

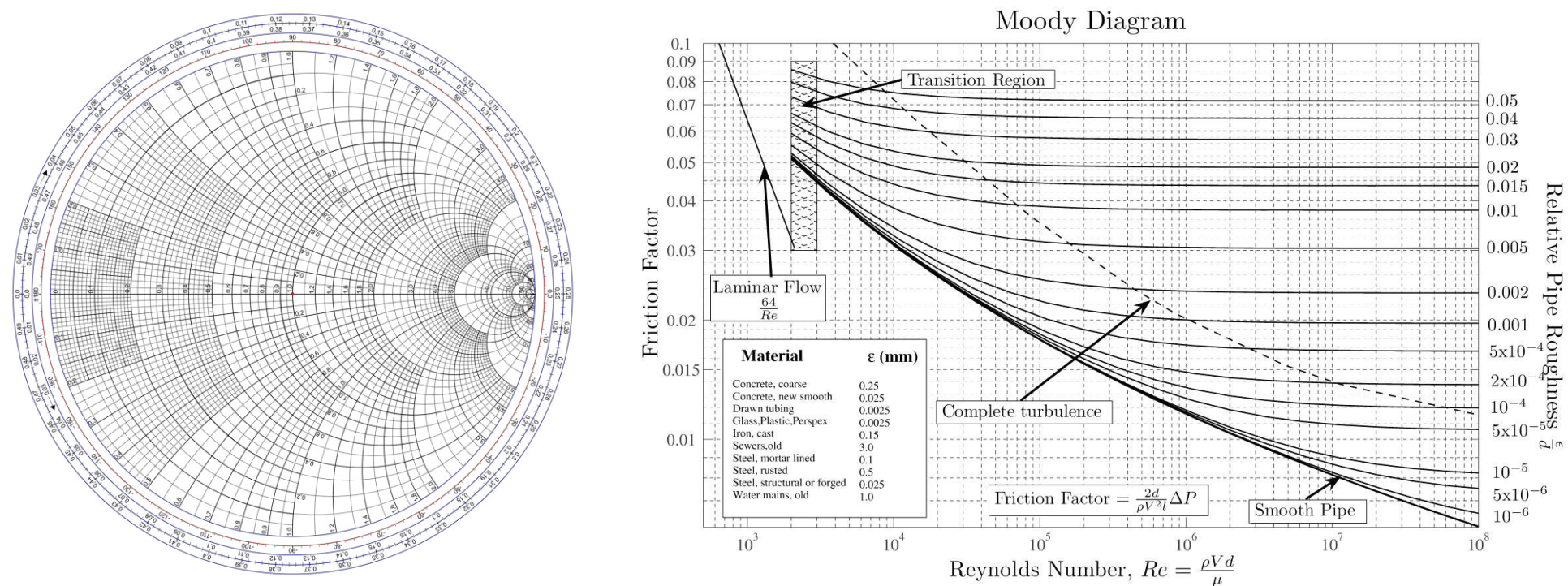
# PhyNOMOnal – Generalized Physical Nomograms

