



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Aratrika Ghatak</b>	<b>Project Number</b> <b>S1406</b>
<b>Project Title</b> <b>A Low Cost Traffic Signal Preemption Solution for Emergency Vehicles Leveraging Mobile and Cloud Computing Technologies</b>	
<b>Abstract</b> <b>Objectives/Goals</b> Emergency vehicles on duty are generally allowed to pass a red light. However that is not always be possible if there are several cars blocking its path. My project objective is to leverage mobile and cloud computing technologies to create a low cost system that will be able to turn the traffic light green right before it reaches the traffic signal. This will ensure that there is no delay in responding to an emergency situation and will prevent potential road hazard. <b>Methods/Materials</b> I have created two mobile apps using MIT AppInventor2 for Android. The first app (named as V2S Communication) will be with emergency vehicle (EV) driver's android device. When destination is entered, it will determine the route and traffic signal data on its path. Traffic signal data is generally available with the city administration. For my project, however, I have manually entered it into a database. When the driver requests to synchronize traffic lights, the app will calculate estimated time of arrival (ETA) to each cross road using time/distance formula and will store such information into a Fusion Table on Google cloud. The second app (named as Traffic Light Simulator) simulates how traffic signal will work in each cross road. It will retrieve ETA of the emergency vehicle (EV) to a specific cross road from Fusion table on Google cloud. It compares current time to the ETA and turns traffic light to green ten seconds prior so that the EV can smoothly pass the cross road. I used free MIT AppInventor2 as app development tool and Google Fusion Database as on-cloud database to store information. <b>Results</b> My first application demonstrated the ability to calculate ETA to each traffic light and then stored the information into on-cloud database. The second app simulated how each traffic light will retrieve ETA from Google cloud and will change it to green ten seconds prior to the ETA, as expected. <b>Conclusions/Discussion</b> My solution has proved to be a low-cost and efficient way of solving the traffic preemption problem for emergency vehicles. Although there are other traffic system preemption devices already in use, their adoption rate isn't too high. Most of them are too expensive or use sensors which can be interfered easily. The price of my solution will include the minimal cost of wireless connectivity. It also demonstrates how cloud and mobile technologies can work together for faster emergency response to save life.	
<b>Summary Statement</b> My project provides a low cost solution for faster emergency response via Vehicle to Signal (V2S) Communication leveraging state of the art Mobile and Cloud technologies.	
<b>Help Received</b> Thanks to my teacher, Mr. Doug Miller to recommend MIT AppInventor2 to develop the mobile apps; Thanks to my dad to investigate and explain the existing preemption solutions; Thanks to my brother to share his android tablet to test my mobile apps.	