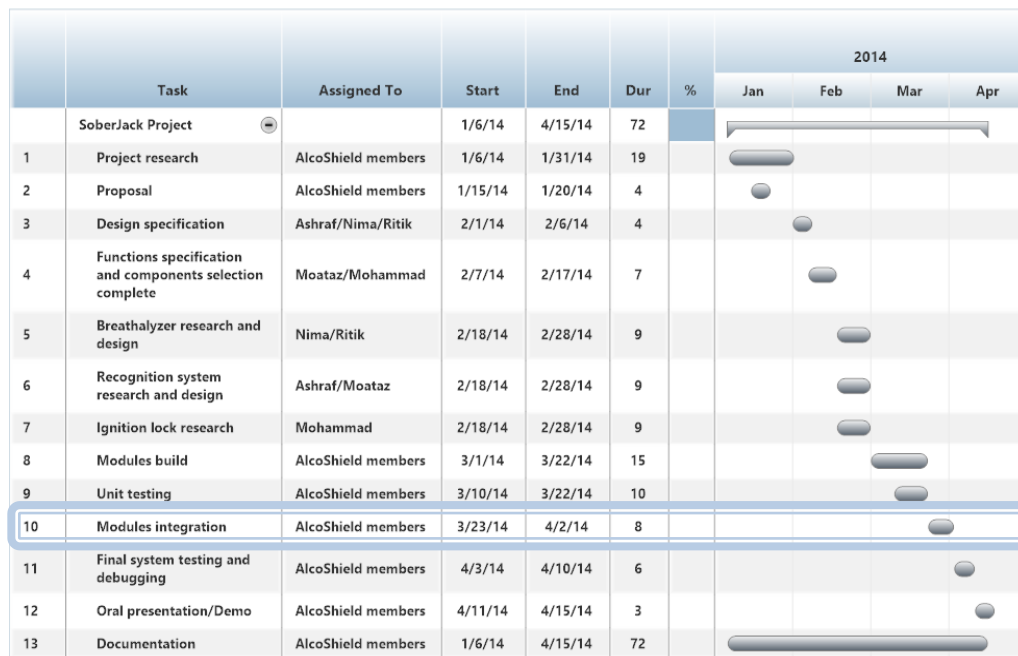
	Task	Assigned To	Start	End	Dur	%	Jan	Feb	Mar	Apr
									2014	
	SoberJack Project		1/6/14	4/15/14	72					
1	Project research	AlcoShield members	1/6/14	1/31/14	19		▬			
2	Proposal	AlcoShield members	1/15/14	1/20/14	4		●			
3	Design specification	Ashraf/Nima/Ritik	2/1/14	2/6/14	4			●		
4	Functions specification and components selection complete	Moataz/Mohammad	2/7/14	2/17/14	7			▬		
5	Breathalyzer research and design	Nima/Ritik	2/18/14	2/28/14	9				▬	
6	Recognition system research and design	Ashraf/Moataz	2/18/14	2/28/14	9				▬	
7	Ignition lock research	Mohammad	2/18/14	2/28/14	9				▬	
8	Modules build	AlcoShield members	3/1/14	3/22/14	15				▬	
9	Unit testing	AlcoShield members	3/10/14	3/22/14	10				▬	
10	Modules integration	AlcoShield members	3/23/14	4/2/14	8					●
11	Final system testing and debugging	AlcoShield members	4/3/14	4/10/14	6					●
12	Oral presentation/Demo	AlcoShield members	4/11/14	4/15/14	3					●
13	Documentation	AlcoShield members	1/6/14	4/15/14	72					

Figure 1. Project schedule and current task

Progress

Successful product development of a project of this scope requires regular meetings and effective communication between the team members. This was ensured through consistent updates on the duties of each individual at team meetings. Additional discussions took place

