

# A Scalable Low-Cost Solution to Provide Personalised Home Heating Advice

Alex Rogers, Reuben Wilcock, Siddhartha Ghosh and N. R. Jennings

Agents, Interaction, and Complexity Research Group  
School of Electronics and Computer Science  
University of Southampton

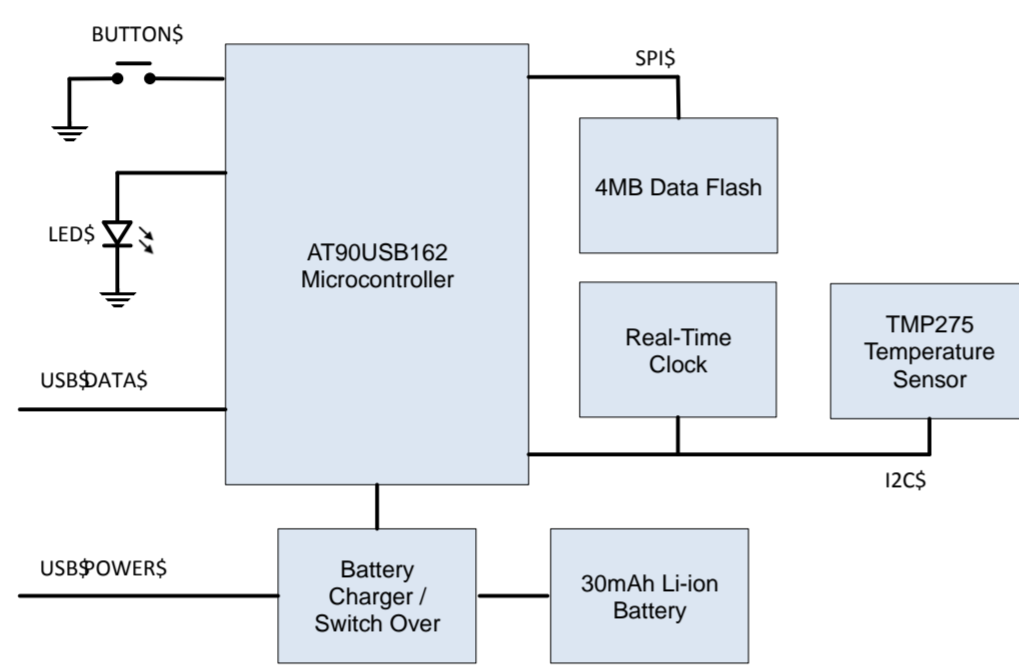
## MyJoulo

MyJoulo provides personalised home heating advice to households at scale and minimal marginal cost.

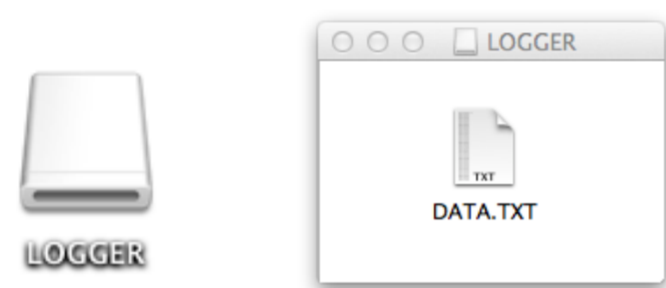
- Order Joulo logger from website
- Record temperature at thermostat for one week
- Upload data and receive personalised energy analysis

## Joulo Temperature Logger

- Embedded microcontroller
- USB interface in firmware
  - HID for configuring
  - Mass storage for user
- No driver required
- Minimal user interface (one button and one LED)



- Logger records 2 min temperature measurements ( $\pm 0.2^\circ\text{C}$ ) for 7 days
- Appears as flash drive when plugged into USB port

