# GLASSMATE


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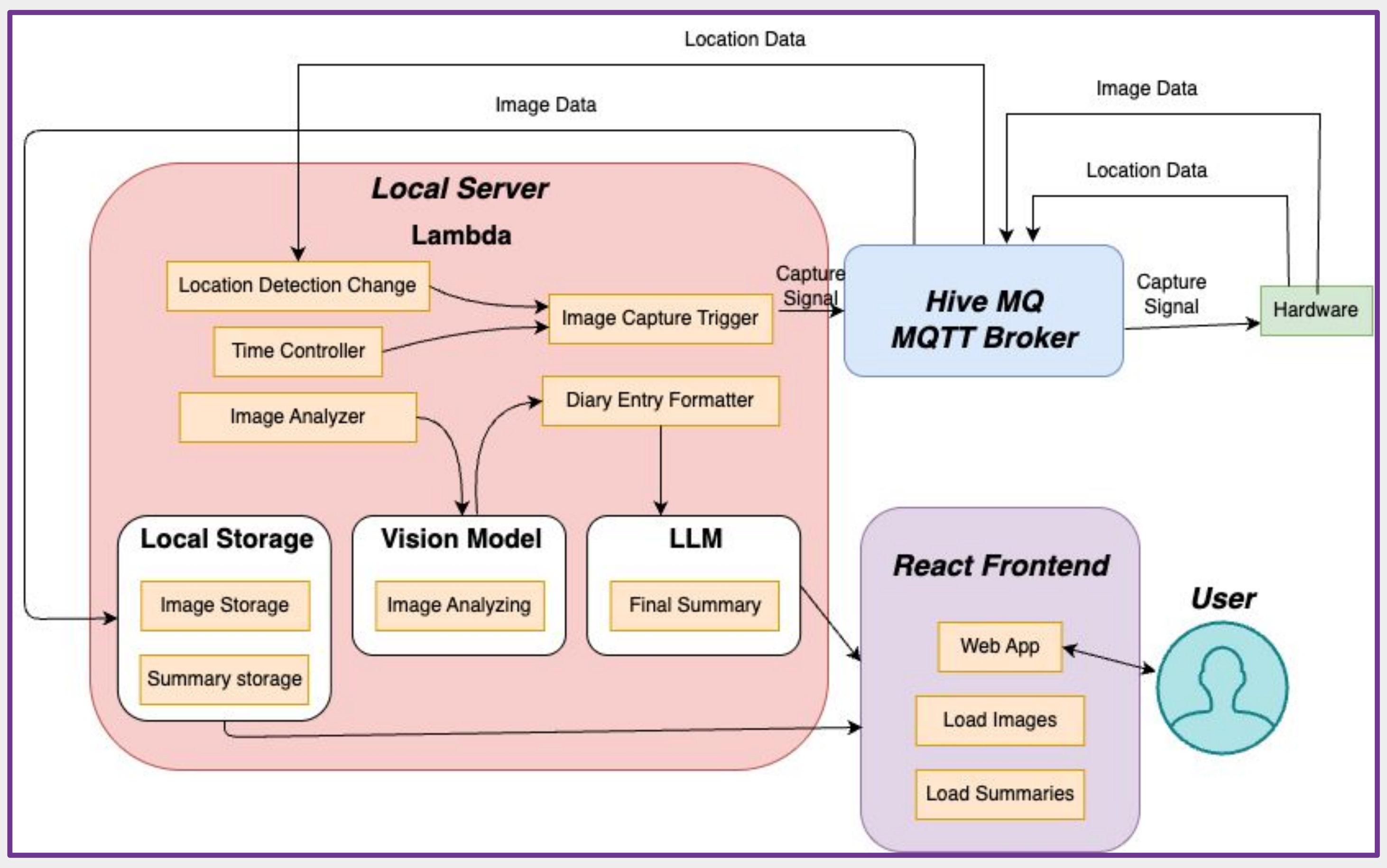
## PRODUCT PITCH

