CROWDEYE

COMPUTER VISION FOR RETAIL

MICROSOFT ENCODE HACKATHON 2020

TEAM MEMBERS:
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BUSINESS CASE/EXPECTED IMPACT

- Allow businesses to control the influx of people entering
  - Promote social distancing
  - Provide a safer shopping experience
- Eliminates the need for In-person crowd control
  - Safer for staff
  - Reduce operational costs
- Helps shops and stores to a safer recovery

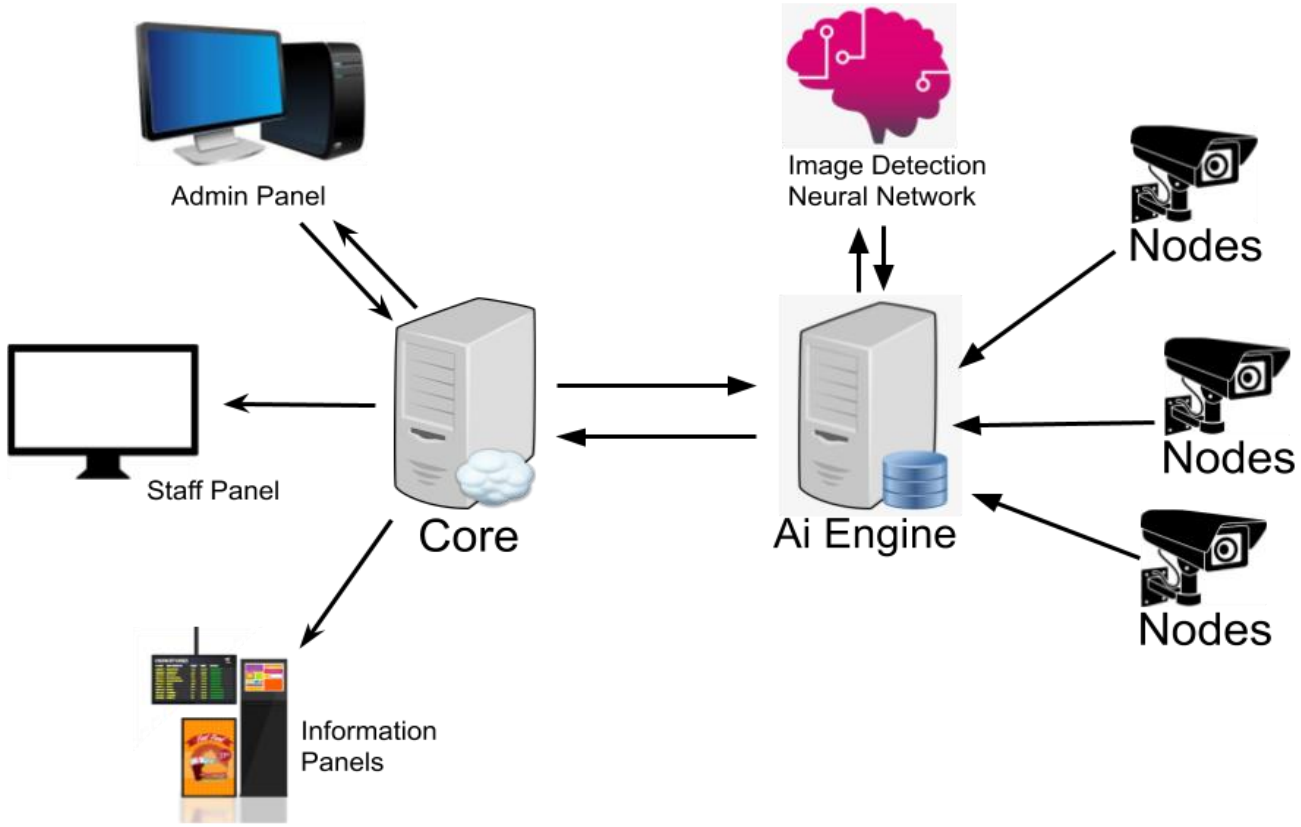
ASSUMPTIONS

- Fast and Stable Internet connection
- Proper Lighting Conditions For AI
- Constant Server Uptime
- Ability to connect cameras to the Internet
  - We provide a sample project to do this

OUR SOLUTION - CROWDEYE

- Use Computer Vision AI to detect the amount of people in the store
- Set settings such as maximum patron amount or directional control
- Allow or Disallow entry of shoppers based off a maximum
- Dynamically add or remove cameras from the admin panel
- Reset lines and counters using the intuitive UI
- Clearly see real-time videos feed and always know how many people are in your shop
- Outdoor flow control signage helps maintain store inflow