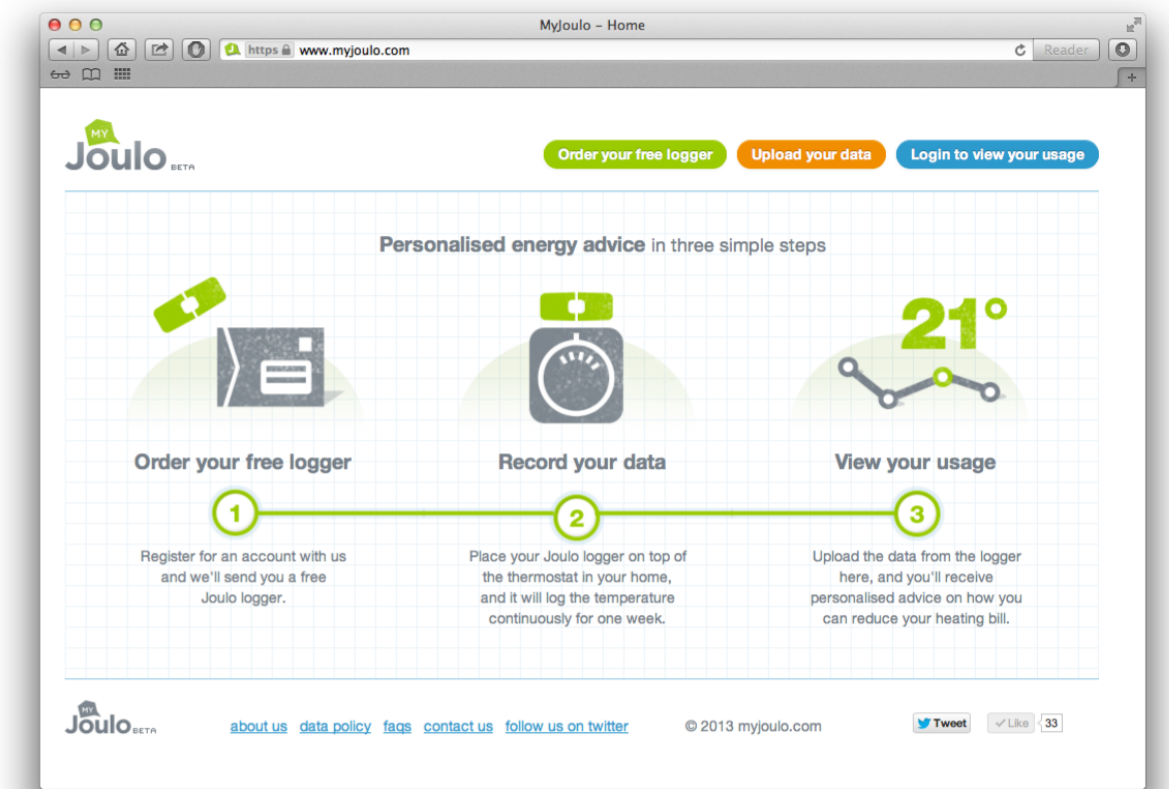


## Trial Deployment

Trial conducted with 750 users from Dec 2012 to April 2013.

Users signed up from an open website.

