



Crazy Pillar 1.1.4

A DISAPPEARING A-PILLAR

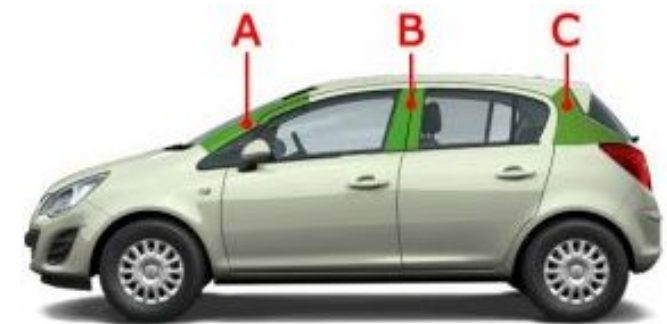
Website: <https://sdmay18-20.sd.ece.iastate.edu>

Group members: Yixuan Wang, Han Liao, Wenrui Wu, Yaowei Lee, Guantong Zhou, Shengliang Liu

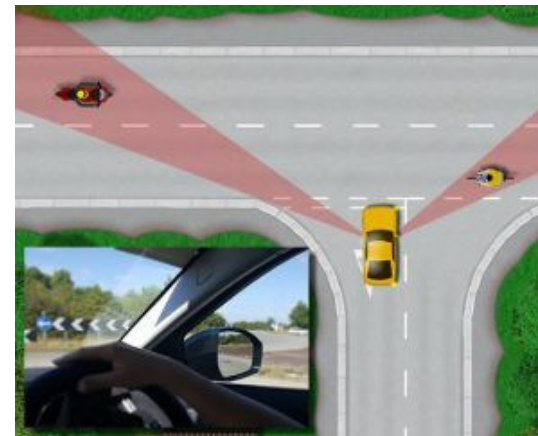
Professor name: Jaeyoun Kim

Problem statement:

The goal of our project is to render the A-pillar “transparent” through the camera, display, and computation of inexpensive tablets.



Car Pillars Drivingtesttips.com



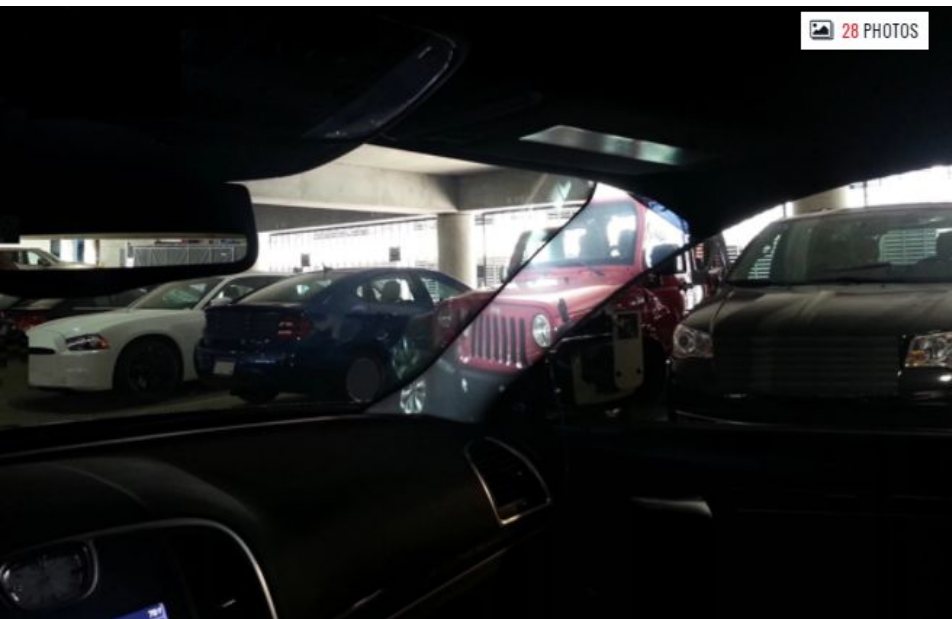
A-Pillar Blind Spots

Drivingtesttips.com

Problem statement: Background Info

1. Based on accident statistics for the year 2014, there were 3,401 seriously injured cyclists and 113 fatalities.
2. A study has found that the number of crashes caused by blind spots has increased by 50% over the last two years.(Motoring news)

Conceptual Sketch



Affix tablet onto the A-pillar to visualize the region obstructed to increase the peripheral vision range of the motorist.