SOLUTION DETAILS



1. AI server connected to multiple camera Nodes that are streaming live MJPG streams
2. Realtime object detection tracks movements and calculates when the line is crossed
3. User-facing Core server connected to the AI server which is rebroadcasting the streams with annotations
4. Admin Panel connected to Core server for managing camera nodes the AI server
5. Information panel connected to Core server for displaying relevant information

TECH ARCHITECTURE (AI ENGINE)

- YOLOv3 Image Object Detection
  - Realtime Object Detection
  - Speed and Direction Detection
- Industry-Leading Libraries
  - Developed On Top Of Anaconda Python 3.8
  - Pytorch, TurboJPEG, DarkNet, Custom Compiled OpenCV
- Flask Webserver
  - Allows For Multithreaded AI Detection Workers

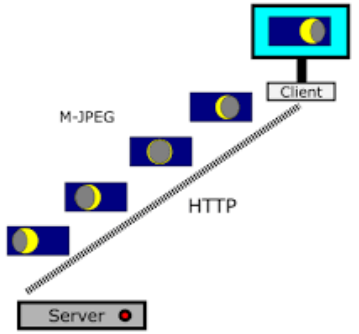
Built On Top Of The Azure NC6 Instance

TECH ARCHITECTURE (CORE)

- Django Webserver
- SQLite3 Database for persistence
- AJAX data Fetching
- Multithreaded Worker Tasks
- Docker Support

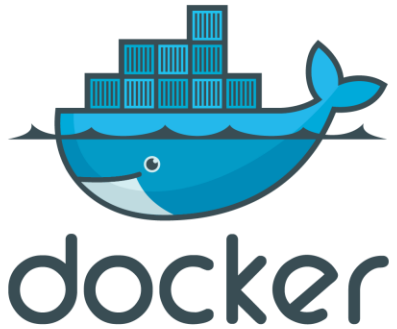
TECH ARCHITECTURE (CAMERA NODES)

- Flask Webserver
  - MJPG Streams (Motion JPEG)
- OpenCV for webcam processing
- Multi-Client Compatible
- Lightweight

