



Cupertino Skyscrapers Robotics team

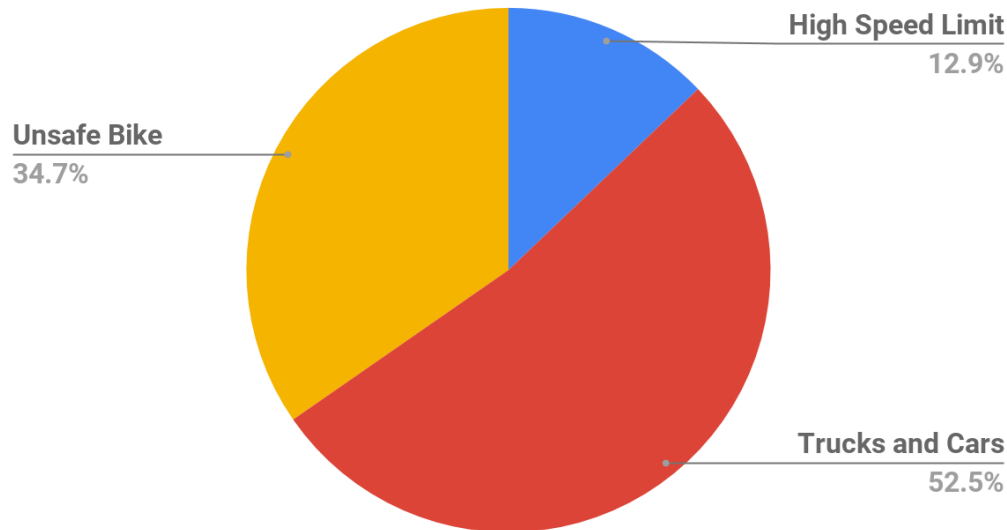
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February 15th 2020

Bike Survey Results - Key Issues

- About 100 west Cupertino residents responded to the survey
- A high percentage of respondents (52.5%) cited trucks and cars as making the biking unsafe during school hours
 - 28 students (41%) and 27 adults (79%) said trucks and cars were a problem
- 47% of respondents also mentioned the following two reasons for not biking to school:
 - 13 students (19%) and 22 adults (65%) mentioned there are unsafe bike lanes
 - 7 adults (21%) said that there is a high speed limit for trucks and cars

Main Reasons for Not Biking





While the City has addressed infrastructure issues ...



... there are still gaps from the Biker's perspective

- **Bikes are not smart**
 - Brighter and blinking tail lamps
 - No virtual bike lanes
 - No affordable smart helmets



- **Cars, buses also not designed to protect bicyclists and pedestrians**



We propose a “Smart Helmet” solution



Features of This Prototype

Smart Helmet addresses the following use cases:

1. **Detect falling biker and trigger appropriate actions**
 - Create audible alarm and visual flashing lights to seek attention by alerting nearby people
 - Send emails/texts to Parents/Guardians
2. **Group riding monitor:**
 - Alert group, Parents if one or more bikers veer off from each other by 10 feet
 - Signal the fellow bikers with audio alarm to alert them about slowing/missing biker
3. **Proximity detector:**
 - If Vehicle is less than 3 feet away from biker, send audio alarm and visual flashing lights
4. **Visibility in Low-light:**
 - Increase brightness of front/rear lighting as it gets dark

Proposed solution Proof-of-Concept (POC)

- POC performed using “Circuit Express”
- Simulated the following scenarios:
 - Detect falling biker and trigger audible alarm and flash LED lights
 - Group riding monitor - Alert group if one bikers veers off from each other
 - Proximity detector: If Object is less than 1 feet away from biker, send audio alarm and visual flashing lights
 - Visibility in Low-light: Increase brightness of Circuit express as it gets dark

Video recording to be attached

Pros and Cons of Solution

Pros:

- Makes biking safer through technology
- Encourages group biking activity
- Helps make Cars/trucks be more responsible while driving
- More exercise for kids
- Safety factor for many circumstances

Cons:

- Technology needs to be proven out
- Evaluate business case to make concept production worthy

Cost of Solution

Cost of standard helmet: \$30-\$40

Cost of Circuit express: \$25

Total cost of Smart helmet: Less than \$100

Here are the assumptions about the cost:

- Simple model of buying standard helmet and attaching circuit express
- Coding circuit express to address the identified use cases.
Incremental unit cost of coding = \$0

Comparison to Competitors

Sena Unisex-Adult Smart Cycling Helmet

- Built-in speakers and mic enable you to listen to your music and your surroundings
- Group Intercom allows you to communicate with up to three other riders
- Bluetooth connectivity pairs to your smartphone so you can access features on-the-go
- Comfortable and secure design, with removable and washable padding, smooth eco-leather chinstrap, and spin lock
- Customize settings such as friend groups, radio presets, and more using a dedicated smartphone app
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Optional Sena R1 Visor can be attached for added sun protection (sold separately)

Feedback from Police Man

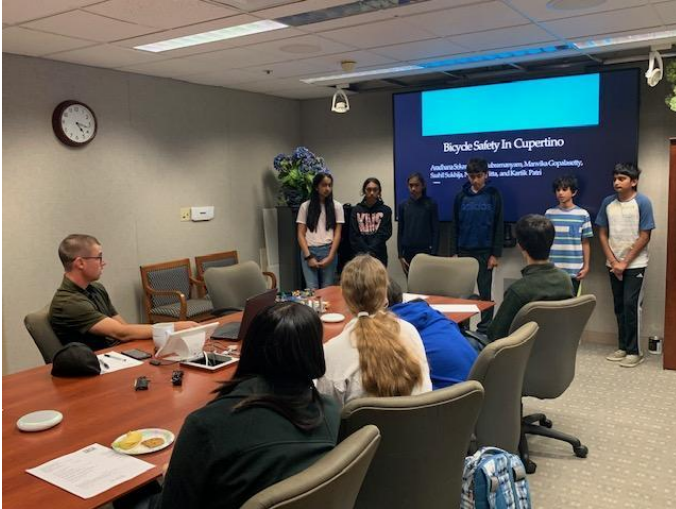


- Liked the idea of fall detection and dark light detection
- Can't expect other object or person to have the same sensor
- The dark light sensor should be able to be seen from 300 feet



Feedback from Cupertino City Council

To be updated



Next Steps

1. Turn the prototype into a usable product
2. Advertise the product and start producing it on large quantities
3. Update the product annually