

Campus Safety Prototype

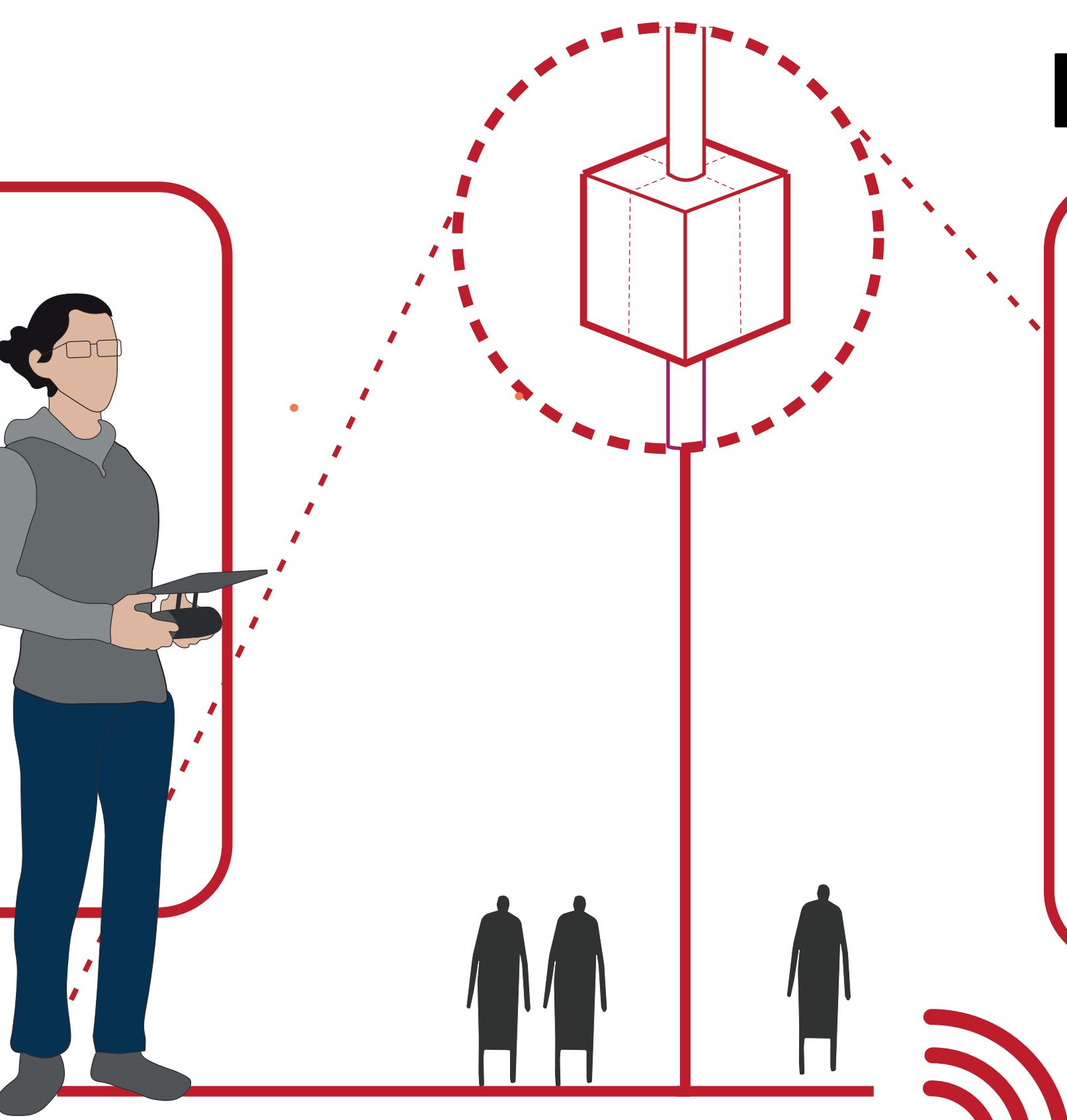
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Why This Matters...

"I didn't feel safe walking back late."

Many campus safety systems respond too slowly or lack intelligent threat detection. The campus safety prototype was created to change that—offering real-time alerts through voice commands, physical triggers, or gesture-based detection. It's built for fast, local responses in moments where every second matters.

System Overview : The system runs on a Raspberry Pi 5, integrating a voice-activated Flask web app, a manual panic button with LED feedback, a synthesized FM alarm tone, and a camera-based fall detection module powered by AI. All components are designed to operate independently or together, creating a layered, low-latency safety net for high-density, high-risk campus environments. Scalable, affordable, and modular prototype bridges the gap between smart tech and personal safety.

