

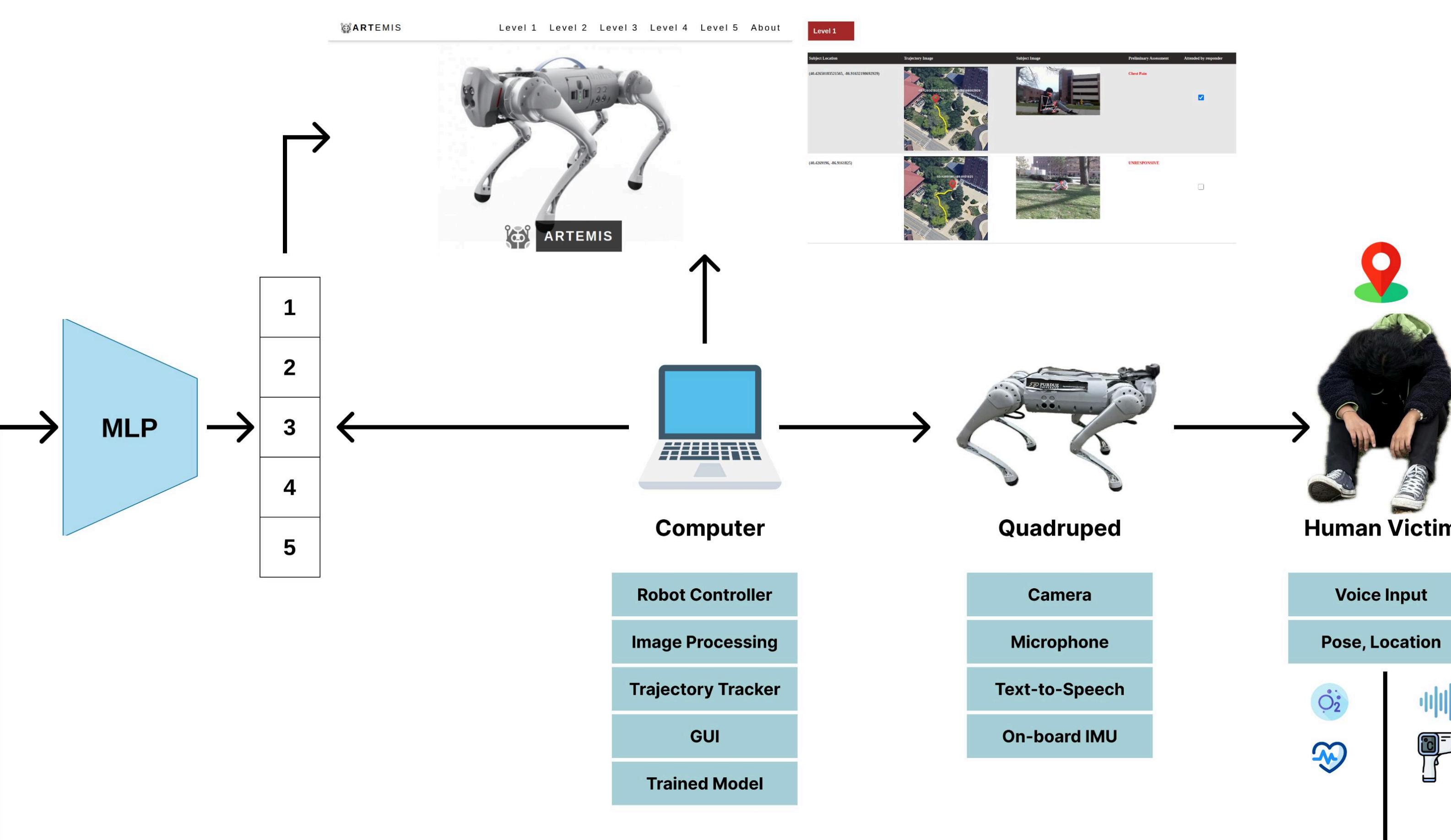
# ARTEMIS: AI-Driven Robotic Triage Labeling and Emergency Medical Information System