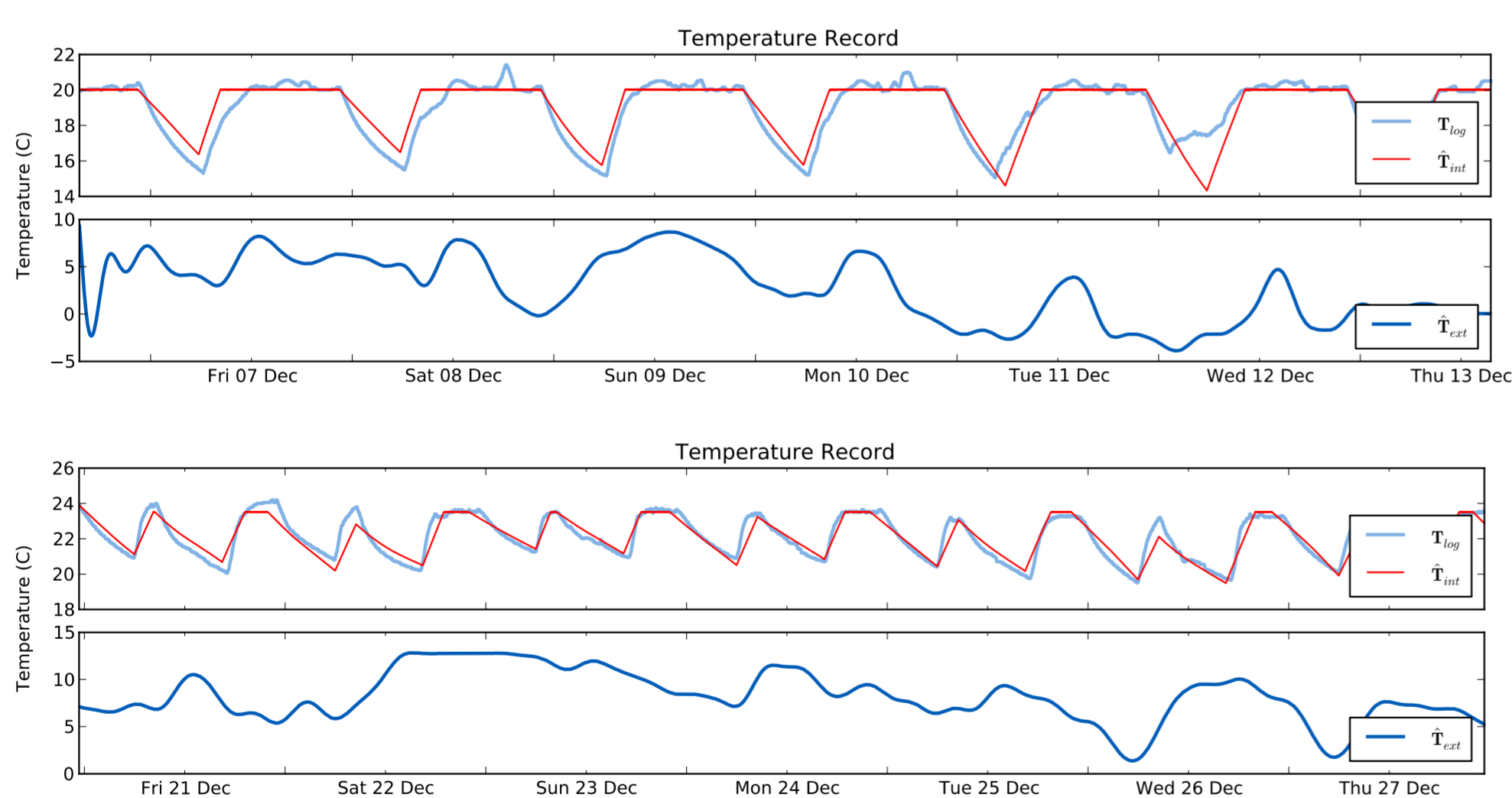
Sent Joulo logger in box with return mailing bag.



## Thermal Modelling and Data Analysis

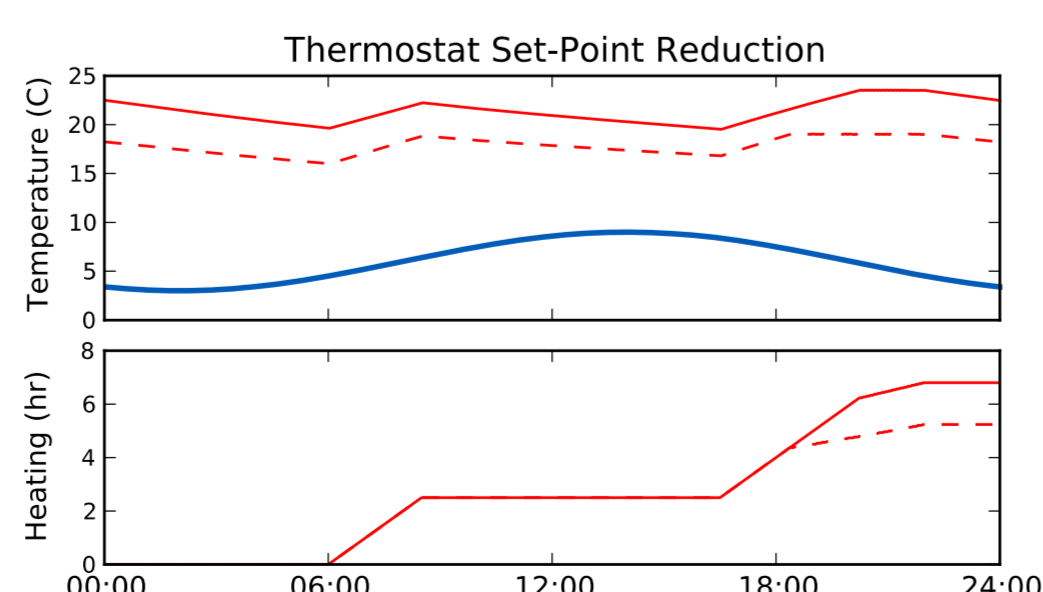
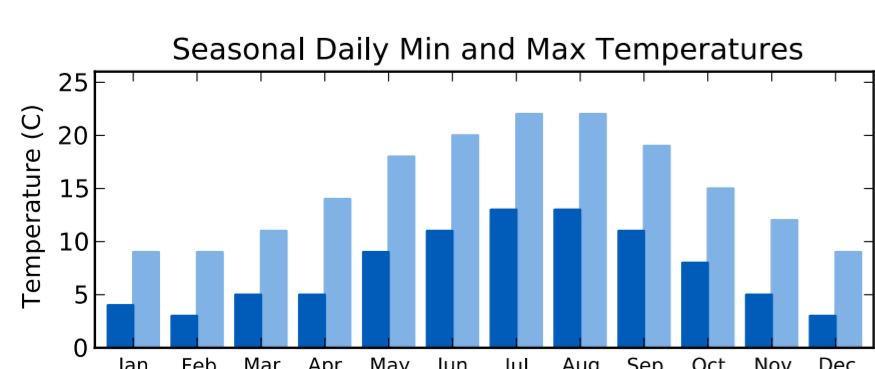
Build parameterised thermal model of a home heating system and user operation.

