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BabyCloud, a Technological Platform for Parents and Researchers

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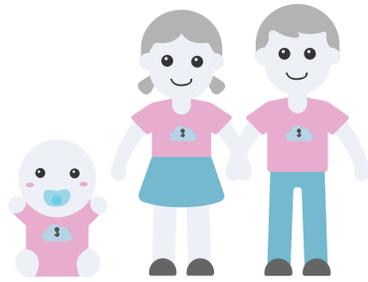
Introduction

Research environments in language acquisition

- Recent progress in infant speech database collection
- Recent progress in computational modeling of developmental processes

Opportunities for:

- Parents: to access tools to explore and document their child's learning progress
- Researchers: to access analytics to understand language acquisition mechanisms



Research Questions

Existing platforms and recording tools

- Existing child data sharing platforms: Childes, Speechome, Homebank
- Existing recording tools: LENA, USB recorders

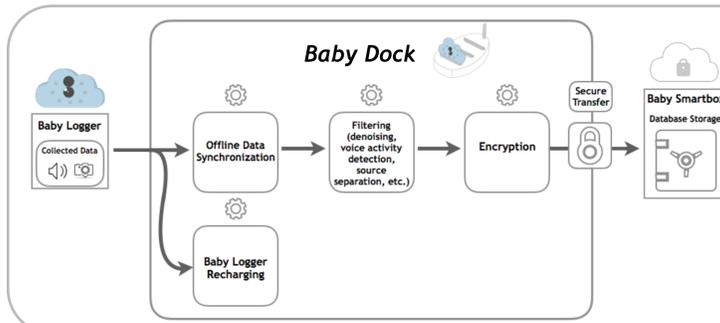
Issues

- Privacy and protection of the collected data
- Audio quality and quantity not optimal for machine learning algorithms
- Proprietary technologies

The Solution: *BabyCloud*

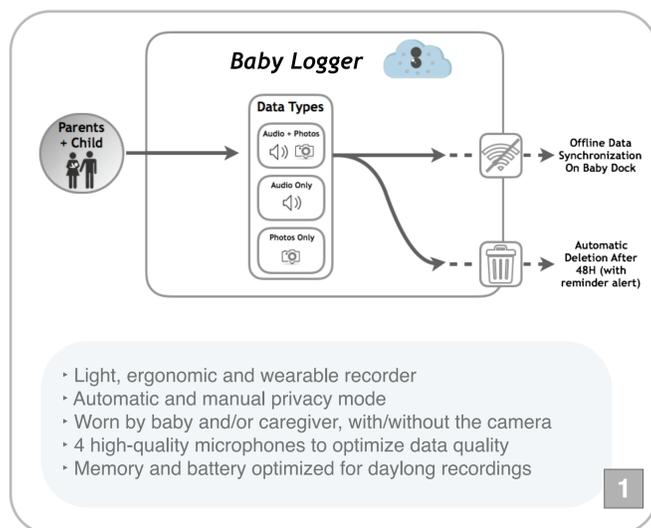
baby cloud

- User-friendly functionalities, optimized for speech processing models
- Gives full control of the data to parents
- Open-source licenses



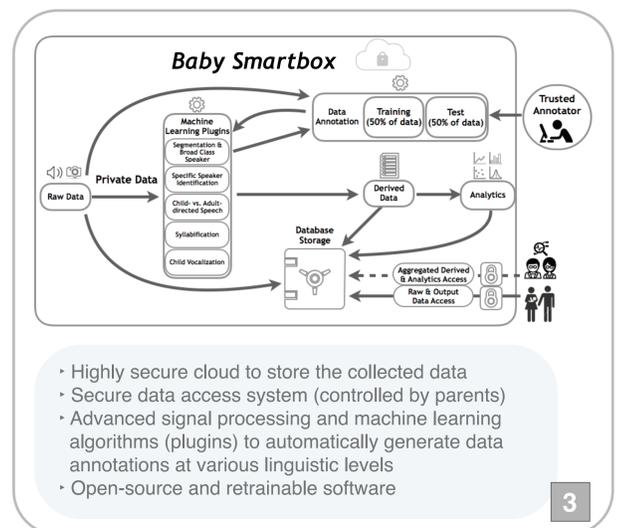
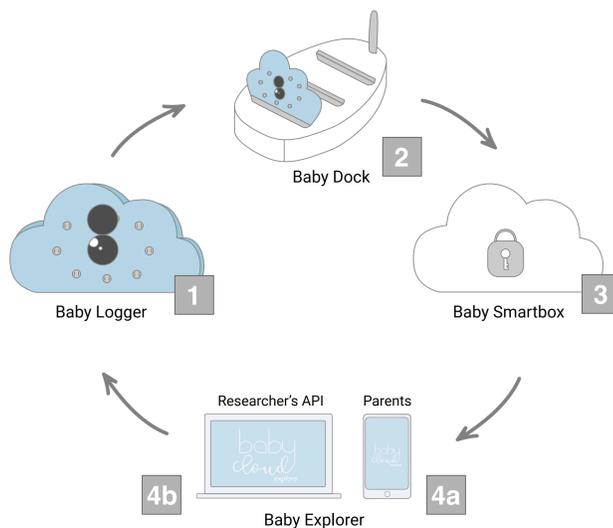
- Charges the battery of the Baby Logger
- Wireless data transfer from the logger to the dock
- Data filtering to reduce the amount of transferred data
- Transfer of the encrypted data to the Smartbox
- Removal of the data from the dock at the end of the process