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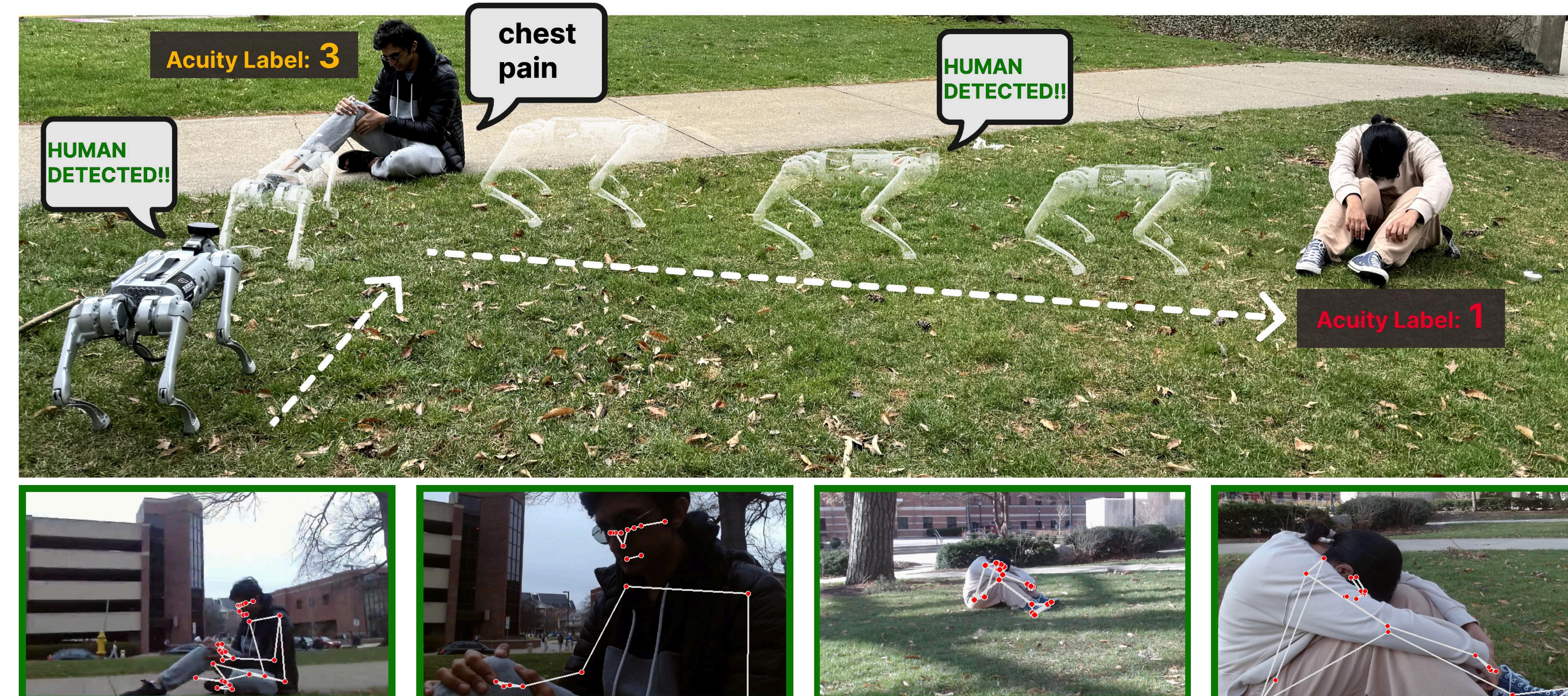
## Introduction

- MCIs (Mass Casualty Incidents): time-critical and priority assistance for those in need is crucial; **Acuity labels (1-5)**: helps first-responders (FRs) attend to victims who need more medical assistance earlier.
- Robots can traverse difficult terrain, access areas inaccessible to humans in an MCI [1, 2].
- Need to send all the necessary information back to FRs in a timely, explained manner along with the importance (acuity), location and path taken by robot to victim.

## Methodology



*"Robotics can assist first-responders in MCIs with triage classification to improve efficiency of attending to victims"*



