

ESGT for Smart Glass Technologies

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Background

- About 610,000 people die of heart disease in the U.S. each year (1 in every 4 deaths)
- Integrating important information into daily routine doesn't require a change to the routine
- Modular design is capable of adapting to a variety of applications (i.e. mirror, windshield, window, etc.)

Objectives

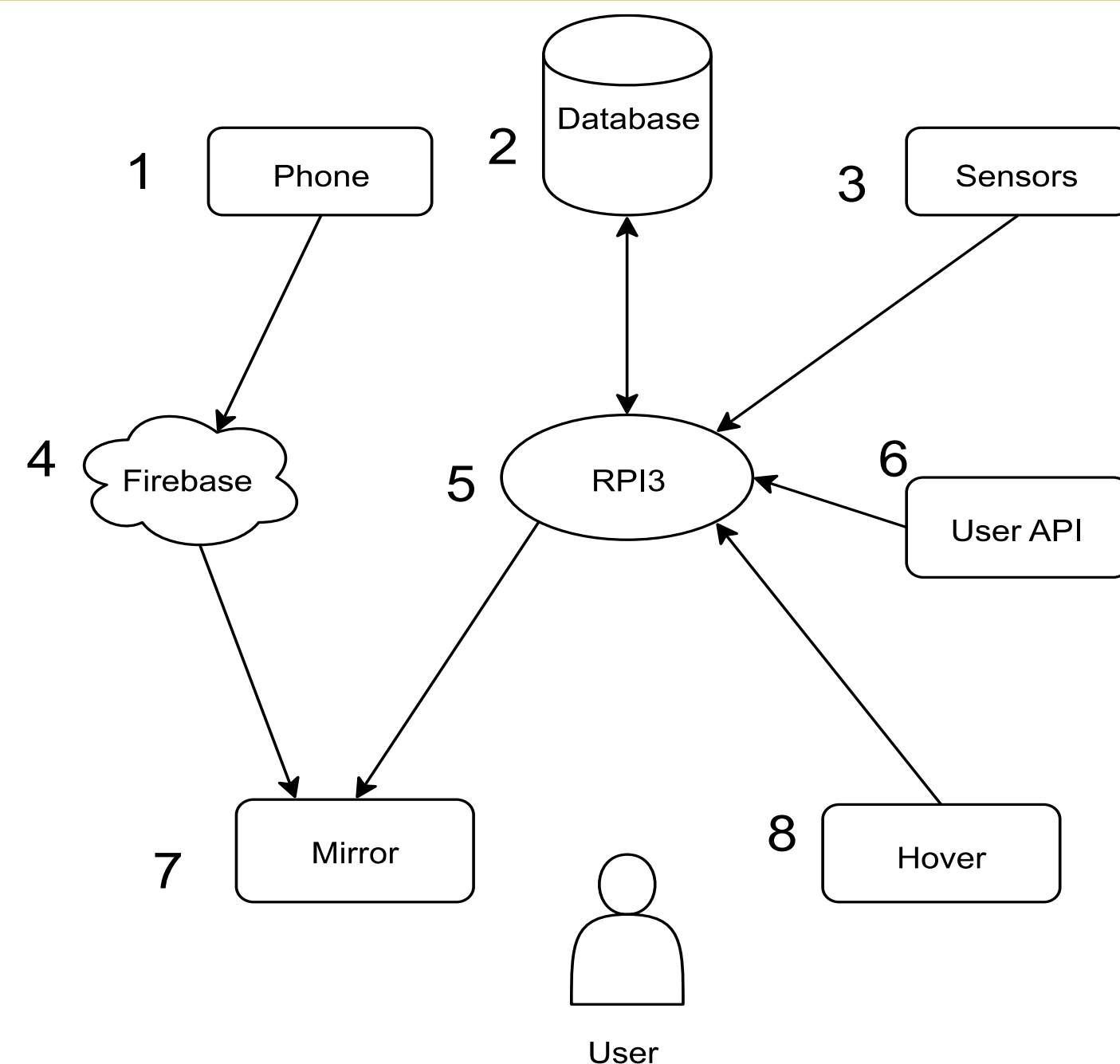
- Display multiple applications in one dashboard (i.e. calendar, mail, time, weather, sensor data, biometric vital signs)
- Control display without smudging it
- Integrate transparent circuitry (i.e. LCD, sensors) into different display materials (i.e. mirror, glass, plastic)

Solutions

A "smart" mirror prototype:

- Interact via Hover gesture sensors
- Synchronize data to Android application
- Appearance of normal mirror when off
- Display real time sensor input
- Personalized email, news, weather, and calendar information