Develop an App using Android Studio to transfer the images acquired from the camera to the screen seamlessly in real time.

Demonstration



Functional Requirements

Tablet(hardware):Nexus7

App development(software):

- Camera activity: Zoom in\out, block size.
- Customized: Input the default size of the pillar.
- Pillar category: Allows users to choose the pillar size of their car.

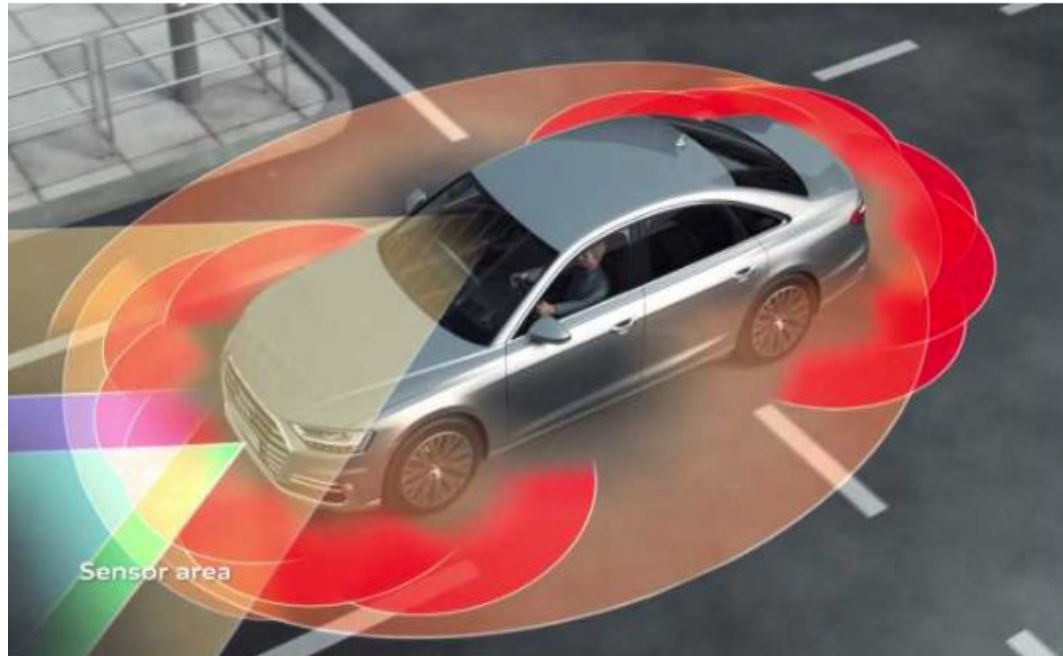
Non Functional Requirements

- The size of the tablet are supposed to suitable for the wide of A pillar.
- Contract us: our introduction and contact information.
- About product: project statement, purpose and design
- App can work at the speed below 10 miles

Technical Consideration

- Use java on android studio to develop an app to make drivers can see the outside view through A pillar.
- We need to develop the camera class by ourselves since the Java version can only be used though the latest edition camera function -camera2

market survey



Corner radar and rear radar



Market Survey

Low cost



No extra device need(Andriod)

The App is convenient to use



We have the user guideline.

Suitable for all kinds of car



Pillar category function included

Available to customized the pillar width and length



Block size is allowed to be customized.

The camera can zoom in/out depend on the distance



We have this particular function to zoom.