Paper



Website



Video

## Dataset

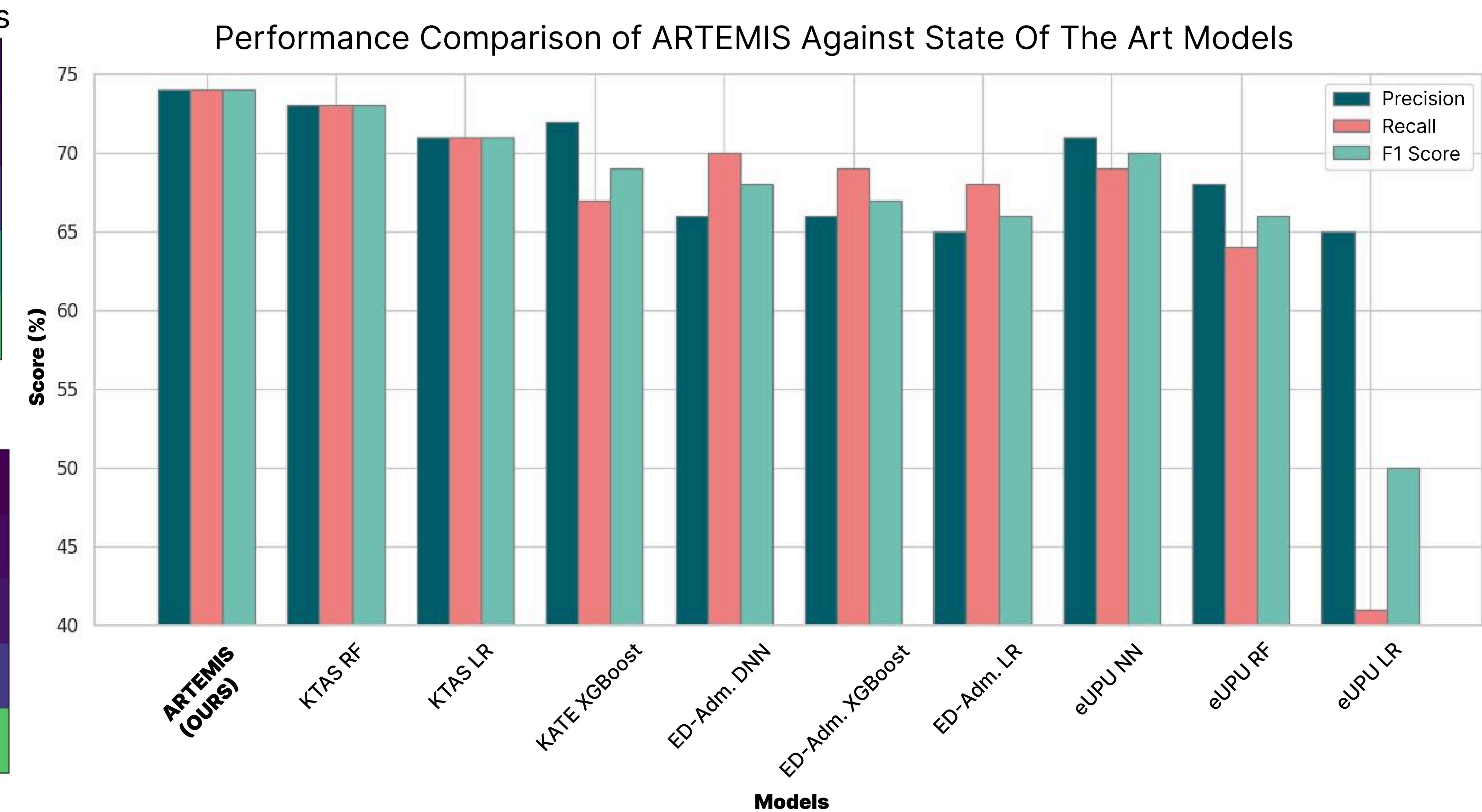
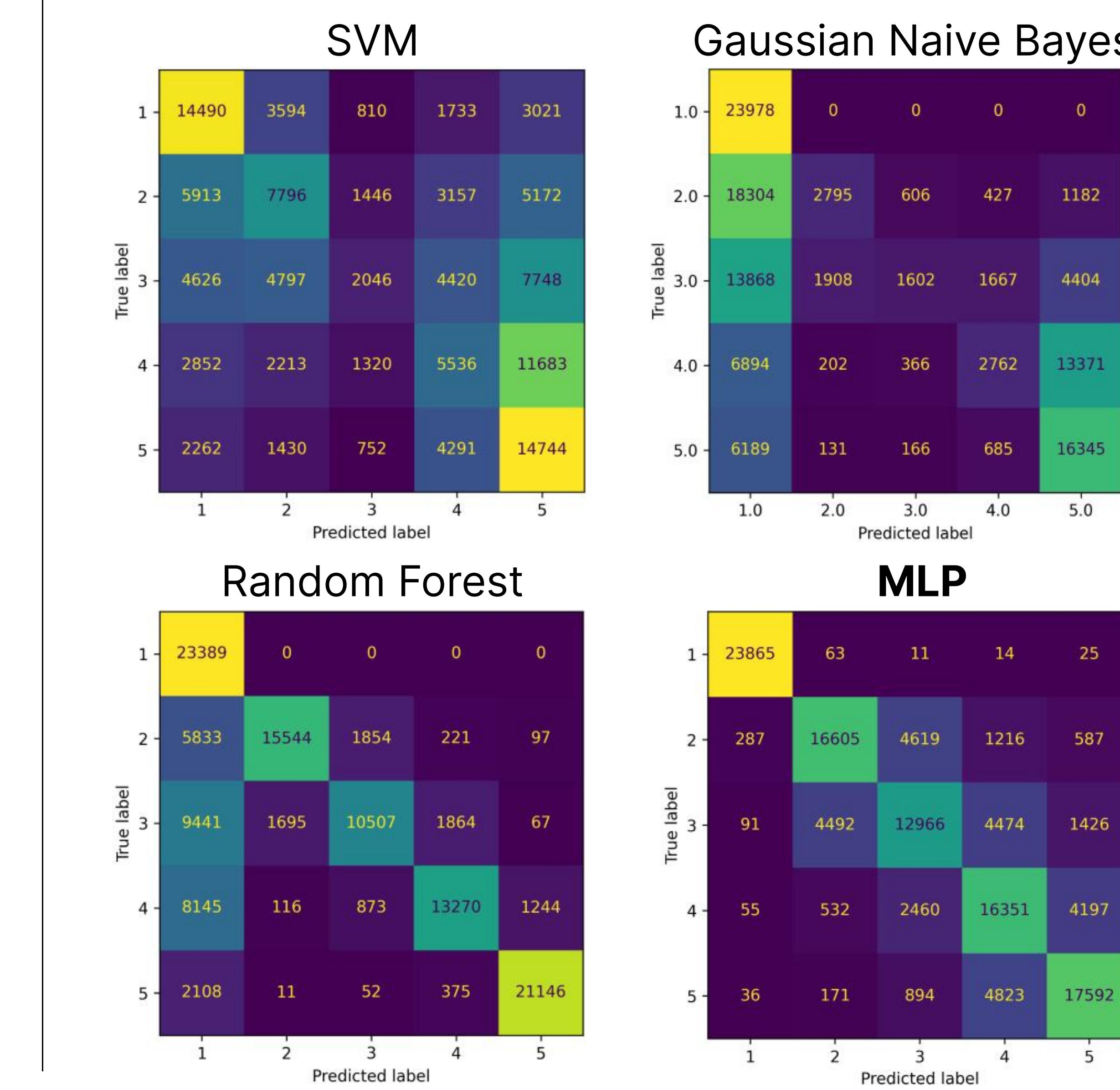
- De-identified dataset (Y-MED) collected from 560,486 Yale Medical School New Haven ED visits [3].
- After cleaning and pre-processing, which included SMOTE [4] augmentation, 589,260 records remained.