System Design



1. Phone: Android app for connecting to Firebase for user configuration
2. Database: PostgreSQL DB for storing sensor data for future use
3. Sensors: IR, temperature, and humid sensors (include biometric in future work)
4. Firebase: Cloud backup and synchronization of user configuration
5. RPI3: Microcontroller for the web browser, database, and analog sensor input
6. User API: The service for email, news feed, weather, calendar, etc.
7. Mirror: Frontend and display for ESGT
8. Hover: Gesture sensor for user interaction

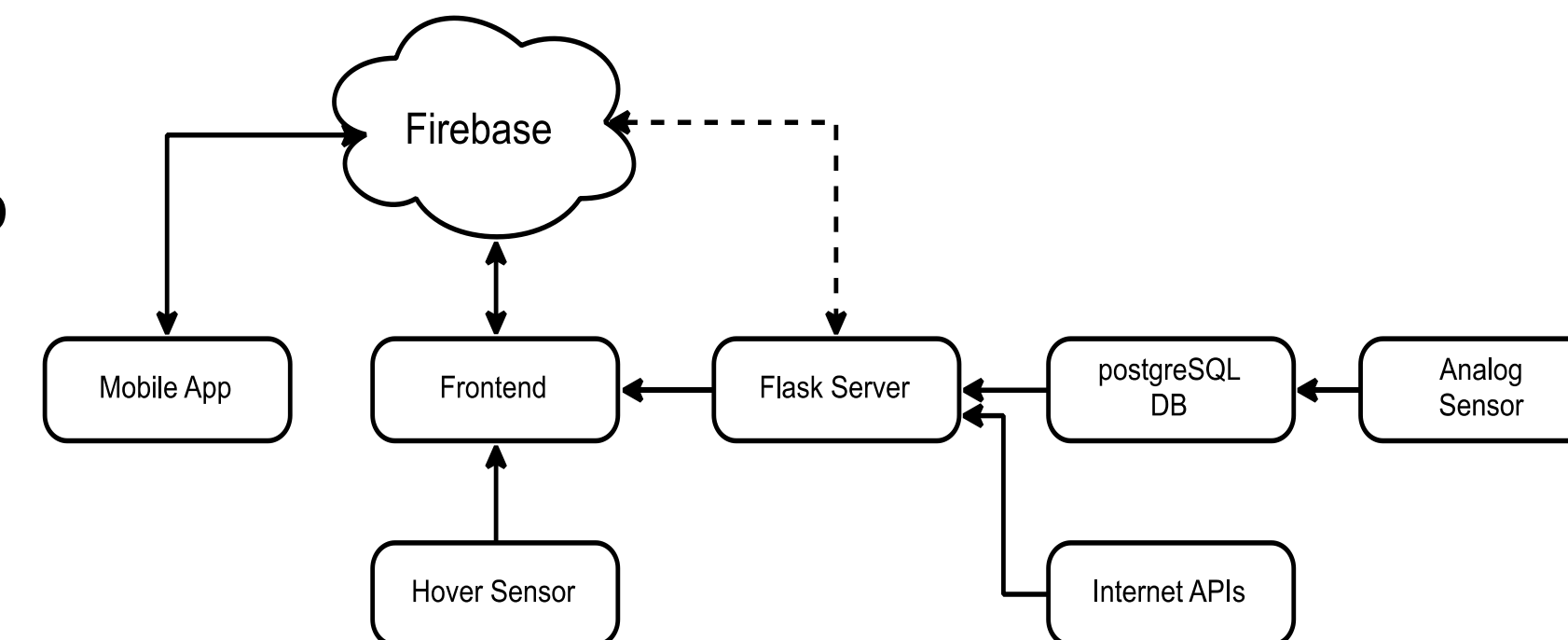
Final Prototype



Results

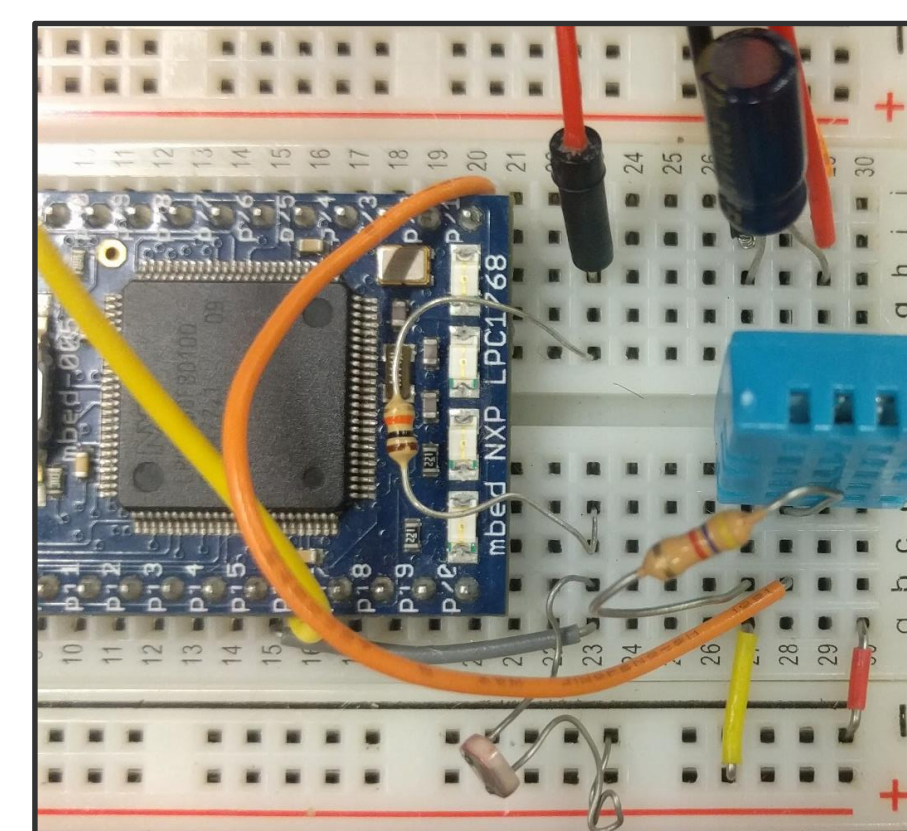
Dataflow Results

- Collect and stores real-time sensor data into database
- User configuration changes update instantly on mirror