Cost Estimate

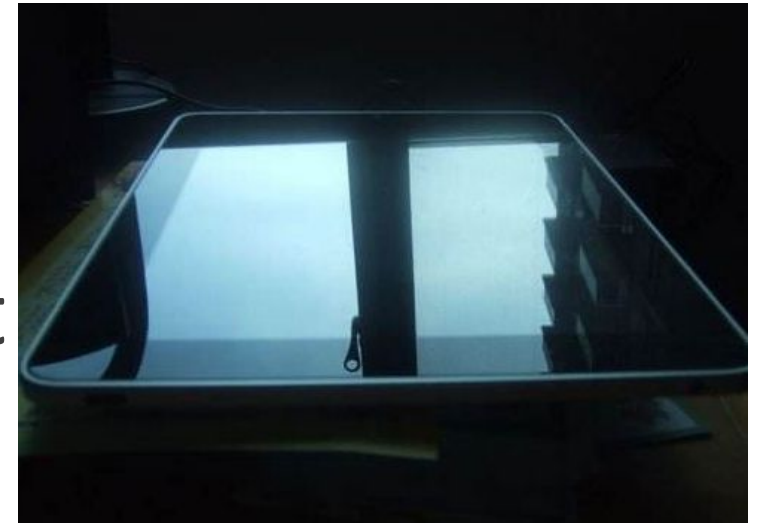
Android 6.0
Marshmallow



No additional cost if you have an android tablet

Potential Risks

1. In sunshine day, driver cannot see screen due to the reflection.
2. Cannot recognize the things that are very close to car.
3. Sometimes the tablet might drop off from the window.



Application Feedback

“I used this app on my car for a week, I think it basically achieved the aforementioned function in product description. But my device kept running out of battery in two hours. Hope the app developer can figure out this problem. I am really looking forward to releasing it in Google store”.

-- *Wenrui Wu* (team tester)

“I think this App is really convenient to use. I can see the outside view through A pillar clearly. and the image quality is good, but there is a slight delay with image display and it definitely can be improved more precise. I highly recommend this app to any driver who are looking for this particular function.”

-- *Jiancheng Zhang*

Functional Decomposition

Java doc

- ▼ com.example.lhan.crazypillar
 - ▶ views
 - Camera_activity
 - CrazyPillar
 - HelpSupport
 - Menu_Contact_Us
 - Menu_Customize
 - Menu_Introduction
 - Menu_Pillar_Category
 - Menu_Screen_Size
 - Menu_Tools
 - Privacy
 - Settings

Xml doc

- ▶ drawable
- ▼ layout
 - activity_cameraactivity.xml
 - activity_crazy_pillar.xml
 - activity_help_support.xml
 - activity_main.xml
 - activity_menu_contact_us.xml
 - activity_menu_customize.xml
 - activity_menu_introduction.xml
 - activity_menu_pillar_category.xml
 - activity_menu_screen_size.xml
 - activity_menu_tools.xml
 - activity_privacy.xml
 - activity_settings.xml
 - app_bar_crazy_pillar.xml
 - content_crazy_pillar.xml
 - layout_shape.xml
 - nav_header_crazy_pillar.xml

Detailed Design(Customize)

Menu_Customize class

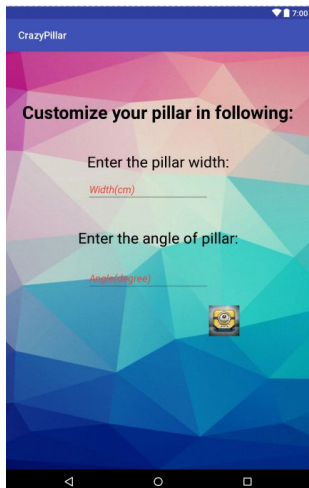
```
protected void onCreate(Bundle savedInstanceState)

Intent intent=new Intent(Menu_Customize.this,
Camera_activity.class);

intent.putExtra("rwinput",rwinput);

intent.putExtra("rainput",rainput);

startActivity(intent);
```



