



## **PROGRESS REPORT for** **ShutSmart – The Safety Add-on for Stoves**

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## ***PROGRESS REPORT***

Over the past three months, we at Universal Safety Solutions Inc. have successfully managed to complete the development of all the individual components mentioned in the design specification document. We are working towards the complete integration of these components to develop the proof-of-concept model which would be a working prototype of our product ShutSmart. The two major components are:

- Main Unit
- Wireless Control Unit

### ***MAIN UNIT***

The main unit largely consists of a microcontroller unit attached to an alarm system and a relay gates mechanism. The purpose of the unit is to detect stove top conditions and perform appropriate actions. If the stove is undetected, the receiver antenna will received a wireless signal from the transmitter end placed in the wireless control unit. The reception of the signal establishes the condition that the stove is unattended, and the timer in the MCU kicks in. Once the timer reaches 10 minutes, the main unit initiates the alarm system which emits a loud beeping sound along with a red flashing light. The user can then press the reset button to turn off the alarm and being the system to its initial state. If the user is unavailable to perform this action, the alarm continues to sound for 5 minutes. After 5 minutes, the relay gates are activated. This overrides the stove system and turns off the whole stove thereby preventing the occurrence of any accidents.

### ***WIRELESS CONTROL UNIT***

The wireless control unit will be the located under the stove plate and consists of a microcontroller unit operated by a battery along with the transmitter end of the communication channel with the main unit. It also has two spring operated hooks on the top which reset beneath the stove coil. If the stove is on and unattended, the spring hooks complete the MCU circuit. The MCU then relays the stove-top condition to the main unit through the transmitter antenna by sending a digital signal, which initiates an appropriate response on the main unit.

## **TESTING**

The above mentioned units have undergone some thorough testing under simulated conditions. The components were setup under a simulated testing situation in the engineering science lab at Simon Fraser University with successful results. The wireless control unit successfully established a connection between the transmitter and the receiver. We used a heat gun (hair dryer) to increase the temperature reception on the thermistor which responded by sending a digital signal through the transmitter end to the receiver end. On receiving the digital signal the timer circuit got initiated in the main unit. The main unit responded well with the alarms and the relay mechanism working as expected. It worked for various time intervals which were programmed in the ATMEGA168 chip on the main unit. The interrupts (reset button) worked well and reset the timer once the alarm was interrupted by the user hitting the reset button.

We intend to test the whole integrated product in real life conditions by setting it up in a real stove.

## **BUDGET**

We received a credit of CAD 800 from ESSEF and have gone slightly above budget, but within acceptable limits. While we still need a few small components for the successful deployment of our proof-of-concept model, these components can be managed with the remaining credit. The financial status of Universal Safety Solutions Inc. is in good shape. The following table shows the expenditure on the project:

	<b>Debit (CAD)</b>	<b>Credit (CAD)</b>
<b>ESSEF</b>		<b>800</b>
<b>Stove for testing + Transportation</b>	<b>236.58</b>	
<b>NerdKits MCU</b>	<b>106.77</b>	
<b>Circuit Components (RP electronics)</b>	<b>103.81</b>	
<b>Circuit Components (RP electronics)</b>	<b>34.27</b>	
<b>Circuit Components (Canadian Tire)</b>	<b>52.57</b>	
<b>DigiKey MCU</b>	<b>30.37</b>	
<b>Circuit Components (DigiKey)</b>	<b>335</b>	
<b>Total</b>	<b>899.37</b>	<b>800</b>
<b>Balance</b>	<b>99.37</b>	

## ***HUMAN RESOURCES***

The team dynamics has been smooth and problem-free despite the group losing two of its members to extenuating circumstances. Ever since, each member of the group has been working hard and putting in a lot of hours to get the project to its current state. The only downside has been the reduction in the scope of the project. We had to shift the sensor unit (with the smoke alarm and the motion detector) to the secondary design which was initially supposed to be integrated with the proof-of-concept model itself. Overall, it has been an extremely satisfying experience and the team collaboration is bound to take a high as we enter the final integration stage of the project.

## ***ACTION ITEMS***

As can be seen, Universal Safety Solutions Inc. is making excellent progress towards finishing the proof-of-concept model by the expected date of April 5<sup>th</sup>, 2010. The main agenda now is to complete the mechanical structure of the project and integrate all of the components together. Once achieved, we will be doing some intense testing of the proof-of-concept model and deal with any bugs that crop up in the process.