during mini-sessions due to conflicting schedules. Figure 2 illustrates the major milestones of the SoberJack product which comprises primarily of documentation deadlines.
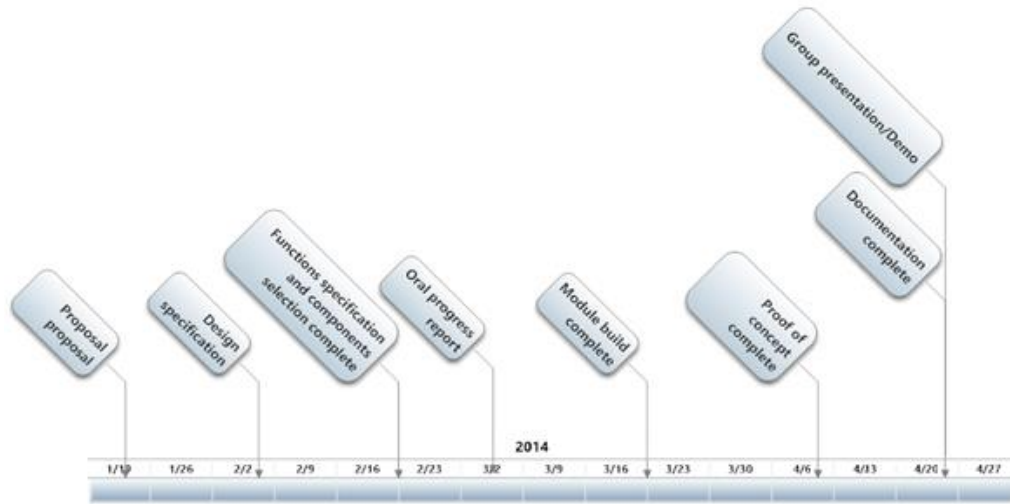

Figure 1. Timeline indicating major milestones

The project is now approaching its final phase of integration, testing, and debugging leading up to the presentation taking place on April 24th 2014. Most of the respective components have been acquired, calibrated, tested, and are now ready to be combined to create the complete system. The four major modules are the Camera module, the Breathalyzer module, the Ignition Kill Switch module, and the Processing module.

Coverage

I.	**Research phase**	
	a. Background research	✔
	b. User functional requirements	✔
	c. Processing platform and camera compatibility	✔
II.	**System design**	
	a. Overall system design – block diagram	✔
	b. Hardware architecture	✔
	i. Acquisition subsystem (Breathalyzer + camera)	✔
	ii. Computation subsystem (Processing unit)	✔
	iii. Actuation subsystem (Ignition kill switch)	✔
	iv. Feedback (user interface)	✔
	c. Software design	✔
	i. System block diagram	✔
III.	**Build and implementation phase**	
	a. Processsing unit operating system setup	✔
	b. Python libraries and software scripting	85%
	c. Breathalyzer ADC circuit	✔

d. Ignition kill switch circuit		20%
e. User interface		-

IV. Integration phase

a. Acquisition and computation modules		✔
i. Camera module integration		✔
ii. Breathalyzer/ADC module integration		60%
b. Actuation module		
i. Ignition kill switch		-
c. Feedback module		
i. User interface		-

V. Testing phase

a. Unit testing		
i. Face detection/recognition		✔
ii. Face+breathalyzer detection		-
iii. Breathalyzer BAC detection		✔
iv. Relay		-
b. System testing		-
c. User testing		-

Table 1. Tasks coverage - ✔ accomplished | - unaccomplished

Financial

Originally funded with $350 through the Engineering Science Student Endowment Fund (ESSEF), Table 2 illustrates the expenditures to date. The minimal purchases are not reflective of the progress of the project as many components were available through the ESSEF parts library. The remaining balance will be used for duplicate parts and test materials. Additionally a contingency fund of $100 has been set aside as originally planned to oversee any unexpected costs. The Alcoshield team members have also agreed to personally contribute financially in case of extreme circumstances.

Item	Quantity	Cost
Raspberry Pi Camera Module	2	$ 72.00
BacTrack Breathalyzer	1	$ 29.99

Table 2. Expenditures to date

Remediation

Due to certain hardware difficulties, the kill ignition switch and the user interface are still under the build phase and this caused a small schedule slippage. To remediate for this issue, two of our members are working solely on the two mentioned parts while others are carrying on the integration work.

Summary

In conclusion, the development of an impaired driving prevention system is going according to plan and the engineers are confident in providing a fully functioning prototype at the demonstration on April 24th 2014. Each respective module has been completed and the financial standing has been assessed positive. The team at Alcoshield envisions sober and safer streets near you very soon.