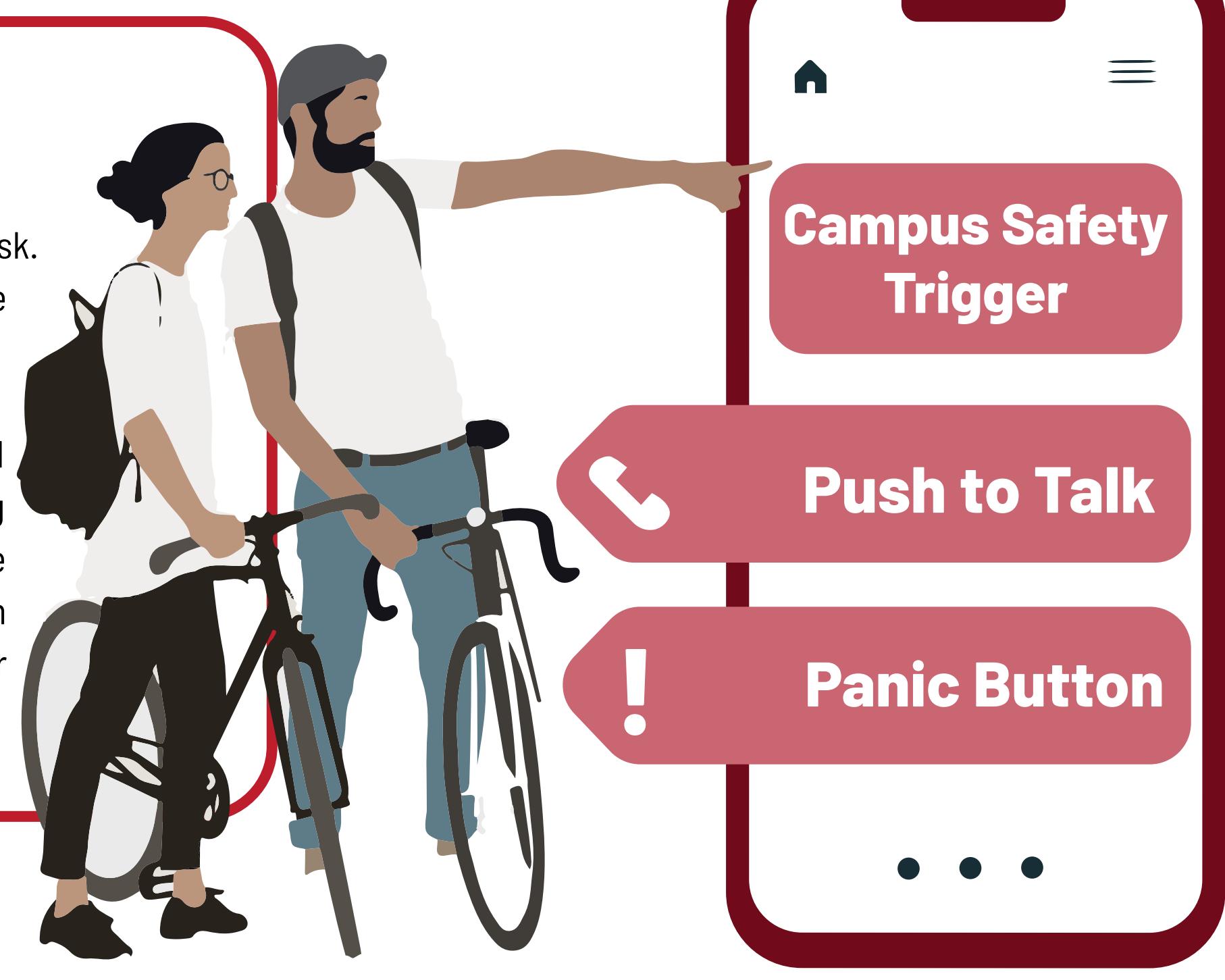


FM Synthesis

Say "Help," and It Beeps—That Simple

This prototype uses a Raspberry Pi 5 and a simple web interface powered by Flask. Once connected to the same network, you can open the web page on your phone and either press a panic button or just tap "Push to Listen" and say "help."

