EE341 - Polarization of Light

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> *“Engineer at your service.” - Engineer, Stronghold Game Series*

Overview

1. Polarization of Light
2. ~~Jones Matrices~~
3. Ethics Case

I. Polarization of Light

Light propagates in strange ways, not just along its movement...

Graphing Code

```
function GraphPolarizer(xFun, yFun, varargin)
    t = 0:0.01:50;
    x=xFun(t);
    y=yFun(t);
    plot(x,y)


    %% Arrow Annotation
    % Dynamically generates directional arrows around the curve.
    for i = 0:0
        %Pt1 = randi(length(t)-1);
        Pt1 = round(length(t)/8);
        if (Pt1 == 0)
            Pt = Pt + 1;
        end
        Pt2 = Pt1 + 1;
```

1. Linear Polarizer

```
GraphPolarizer(@cos,@cos,"1. Linear Polarizer at 45 Degrees");
```

2. Linear Polarizer

```
GraphPolarizer(@cos,@cosQuarter, "2. Left-Hand Elliptical Polariz
    "cos(wt)", "cos(pi/4 + wt)");
```

3. Left-Hand Circular Polarization

```
GraphPolarizer(@cos,@nSin, "3. Left-Hand Circular Polarization",.
    "cos(wt)", "-sin(wt)");
```

4. Left-Hand Elliptical Polarization at -45

```
GraphPolarizer(@cos,@cosTripleQuarter, "4. Left-Hand Elliptical P
    "cos(wt)", "cos(wt + 3pi/4)");
```

5. Linear Polarization at -45

```
GraphPolarizer(@cos,@nCos, "5. Linear Polarization at -45",...
    "cos(t)", "-cos(t)");
```

6. Right-Hand Elliptical Polarization at -45

```
GraphPolarizer(@cos,@nCosQuarter, "6. Right-Hand Elliptical Polar
    "cos(t)", "-cos(t + pi/4)");
```

7. Right-Hand Circular Polarization

```
GraphPolarizer(@cos,@sin, "7. Right-Hand Circular Polarization",.
    "cos(t)", "sin(t)");
```

8. Right-Hand Elliptical Polarization at 45

```
GraphPolarizer(@cos,@nCosTripleQuarter, "8. Right-Hand Elliptical
    "cos(wt)", "-cos(wt + 3pi/4)");
```

9. Linear Polarizer at 45 Degrees

```
GraphPolarizer(@cos,@cos,"9. Linear Polarizer at 45 Degrees");
```

II. Ethics Case Study

“And now for something completely different!” - And Now for Something Completely Different