Menu_Camera_activity class

```
if (getIntent() != null &&
getIntent().getExtras() != null){

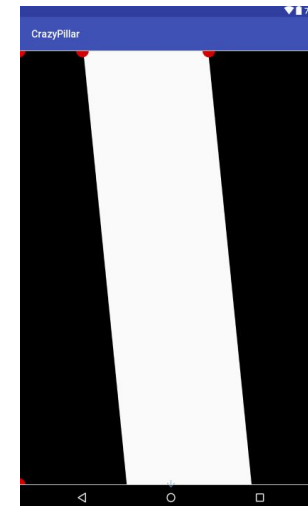
size=Integer.valueOf(getIntent().getStringExtra(
"rwinput"));

angle=Integer.valueOf(getIntent().getStringExtra(
"rainput"));
CustomView customeView=new
CustomView(this);

mcustomView=(CustomView) findViewById(R.id.custo
mView);
mcustomView.changeSize(size,angle);
}
```

Menu_CutomeView class

```
public void changeSize(int
width,int angle){
Width=width*100;
Angle=angle;
cos=(float)
(Math.cos(Math.toRadians(Angle))
);
}
```

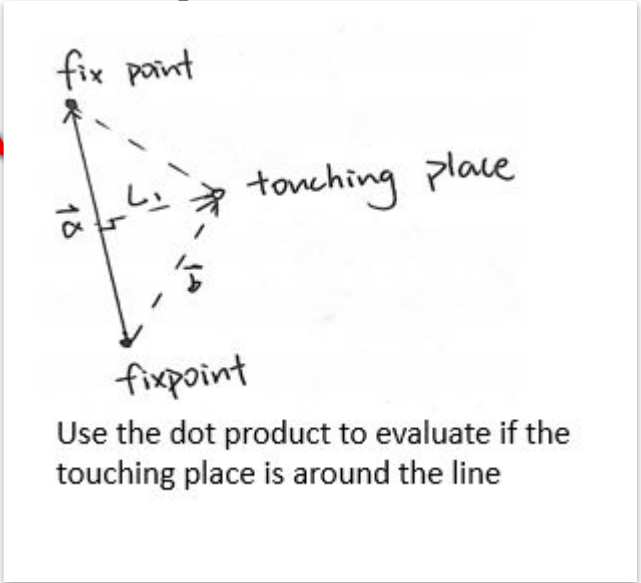


Detailed Design(Block size layout)



Step1: Evaluate if the area touched is around the line.
Step2: Depending on the movement of fingers, the blocks will pulled to left or right.
Step 3: Create a new CustomeView.