- Heater output and thermal leakage
- Thermostat set-point and timer settings

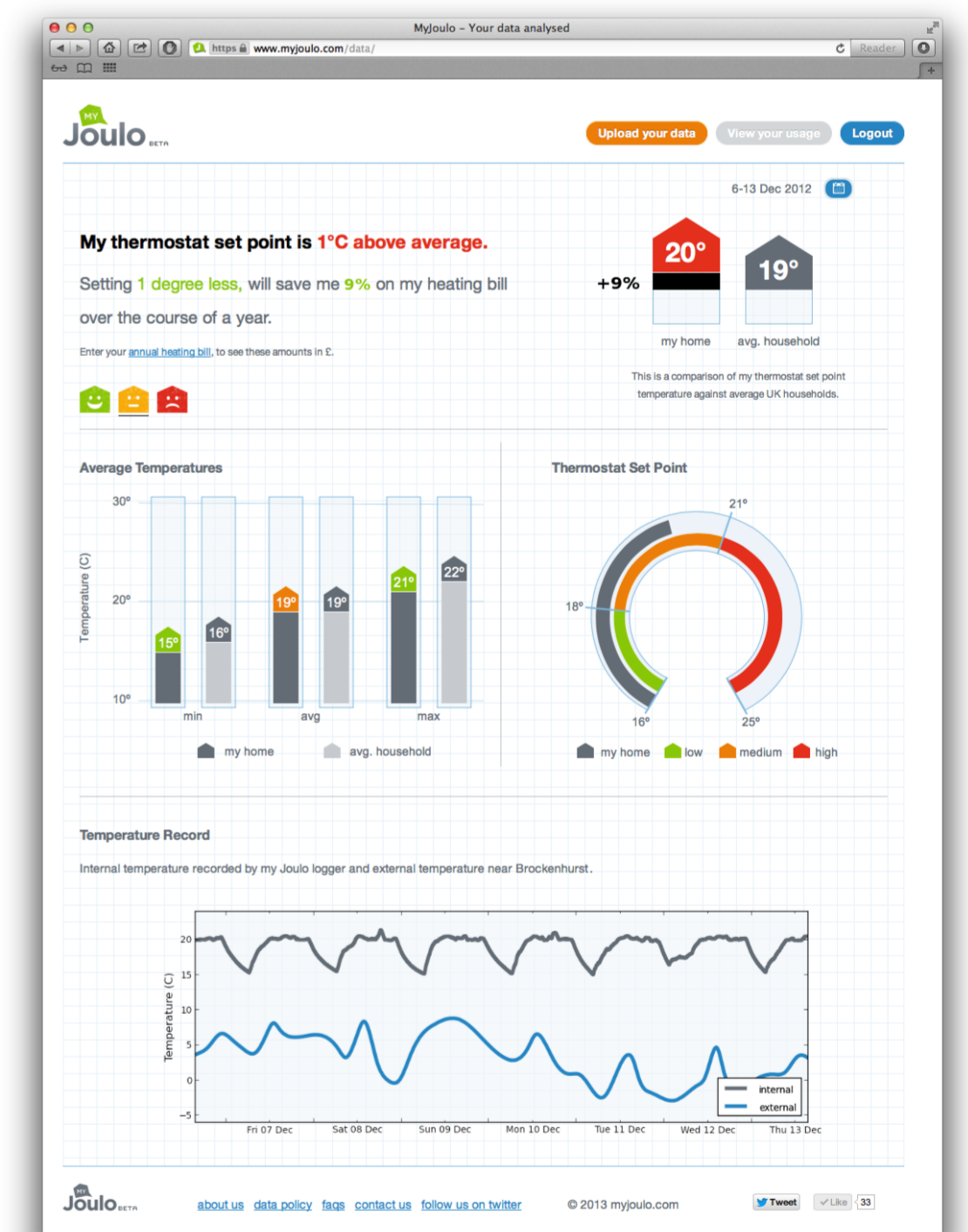
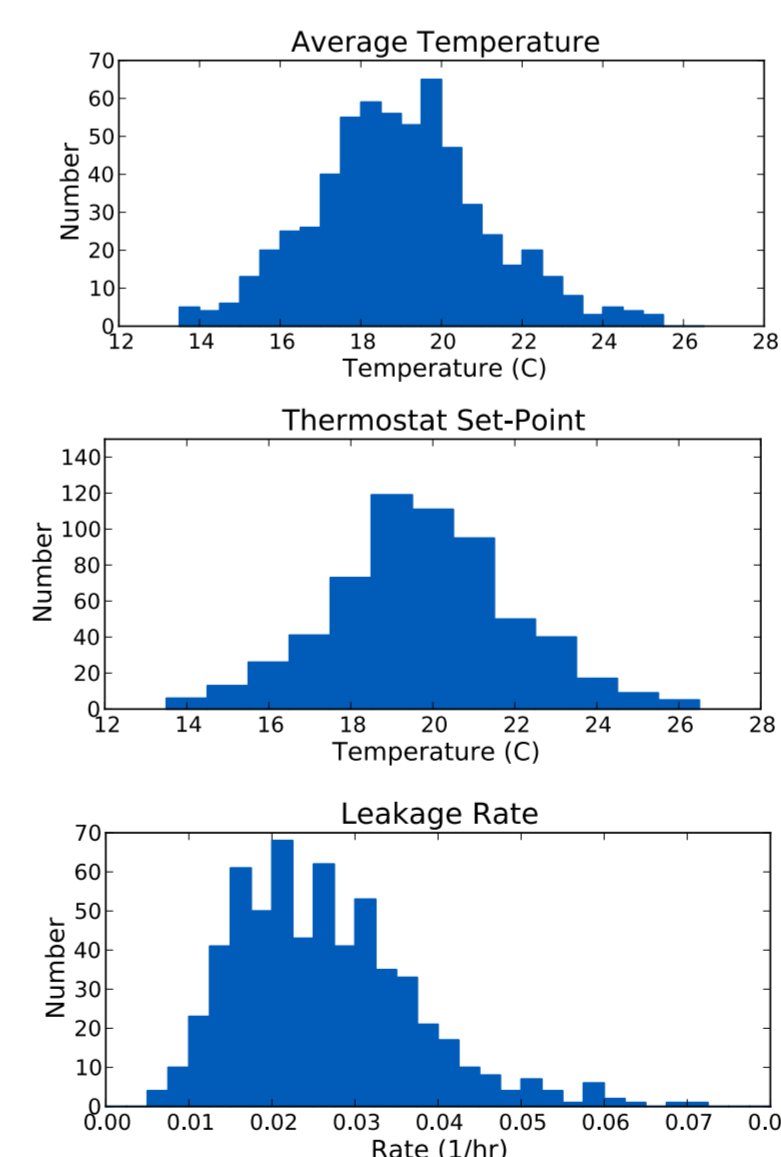


Simulate seven month heating period with modified operational parameters to generate saving estimate for feedback.

Use seasonal data to generate typical daily external temperature profiles.



Feedback provided on reduced thermostat setting.



## Future Work

- Extending analysis to recognise inadequate home insulation and poorly sited thermostats.
- Completed temperatures survey for DECC in April 2013.
  - Talking to ETI to do similar in 2014.
- Exploring commercialisation opportunities with energy companies and licensing opportunities for the logger design.