Multi-Device Forensic Autopsy Documentation and Report Generation Using Mixed Reality

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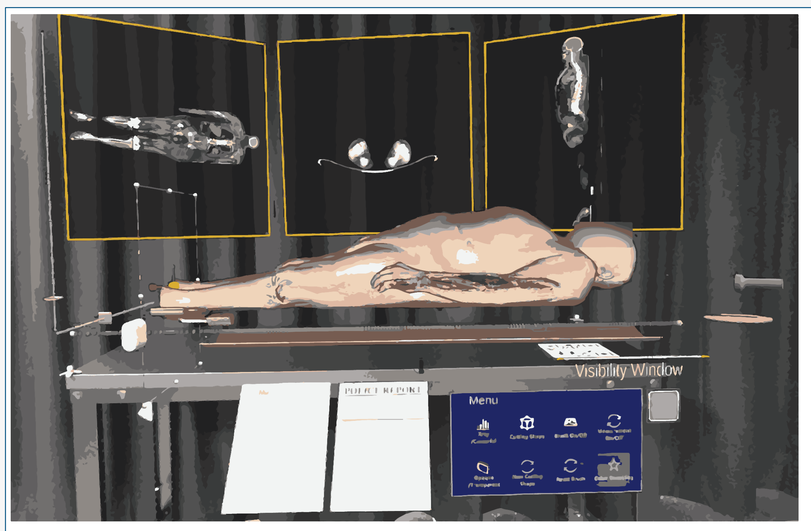

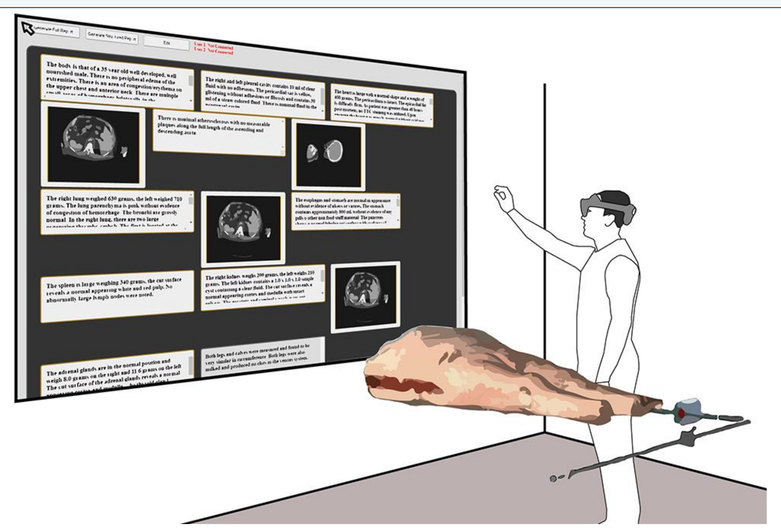

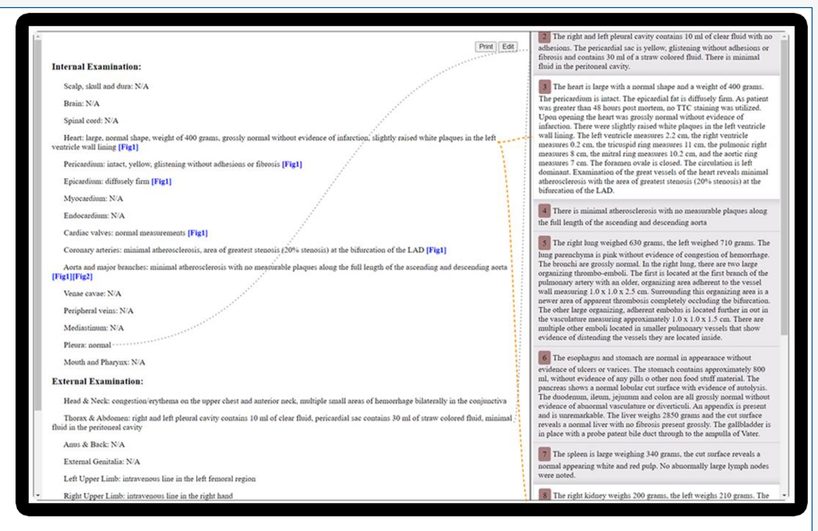

Figure 1. Left) MR autopsy room, Middle) Data collection/organisation from MR and physical environment, Right) Customised report editor.

Background and Motivation:

- Forensic autopsy workflow is **complex**, and requires many experts involved.
- Present methods are **expensive**, **time-consuming**, and unable to capture all data.
- Recent studies indicate that MR facilitates in-situ CT analysis [1,2] and advanced 3D manipulation of visualised bodies [3]. But technology can further optimise the forensic autopsy process.

