

REAL-TIME THERMAL COMFORT PREDICTION USING WEARABLE SENSORS

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OBJECTIVE

To predict real-time thermal preference using physiological and environmental parameters

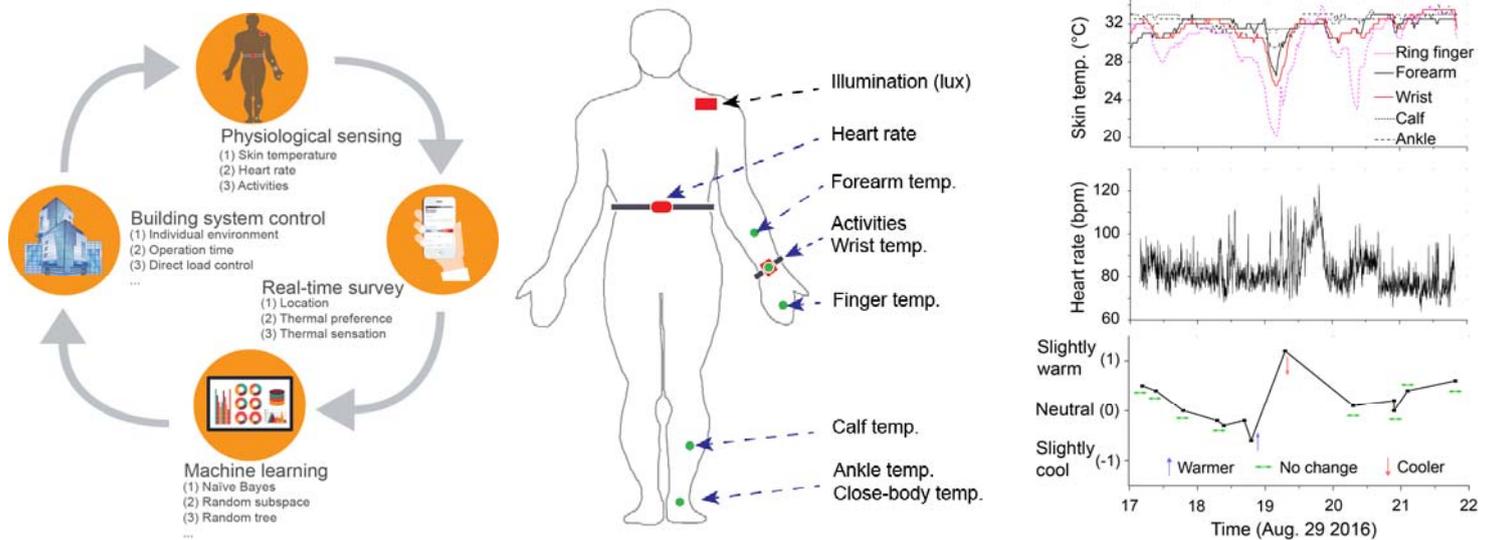
METHODOLOGY

Subjects: Females (n=8), males (n=8)

Test period: 2 wk, 20 hr/day

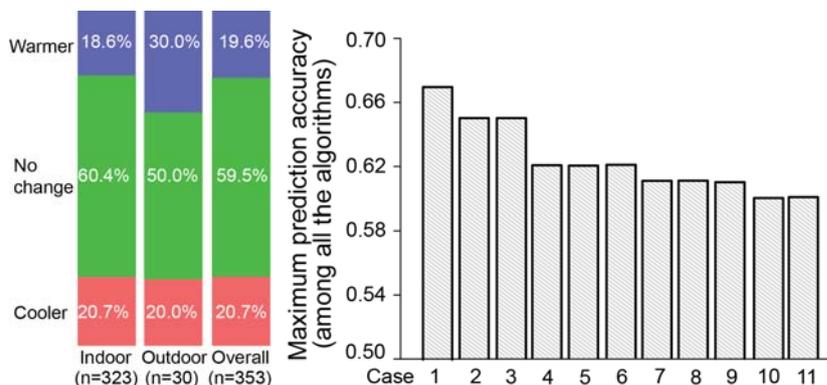
Parameters: Skin temperature, heart rate, activities, illuminance, meteorological data

Algorithms: Bayes net, naïve Bayes, logistic, MLP, AdaBoost, random subspace, decision stumps, J48, random tree, random forest



PRELIMINARY RESULTS

- During the two weeks occupants prefer “warmer” or “cooler” conditions ~ 40% of the time
- The average prediction accuracy for thermal preference is 60% - 70%
- Skin temperatures and derivatives are the most important indicators for thermal preference



Case 1: T_wrist, T_ankle, T_calf, T_finger, Tgrad_finger, Tgrad_arm, heart rate (HR), HRgrad, time (morning or afternoon)

Case 2: T_wrist, T_ankle, T_arm, T_calf, T_finger, T_close-body, (T_finger - T_wrist), Tgrad_finger, Tgrad_arm, HR, HRgrad, location (Loc), time

Case 3: T_wrist, T_ankle, T_arm, T_calf, T_finger, T_close-body

Case 4: T_ankle, Loc, time

Case 5: T_arm, Loc, time

Case 6: T_finger, Loc, time

Case 7: T_wrist, Loc, time

Case 8: T_close-body, Loc, time

Case 9: T_finger, T_wrist, (T_finger - T_wrist), Loc, time

Case 10: T_calf, Loc, time

Case 11: T_finger, T_arm, (T_finger - T_wrist), Loc, time

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