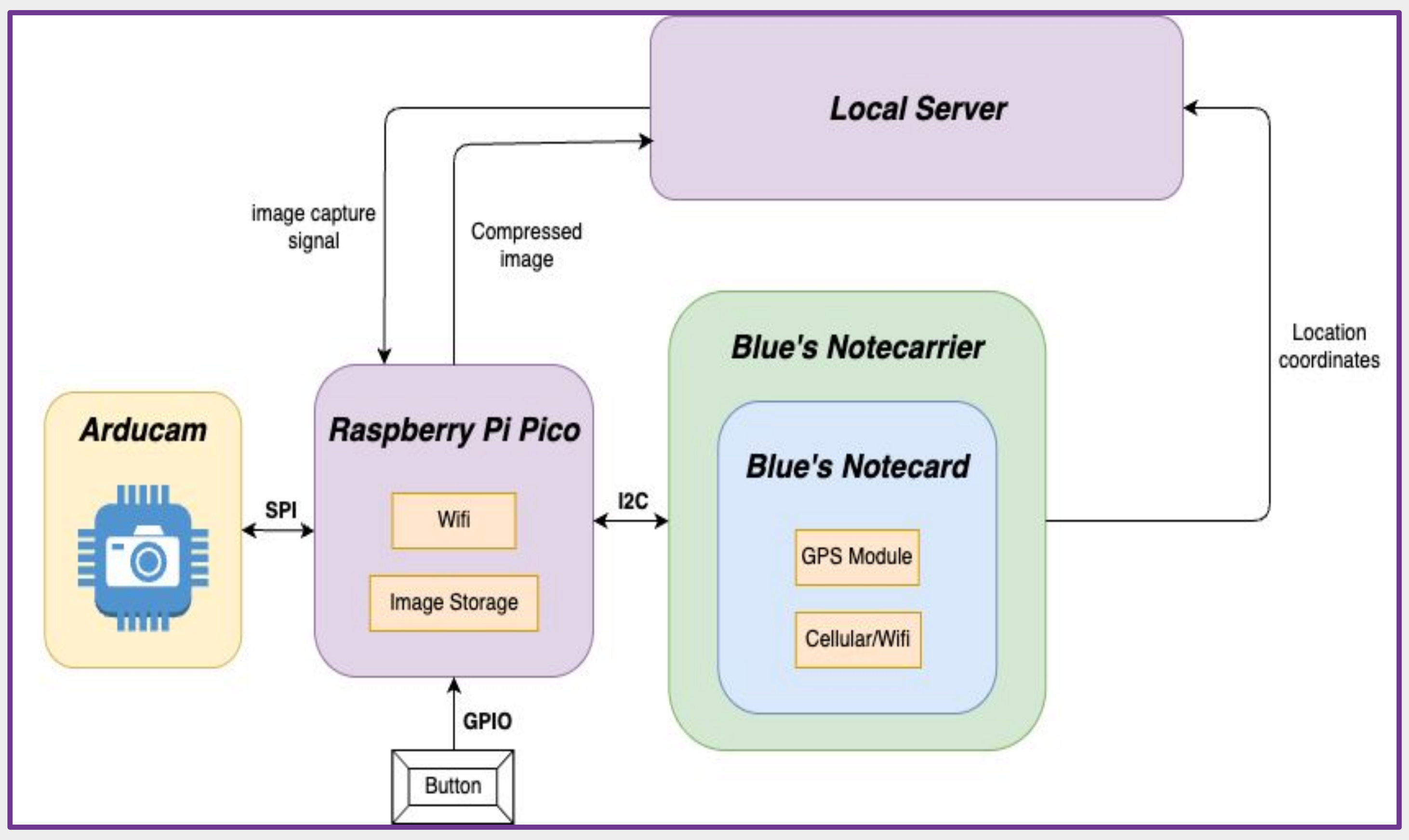
**Maintaining meaningful records of daily experiences is challenging for many people** – forgetting to take photos at key moments, finding manual journaling too time-consuming, and struggling to recall details of where and when activities occurred. GlassMate solves these problems with a wearable clip device that **automatically captures photos when you remain stationary for 10+ minutes** at a location, **tracks your movements with 100-meter accuracy**, and uses artificial intelligence to **generate personalized daily summaries**. Our testing shows **92% user satisfaction with diary entries** and **96% reliability in data transmission** over cellular networks. GlassMate successfully transforms passive location data and images into meaningful daily narratives without requiring active user input or specialized technical knowledge.

## SYSTEM ARCHITECTURE

### Web Application Block Diagram




### Hardware Interface Block Diagram




## CONCLUSIONS & ADDITIONAL INFO

Our final system closely matched our original goals by capturing meaningful daily experiences automatically with high reliability and user satisfaction. GlassMate met both our technical performance targets and usability aspirations.

Through this project, we learned important lessons about embedded programming, hardware-software integration, wireless communication challenges, and how small changes in physical design (housing, wiring) impact usability. Effective collaboration and rapid iteration were key to completing the system on time.