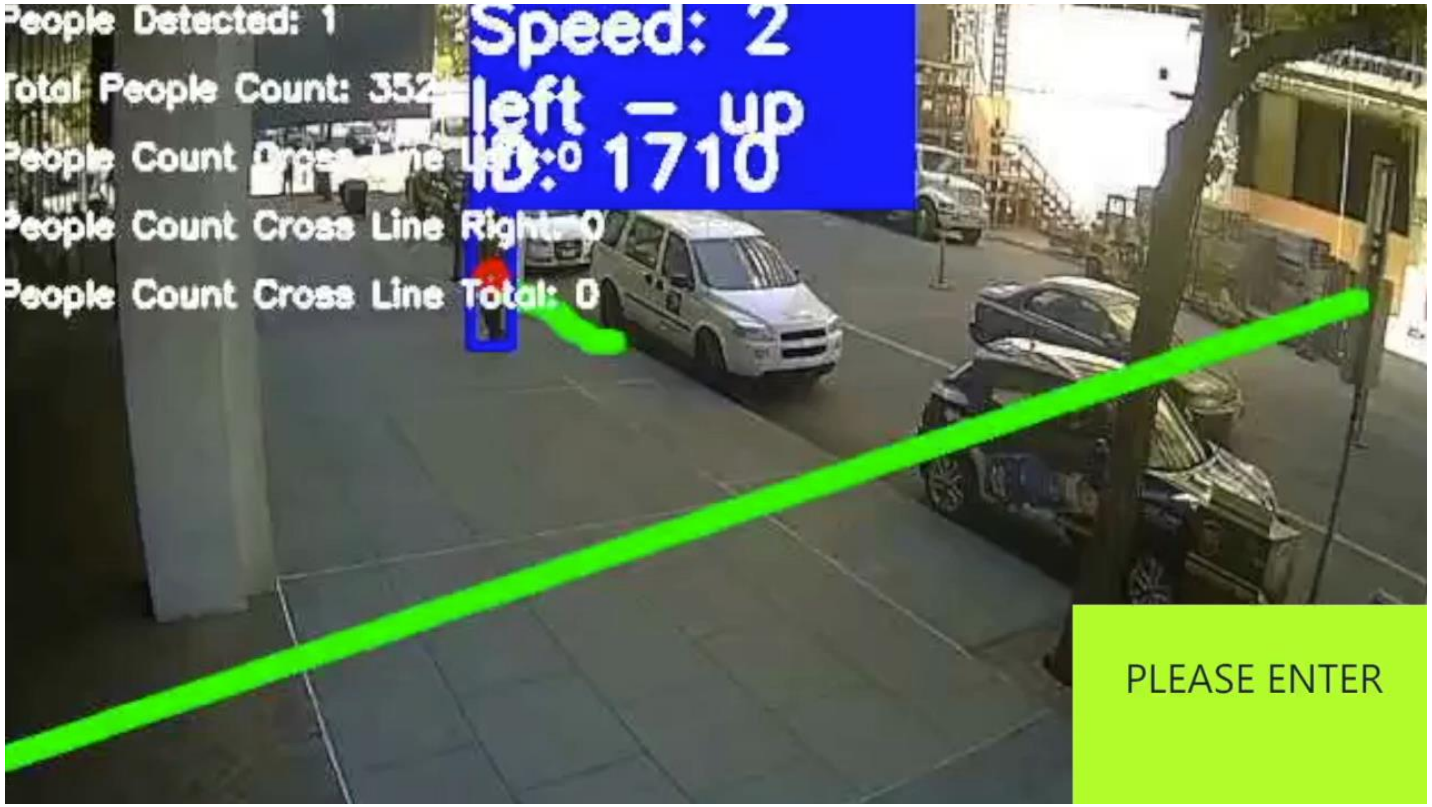


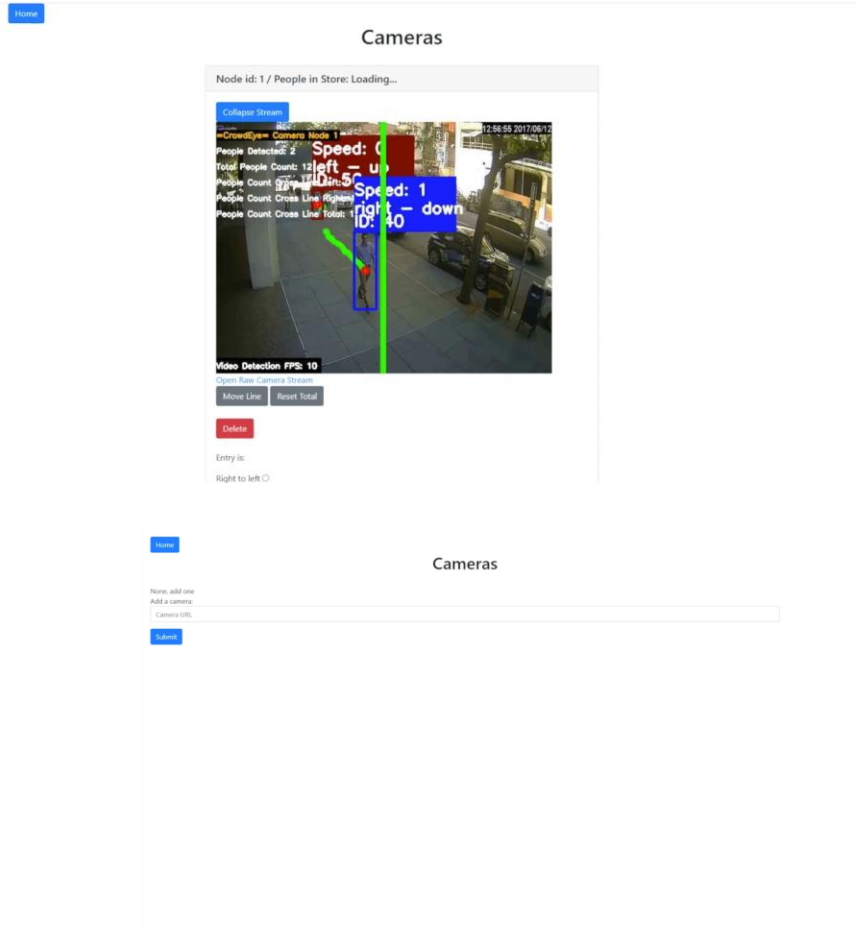
TECH ARCHITECTURE (OVERALL)

- Built To Be Docker Compatible
- Code Hosted On GitHub
  - Fully Open Sourced
- Built For the Azure VM Architecture