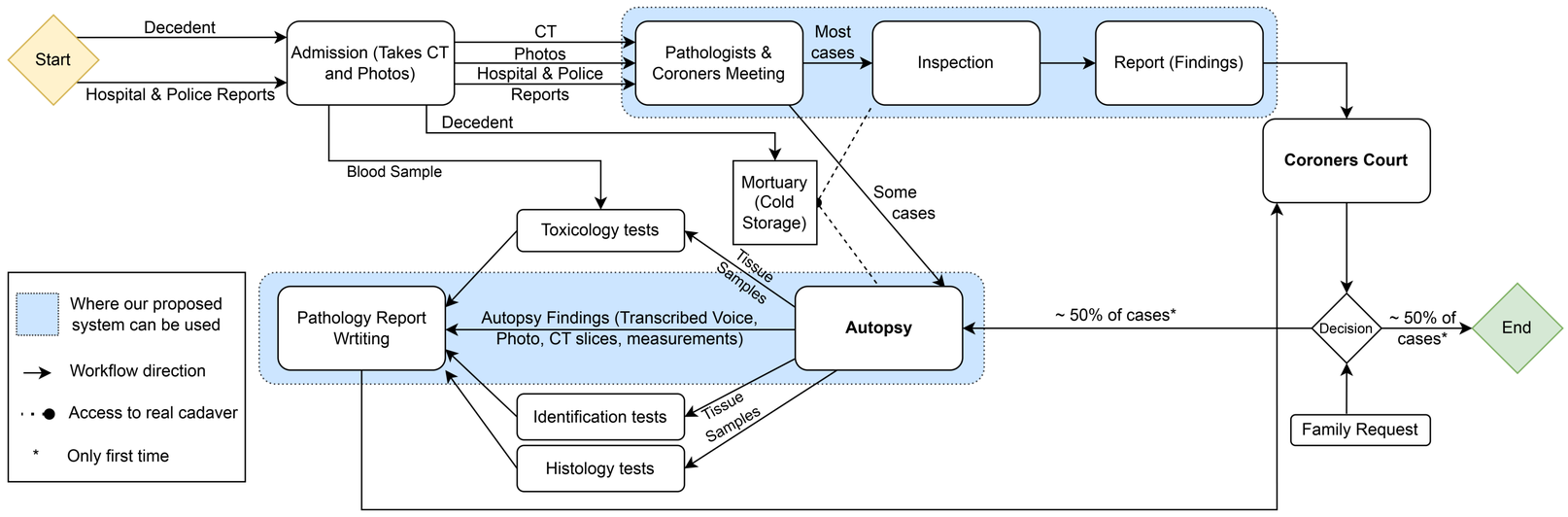

Figure 2. Forensic autopsy workflow.

Results and Discussion

Evaluated by three experienced forensic pathologists. Their feedback include:

- Provides an all-in-one device and system, and captures data effectively
- Reduces the reliance on memory
- Simplifies final report generation.
- Reduces autopsy duration and cost
- Has use cases such as “within mortuary” and “educational purposes”
- Although needs extensive training
- Decelerates the inspection, but accelerates autopsy

Methods and Materials

- We propose a **novel report generation workflow**.
- We introduce a multi-device system using **mixed-reality** to access data and **document findings** on a digital board (Fig. 1 - Middle) . These functionalities are based on our previous mixed-reality autopsy operation room (Fig. 1 - Left) [3].
- The proposed system uses AI ChatGPT v4 API for automated report generation (Fig. 5). Fig. 3 shows the functionality of the system.
- We have developed an AI-collaborative editor for user modifications (see Fig 1-right, Fig. 4).

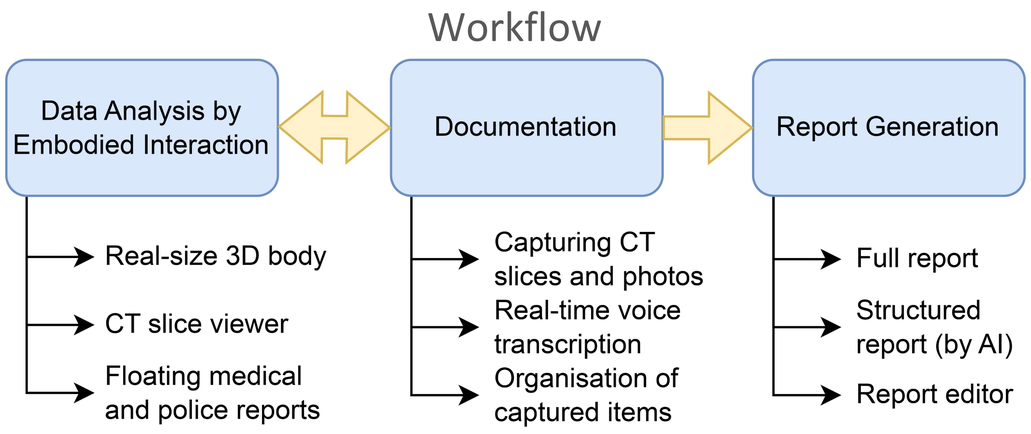

Figure 3. Proposed report generation using Mixed Reality.