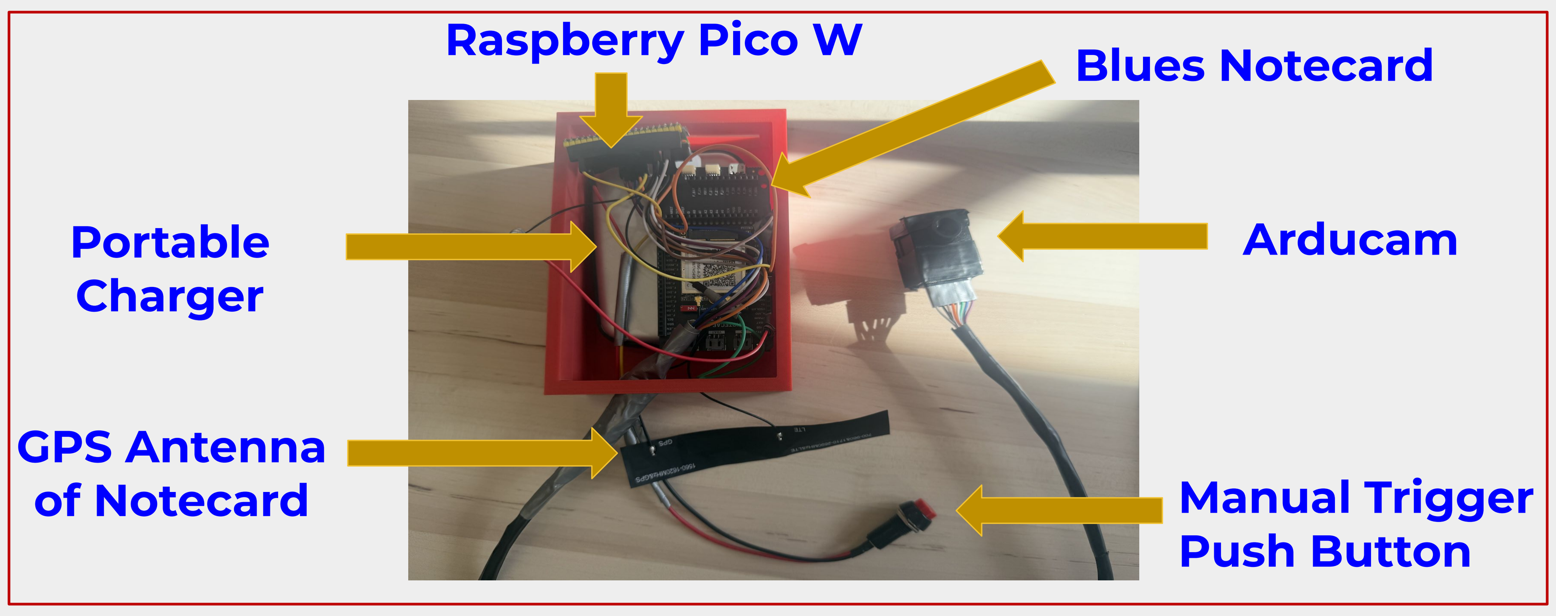
Future directions could include adding facial recognition to identify friends in captured images and display their names on the web application, as well as further miniaturizing the hardware for improved comfort and wearability. If given more time, we would spend more time on adding more usability to the pocket housing via 3D printing.

## SYSTEM DESCRIPTION

### HARDWARE

- **Raspberry Pi Pico W:** Central microcontroller managing all operations
- **Arducam:** Low-power 2MP camera for image capture
- **Blues Notecard:** Cellular connectivity and GPS location tracking
- **Voltaic V50 Battery:** 12,800mAh Long-lasting power source
- **Manual Trigger Button:** Optional user-controlled image capture

### Physical Design of Product




### SOFTWARE

- **MQTT Broker (Hive)**: Reliable message handling between hardware and software
- **Local SQLite Database**: Efficient storage of images and metadata
- **React Web Application**: User-friendly calendar and diary interface
- **Google Maps API**: Converts GPS coordinates to recognizable location names
- **OpenAI (GPT-4)**: Generates natural language summaries from image data, location, and additional context

## SYSTEM EVALUATION

### Verification Test

| REQUIREMENT | TARGET | ACHIEVED |
|---|---|---|
| Location Accuracy | ≤ 100 m | ~ 30 - 50 m |
| Image File Size | ≤ 8 KB | 30-80 KB |
| Battery Life | ≥ 8 hours | 8+ hours |
| Image Capture Delay | ≤ 20 sec | ~8 sec |
| Location Update | 5 min | 1 min |
| Data Transmission | ≥80% success | 96% success |

### Validation Test

| REQUIREMENT | RESULT SUMMARY |
|---|---|
| Automated Capture | Captured all stops >10 min |
| Location Tracking | 90% movement detection, 50m accuracy |
| Daily Summaries | 4.2/5 accuracy, 90% key events identified |
| Web Interface | <3s load time, correct date & metadata display |
| Integration Testing | 85% success rate, 38s average latency |
| User Experience | 92% task success, usability rated 4.3/5 |

### Design Tradeoffs

- **2MP Arducam vs 5MP**
  - Lower power consumption & size, but reduced image quality
- **MQTT vs Direct Serial**
  - More reliable data transmission & wireless feature, but increased system complexity
- **Local vs Cloud Development**
  - No AWS costs and simpler development, but lost remote access.
- **Blues Notecard**
  - Easier hardware integration w/ cellular support & more accuracy indoors, but larger size

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