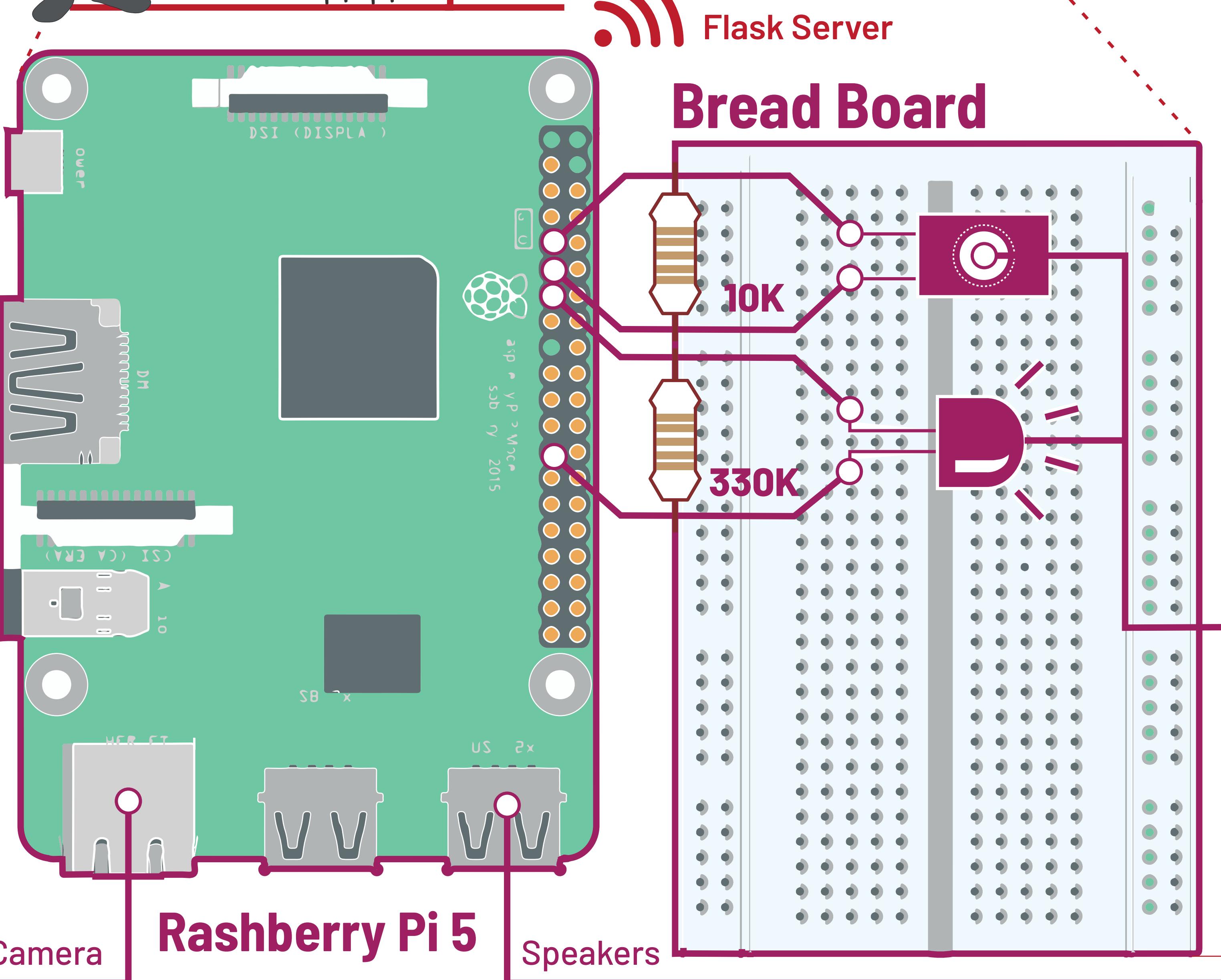
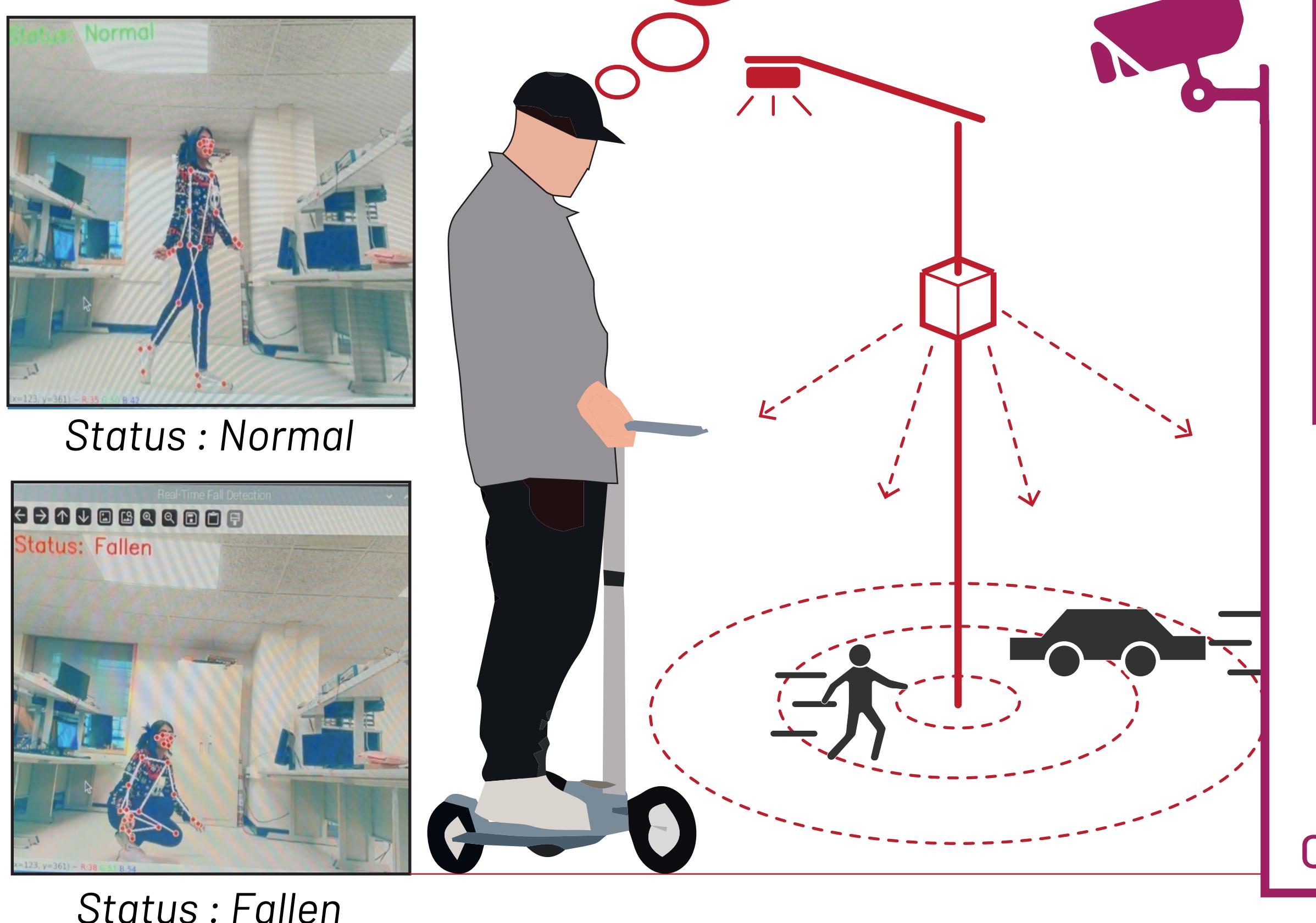
The browser listens using built-in speech recognition and sends that command to the Pi. Instantly, the Pi runs a Python script that plays a sharp FM beep using the pyo audio library—loud enough to alert people nearby. And in case the voice trigger doesn't work—for example, if there's noise or no mic access—you can always tap the manual panic button, which fires the same alarm for a longer duration. It's light, responsive, and reliable when seconds matter.