- Supports multiple devices and users

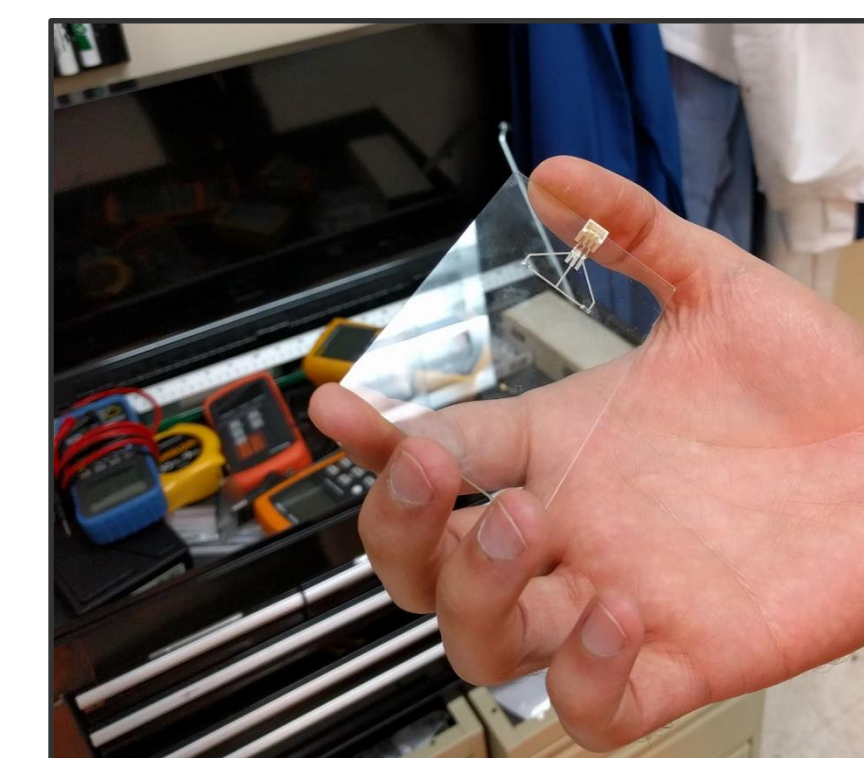


Hardware Configuration Results

- Hover for gesture input
- Use RTOS to reduce responsive delay



- Attached 2 surface-mounted resistors + power supply + light + humidity / temp sensor
- Proved concept of inkjet printing on glass



Transparent Circuitry Results

Conclusion

- Software ecosystem implementable on variety of products (i.e. eyeglasses, window)
- Shows / hides widgets, depending on user's desired settings
- Allows HMI without smudging display

Future Work

- Integrate transparent circuitry into two-way mirror, glass, flexible glass etc.
- Add biometric device to detect vitals (i.e. blood pressure)
- Add device to detect close proximity to turn on and off the display
- Use more conspicuous gesture sensor