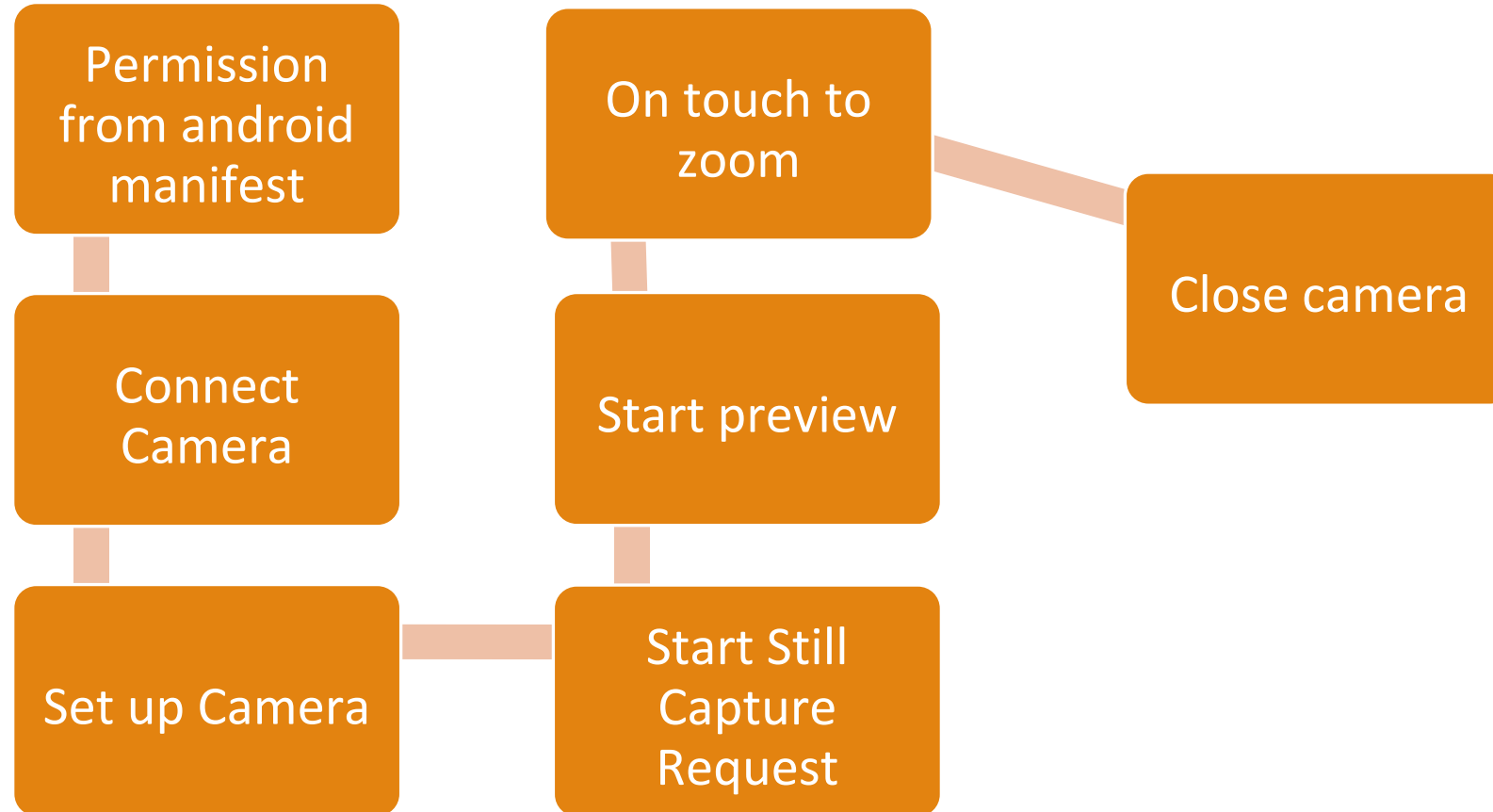
Step 1: Evaluate if the touch place is around the circle
Step 2: Depend on the finger position, move the red circle to a certain place.
Step3: Create a new CustomeView.



```
public boolean onTouchEvent(MotionEvent event)
```

```
public void onDraw(Canvas canvas)
```


Detailed Design(Camera)