Real Time Monitoring

Someone's Always Watching Out !! 0_o

Using a camera and AI, this system tracks my body in real time. If I fall, it detects the posture shift and instantly flags it. It's fast, subtle, and built for those quiet moments when no one's around.

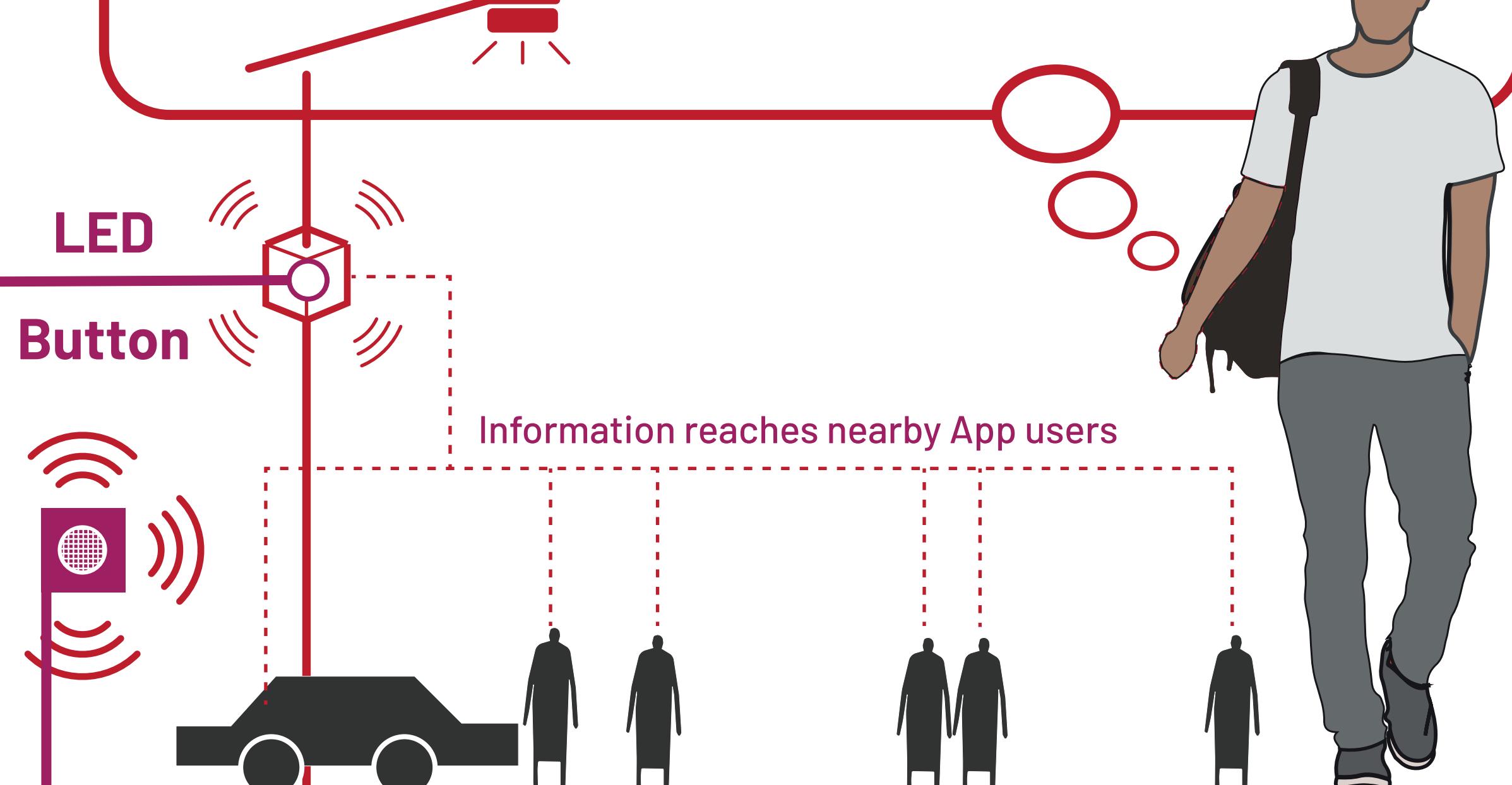


Physical Trigger Module

When I Don't Have Time to Speak, I Just Press the Button

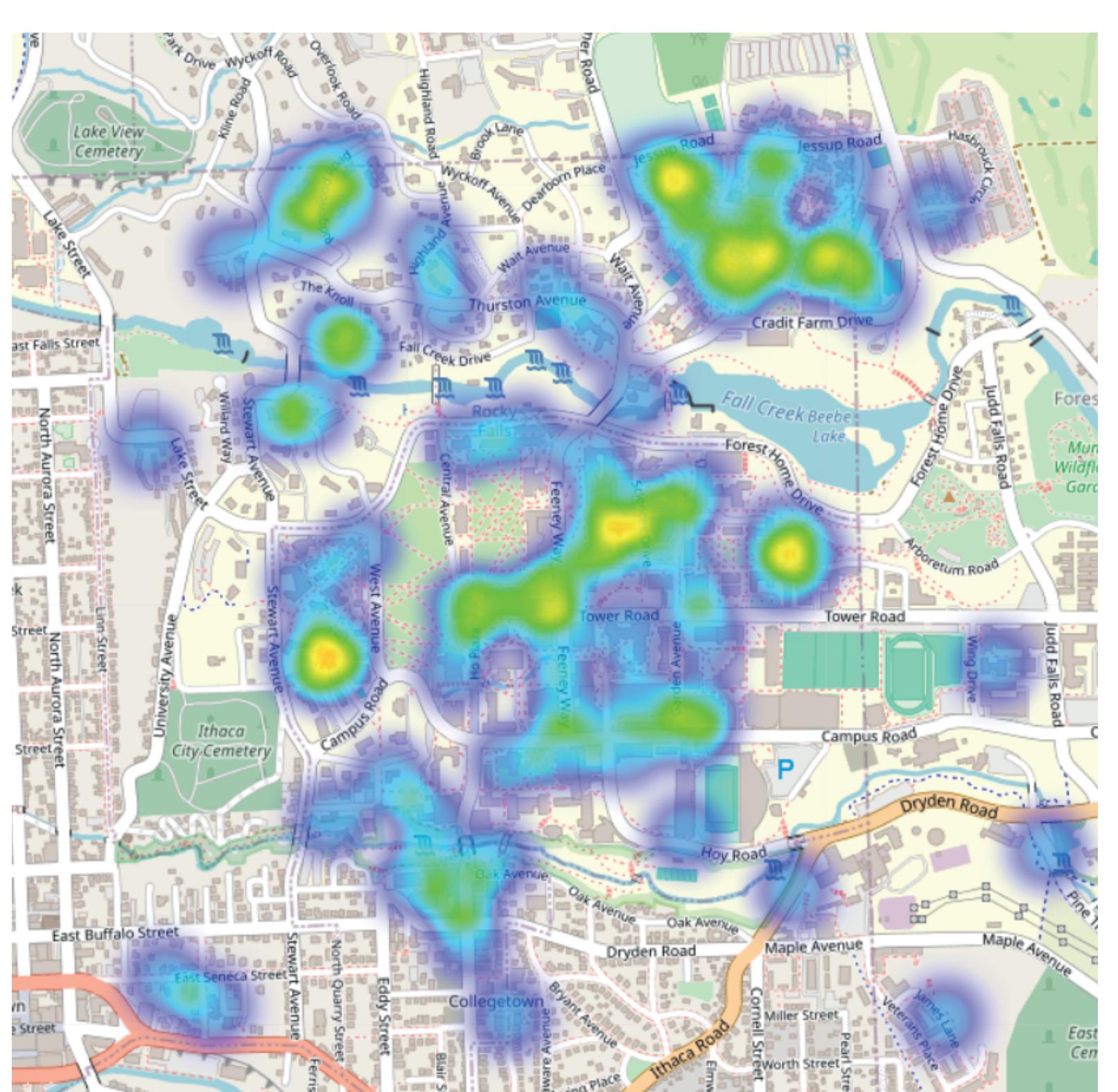
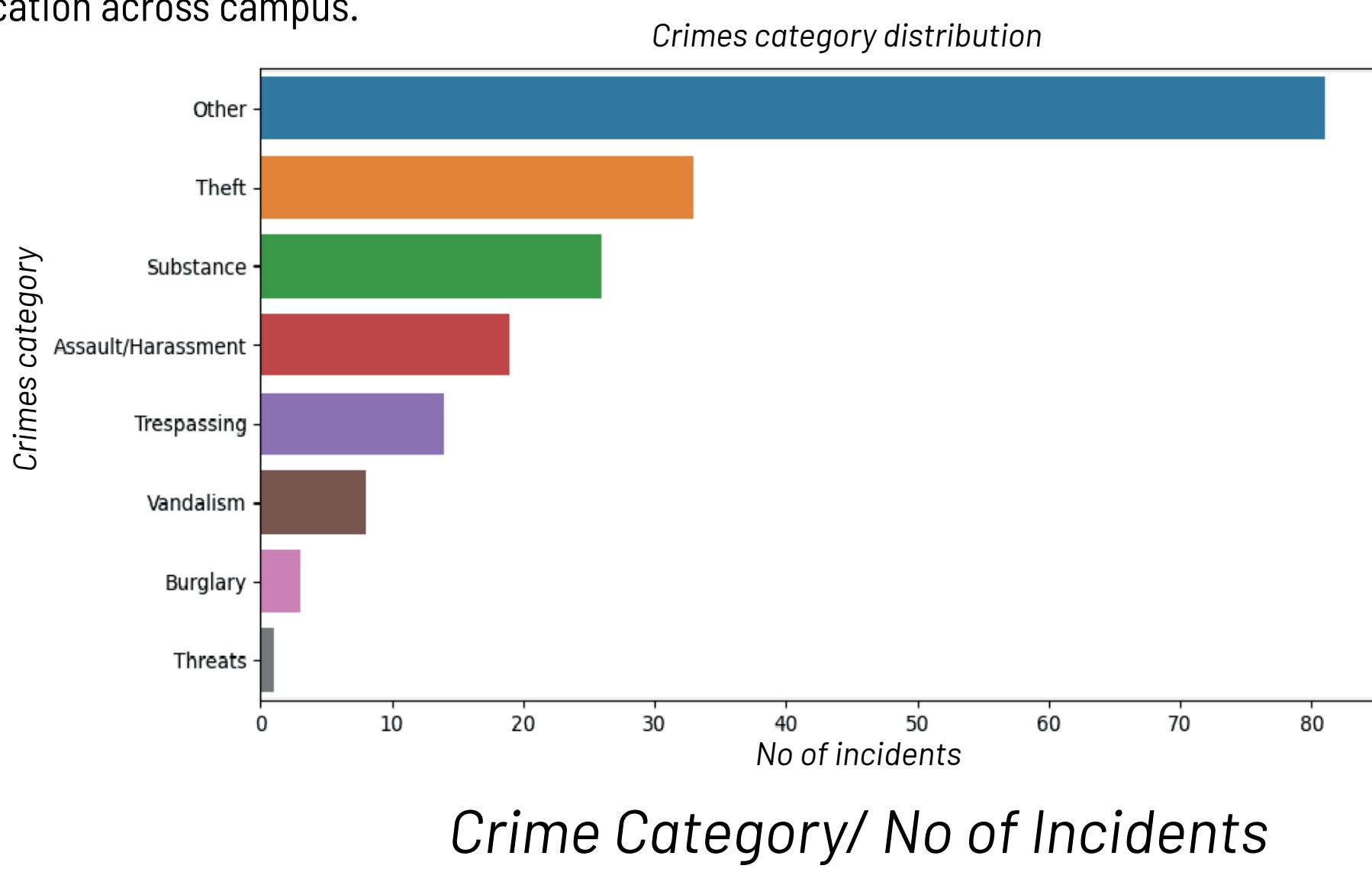
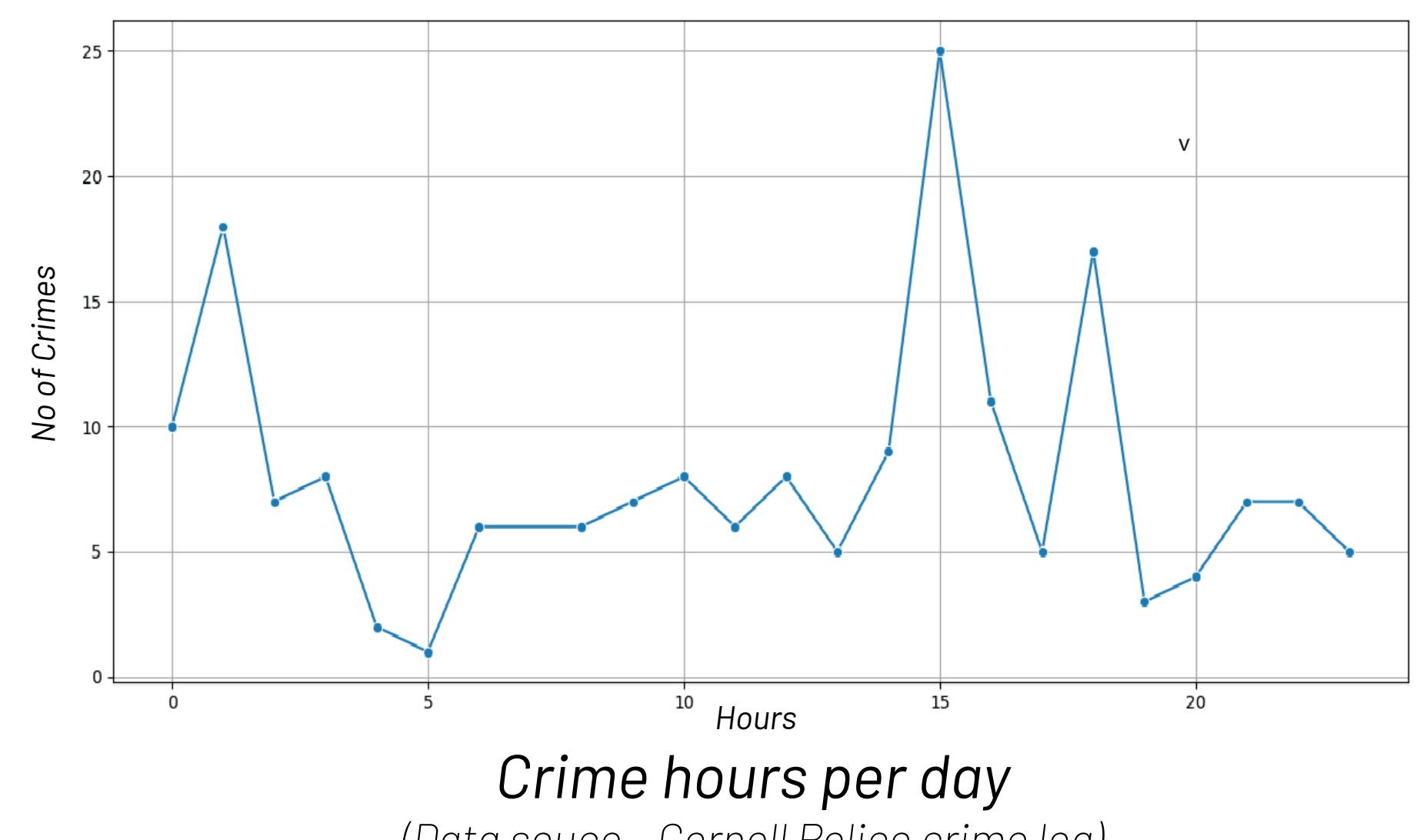
I carry this everywhere on campus. It's simple but powerful. If I ever feel unsafe, I just press this panic button—it's wired to the Raspberry Pi and instantly sets off a loud FM beep. It's fast, no need for Wi-Fi or speech.