2



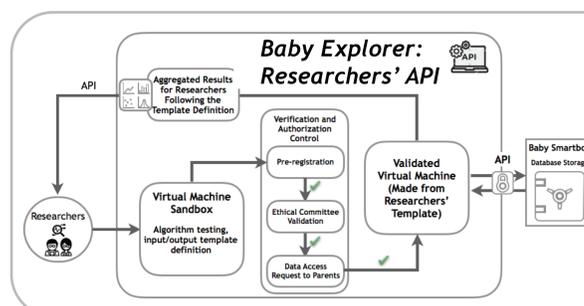
- Light, ergonomic and wearable recorder
- Automatic and manual privacy mode
- Worn by baby and/or caregiver, with/without the camera
- 4 high-quality microphones to optimize data quality
- Memory and battery optimized for daylong recordings

1



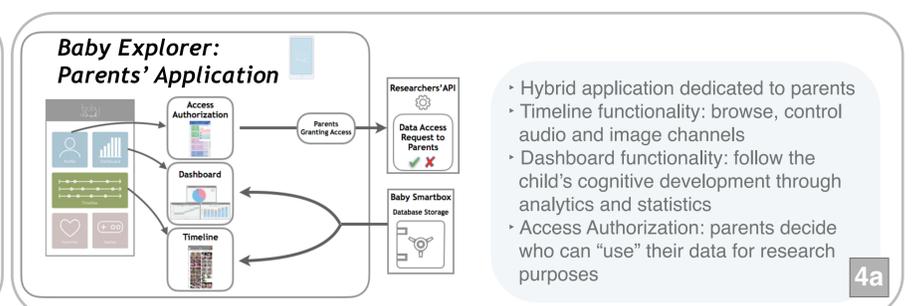
- Highly secure cloud to store the collected data
- Secure data access system (controlled by parents)
- Advanced signal processing and machine learning algorithms (plugins) to automatically generate data annotations at various linguistic levels
- Open-source and retrainable software

3



- Need pre-test of the algorithms with public data by researchers
- Need pre-registration of their studies
- Need approval by an ethics committee
- Need validation of the algorithms by the BabyCloud platform
- Output retrieved is only anonymized statistics of the data

4b



- Hybrid application dedicated to parents
- Timeline functionality: browse, control audio and image channels
- Dashboard functionality: follow the child's cognitive development through analytics and statistics
- Access Authorization: parents decide who can "use" their data for research purposes

4a

Completed Work

- IRB approval
- Draft of Privacy Impact Assessment to comply with the GDPR
- Working prototype of the Baby Logger
- Working version of the Baby Explorer for parents
- Some modules of the annotation process (vocal maturity, speaker diarization)
- Pilot of 6 families (one day recording)

Future Work

- Secure and encrypt the pipeline and platform
- Test and miniaturize the Baby Logger
- Design shell for the Baby Logger
- Develop the Baby Dock
- Develop the Baby Explorer for researchers
- Collect feedback from pilot families

Conclusion and Expected Impact

BabyCloud: innovative platform whose objective is to strengthen collaboration between parents and researchers

Benefits

- Full protection and control of the data by the family
- Better quality of life: digital portfolio of the child's early stages in life
- When certified clinically, could spot potential developmental delays and trigger early medical intervention

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