Prototype Implementations

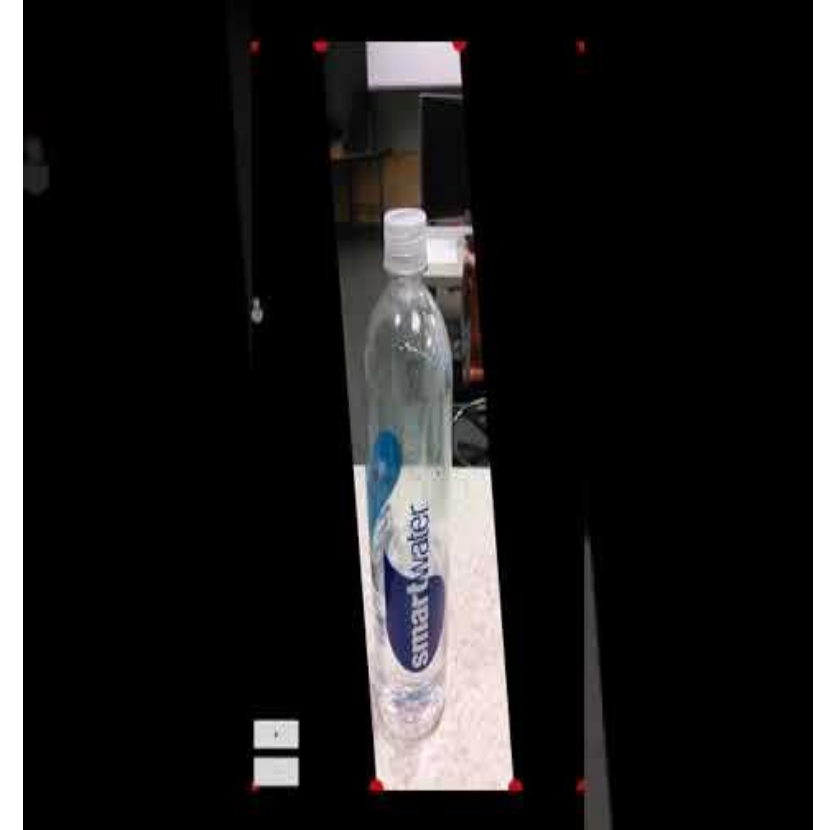
Customized width and angle



Zoom in/out



Customizable block



Test Plan



Step 1:
Test car(Ford Edge) and
tester



Step 2:
Affixed magnetic holder onto
the windshield to hold the
tablet



Step 3:
Tablet is attached onto
The A-pillar.



Step 4:
A video is recorded while
the vehicle is moving from
the driver's view.

Technology platform

- Android studio 2.3.3



- Android 6.0 Marshmallow



- Nexus 7.0



Contribution on main function:

| Yixuan Wang | Zoom in/out\\Camera function\\Contact us\\Pillar category |
|----------------|----------------------------------------------------------------------------|
| Wenrui Wu | Zoom in/out\\Camera function\\Contact us\\Pillar category |
| Guantong Zhou | Zoom in/out\\Camera function\\Pillar category |
| Han Liao | Block size\\Camera function\\customize\\Contact us\\Pillar category |
| Yaowei Lee | Block size\\Website\\Camera function\\Document submitting\\Pillar category |
| Shengliang Liu | Block size\\Camera function\\Pillar category |

Schedule:

| | |
|-----------------|--------------------------------------|
| Aug 20-Aug 31 | User interface frame |
| Sep 1-Sep 15 | Contact us function |
| Sep 16-Sep 29 | Customizable block size |
| Oct 1-Oct 20 | Camera activity |
| Oct 20 – Nov 13 | Touch controllable block size |
| Nov 14 – Dec 1 | Zoom in/out function |

Conclusion:

Overall, this was a challenging project for us to undertake due to the fact that our programming knowledge was fairly basic. We spent a good amount of time at the start of the semester figuring out how to work with Android Studio. Our goal for this project is to render the A-pillar invisible and to be able to see the region obstructed by the A-pillar. I can safely say that we have achieved this milestone. We will work on improving the workability of the functions already available in the App, such as the zoom/in function, image quality, and block size.

Plans for next semester:

1. Improve the image quality.
2. Finish the “user privacy” function
3. Finish the “tools” function
4. Improve the art/design of the App
5. Improve gesture operation and make it more accurate
6. Reduce the delay time

Reference

<https://www.drivingtesttips.biz/driving-test-tutorials/a-pillar-blind-spots.html>

<http://www.motortrend.com/news/2016-ces-tech-highlights/>

<https://www.youtube.com/watch?v=lbrA3K7P8vg>

<https://www.youtube.com/watch?v=KLunXJxd9-g>

<https://www.youtube.com/watch?v=zTZrDEhmPd4>

<https://www.androidauthority.com/android-studio-tutorial-beginners-637572/>

<http://techtrickz.com/how-to/unofficial-aosp-android-6-0-marshmallow-available-for-nexus-s-installation-guide/>

<https://www.xda-developers.com/push-your-nexus-7-to-the-limit-with-elite-kernel/>

<https://www.youtube.com/watch?v=c98h41TkREA>

<https://www.zhihu.com/question/62307321/answer/242934910>

Thank
you!