There's also this little LED right here—it lights up the moment the system registers my press, so I know the alert went through. It's all hardwired using GPIO pins on the Pi, with a pull-up resistor on the button and a 330k resistor for the LED.



Mapping & Predictive Model

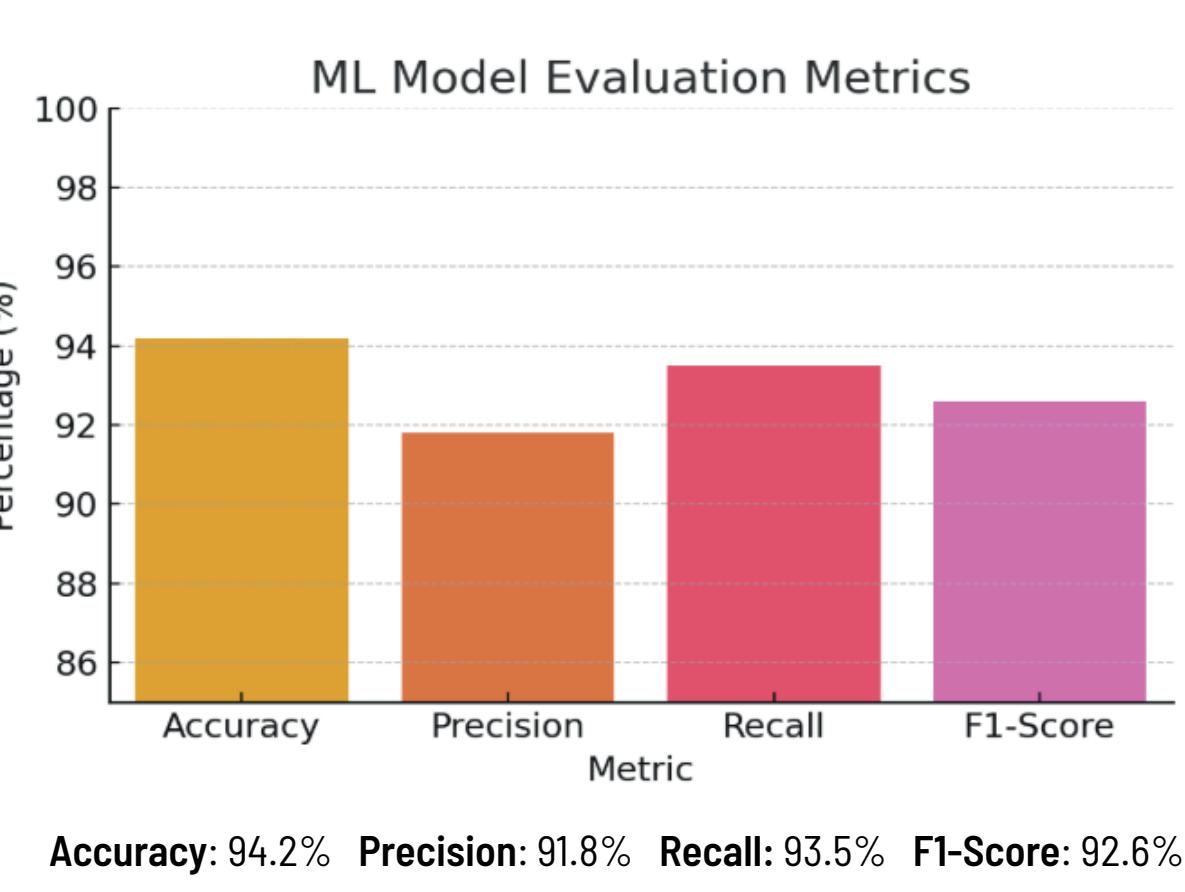
This module continuously ingests campus crime data from Cornell Police crime log website , updates geospatial layers, and runs real-time predictive models. It learns from trends—by hour, category, and location—and adapts over time. The visualizations shown are live outputs the system feeds on daily to inform safer planning and deployment decisions. This allows for dynamic placement of safety tools and smarter resource allocation across campus.



Conclusion

The Campus Safety prototype delivers a real-time, scalable safety system for large university campuses—built with components costing under \$60. It integrates AI-powered fall detection, manual triggers, and web-based voice activation into a single, responsive network.

These results confirm strong real-world reliability. With future work focused on hardware miniaturization and campus-wide deployment, this solution sets the stage for smarter, safer environments.



ML Model Evaluation Metrics

I sincerely thank my faculty advisor Professor Hunter Adams, for his mentorship and guidance throughout this project. I also thank Balaji Ramesh (MRP-br455) for his collaboration and insights as the urban planning lead. All statistical data & graphics this work are based on datasets provided by the Cornell University Police Department.