Catherine’s Dilemma

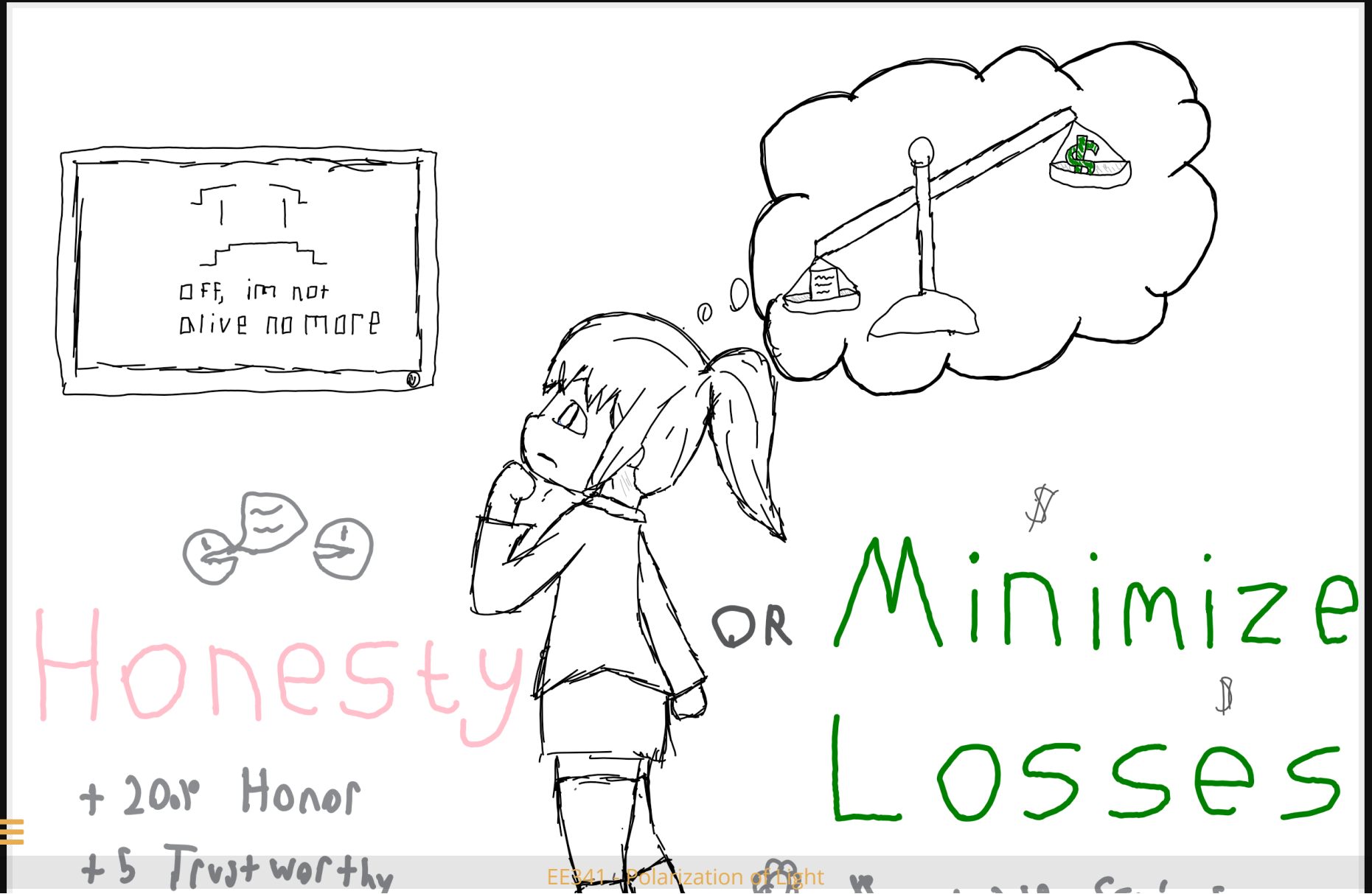
Be Honest

Tell the customer that the mistake was on her own company and the units can be replaced for free.

Lie

Report the units as incorrectly installed or such to warrant a full re-purchase.

Catherine's Dilemma




- 40 Mistake
+ $7000
- Have to live with yourself

Tough Moral Dilemma?

From the IEEE Code of Ethics...

Avoid Conflict of Interests

2. *to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist*

Correct Errors

7. *to seek, accept, and offer honest criticism of technical work,* ***to acknowledge and correct errors****, and to credit properly the contributions of others*

Avoid Injuries

9. *to avoid injuring others, their property, reputation, or employment by false or malicious action*

It’s not a Trolley Problem

Credit: https://gavinortlund.files.wordpress.com/2013/09/fo in-the-road.jpg

Conclusion

- Light rays propagate in unique ways; we can visualize this with graphs of their movement paths.
- We must strive to abide by standards of ethics for fair play as engineers.

Any Questions?

Credit

...where credit's due.

- NowForSomethingCompletelyDifferent: https://en.wikipedia.org/wiki/And_Now_for_Som
- Stronghold: https://en.wikipedia.org/wiki/Strongl
- TwoRoadsDiverged: https://gavinortlund.files.wo in-the-road.jpg
- PolarizationOfLight: https://www.physicsclassroo 1/Polarization
- EthicalCaseStudy: https://www.scu.edu/ethics/fo areas/more/engineering-ethics/engineering-ethi with-you/