## Experiments and Demos

- Different model variations including SVM, Gaussian Naive Bayes, Random Forest, MLP were all tested with some baseline datasets and Y-MED.
- Real-world controlled demos with ARTEMIS tested.
- MCI simulation experiment with quadrupeds performed.

## Robot

- Unitree Go1 Quadruped with ROS1, a vision-based trajectory controller with human pose detection and human voice detection and text-to-speech pipeline.



Gazebo MCI Simulation

## References

- [1] J. Lee, J. Hwangbo, L. Wellhausen, V. Koltun, and M. Hutter, "Learning quadrupedal locomotion over challenging terrain," *Science Robotics*, vol. 5, no. 47, p. eabc5986, 2020.
- [2] G. Valsecchi, R. Grandia, and M. Hutter, "Quadrupedal locomotion on uneven terrain with sensorized feet," *IEEE Robotics and Automation Letters*, vol. 5, no. 2, pp. 1548–1555, 2020
- [3] A. Vântu, A. Vasilescu, and A. Băicoianu, "Medical emergency department triage data processing using a machine-learning solution," *Heliyon*, vol. 9, no. 8, 2023.
- [4] N. V. Chawla, K. W. Bowyer, L. O. Hall, and W. P. Kegelmeyer, "Smote: synthetic minority over-sampling technique," *Journal of artificial intelligence research*, vol. 16, pp. 321–357, 2002.