Conclusions & Future Directions

We proposed an MR system for forensic autopsy documentation and reporting, offering advantages like less device dependency, reduced memory reliance, and less need for assistance.

However, limitations include a restricted field of view, bulky headsets, and free-hand interaction issues.

Future work will explore its potential for collaborative report generation and interactive educational materials.

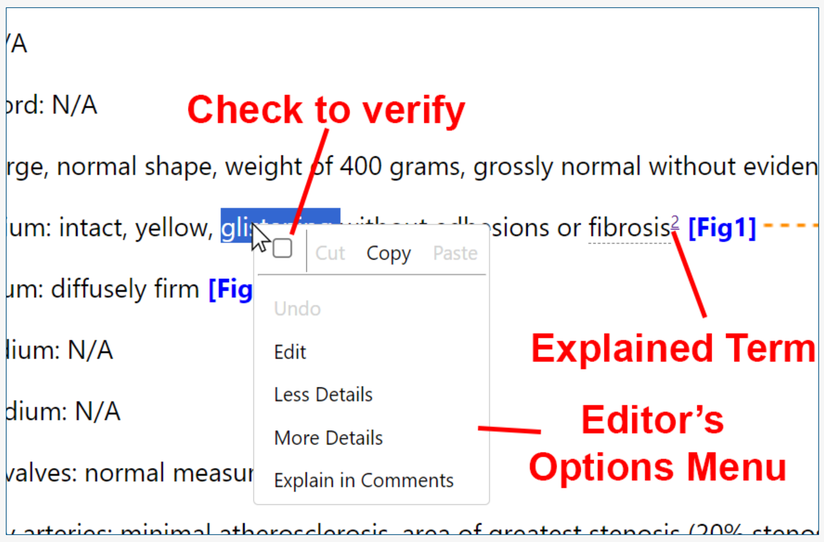

Figure 4. Options available in the editor.

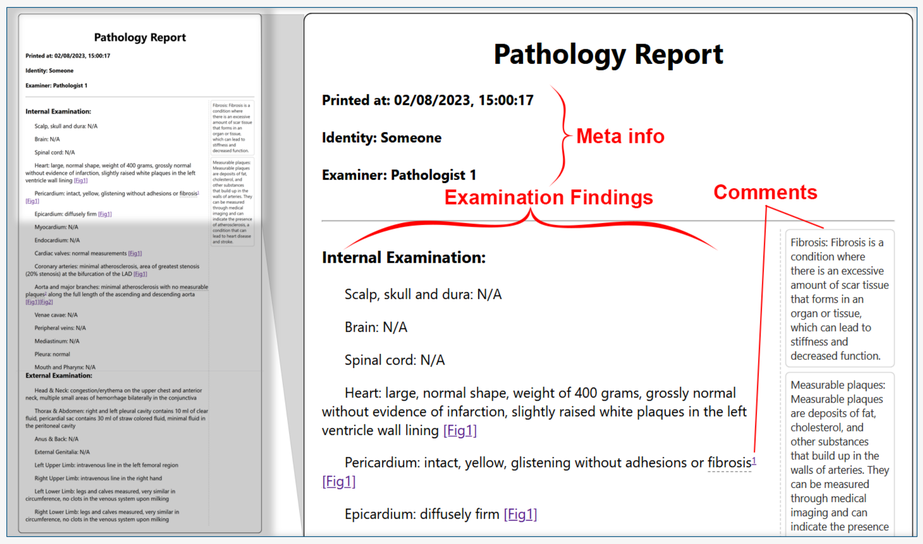

Figure 5. Well-formatted report with clickable links to figures and comments.

Scan the QR Code
to watch the video demonstration

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References

1. R. Affolter, S. Eggert, T. Sieberth, M. Thali, and L. C. Ebert. Applying augmented reality during a forensic autopsy—Microsoft HoloLens as a DICOM viewer. Journal of Forensic Radiology and Imaging, 16:5–8, Mar. 2019. doi: 10.1016/j.jofri.2018.11.003
2. J. Bulliard, S. Eggert, G. Ampanozi, R. Affolter, D. Gascho, T. Sieberth, M. J. Thali, and L. C. Ebert. Preliminary testing of an augmented reality headset as a dicom viewer during autopsy. Forensic Imaging, 23:200417, 2020. doi: 10.1016/j.fri.2020.200417
3. V. Pooryousef, M. Cordeil, L. Besan c¸ on, C. Hurter, T. Dwyer, and R. Bassed. Working with forensic practitioners to understand the opportunities and challenges for mixed-reality digital autopsy. In Proc. CHI, pp. 1–15, 2023. doi: 10.1145/3544548.3580768

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