VIDEO EXAMPLE





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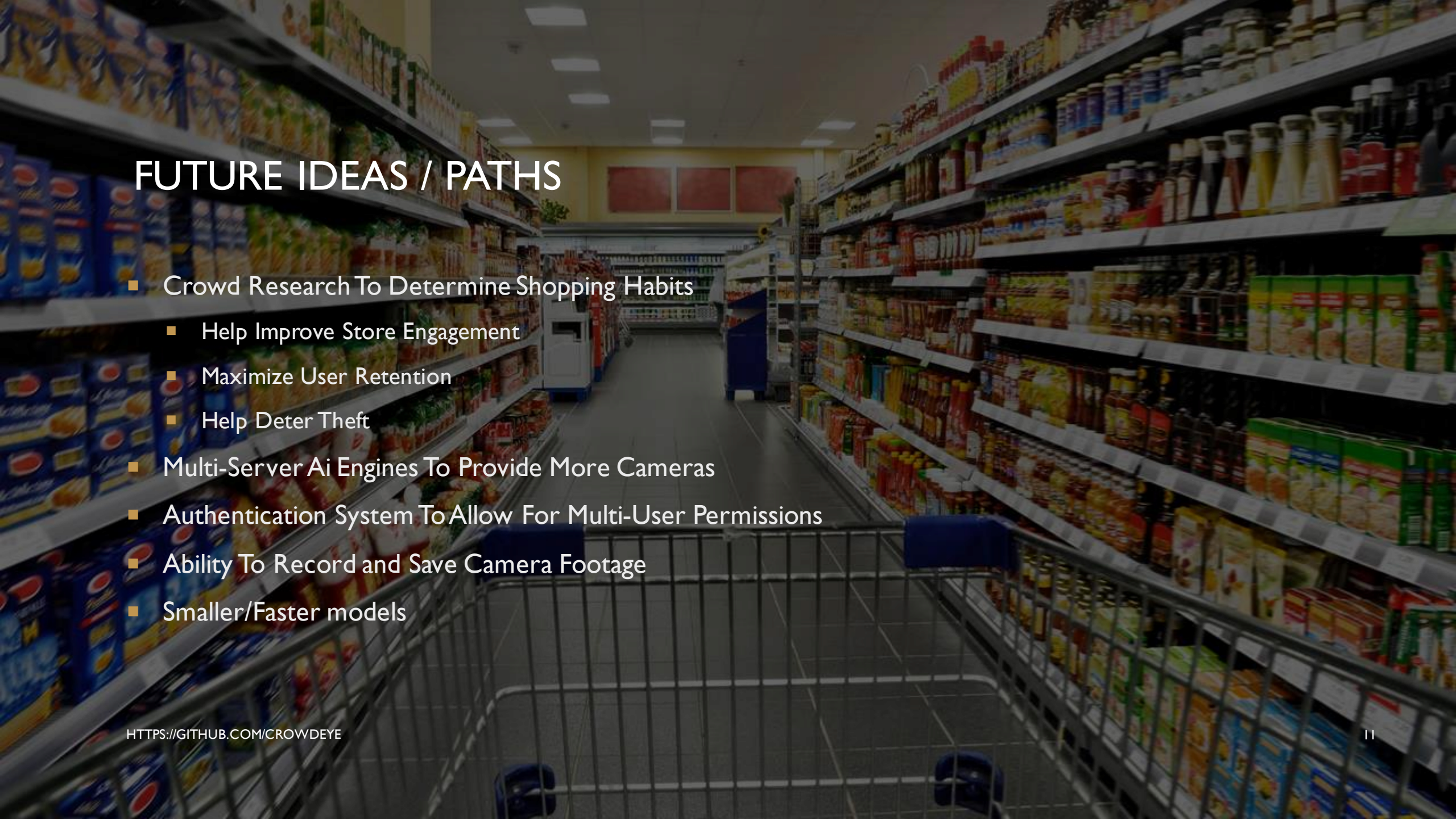

FUTURE IDEAS / PATHS

- Crowd Research To Determine Shopping Habits
  - Help Improve Store Engagement
  - Maximize User Retention
  - Help Deter Theft
- Multi-Server Ai Engines To Provide More Cameras
- Authentication System To Allow For Multi-User Permissions
- Ability To Record and Save Camera Footage
- Smaller/Faster models

CONCLUSION

- **CrowdEye – Computer Vision For Retail**
- Industry-Leading AI Technology
- Highly Flexible, Highly Dynamic
- Expandable Architecture Built On Azure
- Can Be Set Up With Any Regular IP CCTV Stream
- Intuitive User Interface

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APPENDIX

Microsoft Encode Hackathon

Sponsored by Microsoft

Presented by agorize

- Team Members: @radioactivehydra @tommcn
- Project Name: CrowdEye