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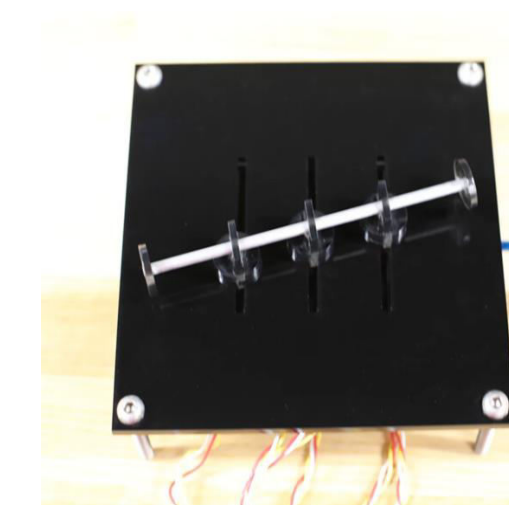
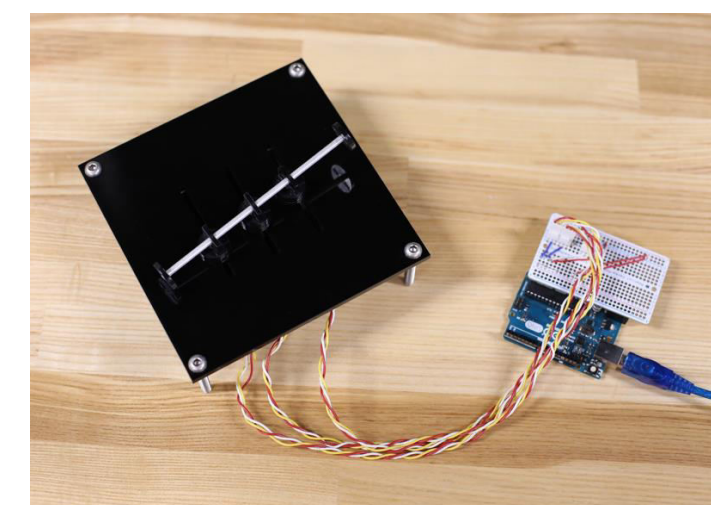
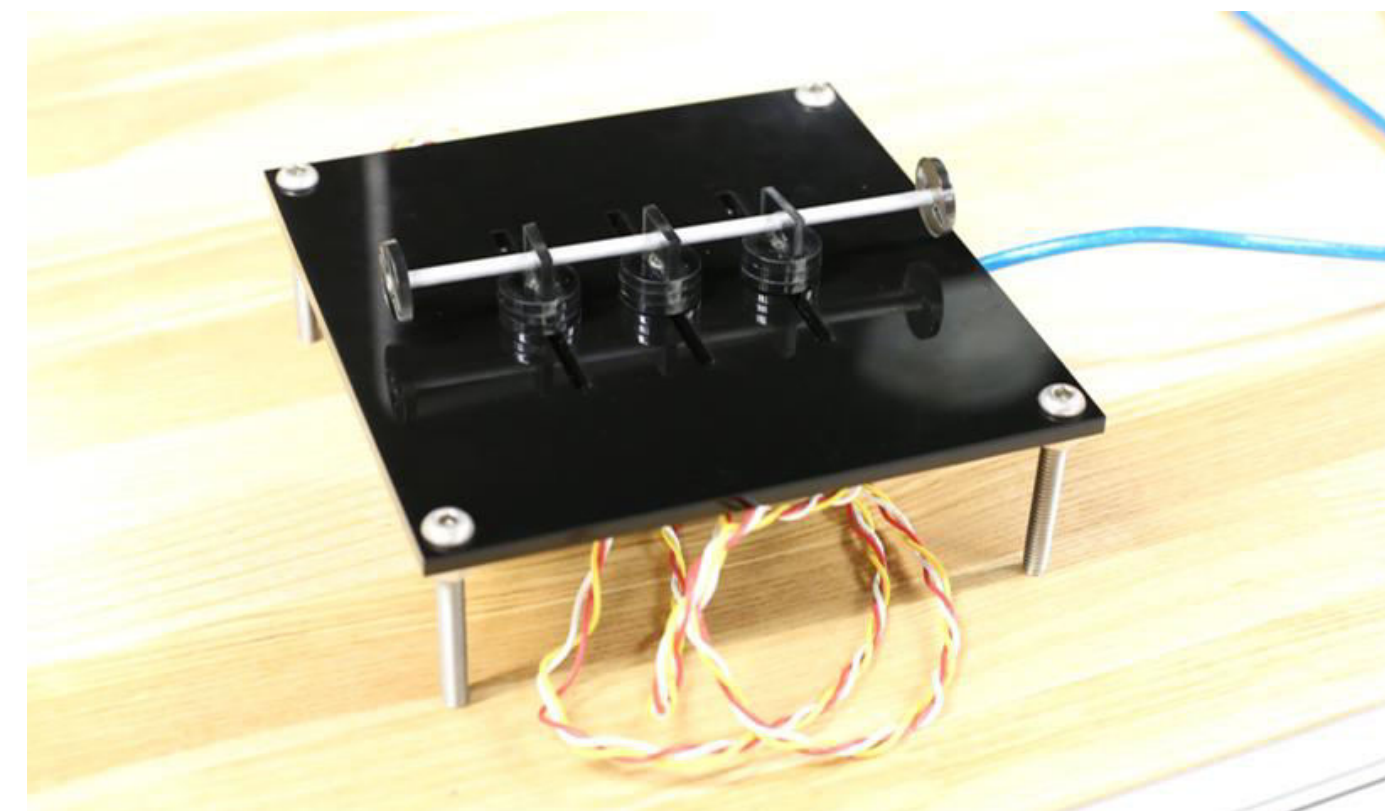
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## Background

- A graphical calculating device that allows the approximate graphical computation of a mathematical function.
- Frequently used in engineering



## Tangible User Interface



Micro Controller  
(Arduino Uno)

Linear Potentiometer

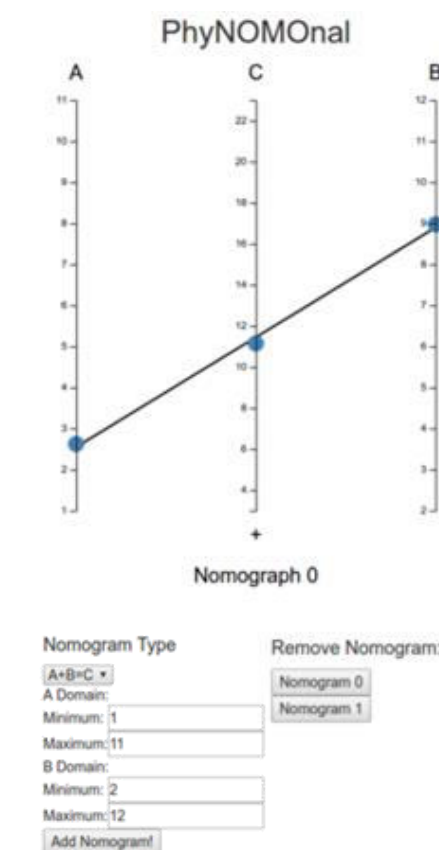
Linear Potentiometer

(Multiplexer)

(Rotary  
Potentiometer)

- Arduino Uno as Micro Controller
- Use Multiplexer for passing multiple analog reading to Micro Controller
- Linear potentiometer (slider) for representing/reading linear scale in nomograms
- Rotary potentiometer (in combination with slider) for representing/reading non-linear scale in nomograms

## Graphical User Interface



- Allows user choosing different operations including summation, multiplication, subtraction and division
- Capable of adding multiple modules and link variables between different modules (not implemented in physical nomograms yet)
- Synchronized with the physical nomogram

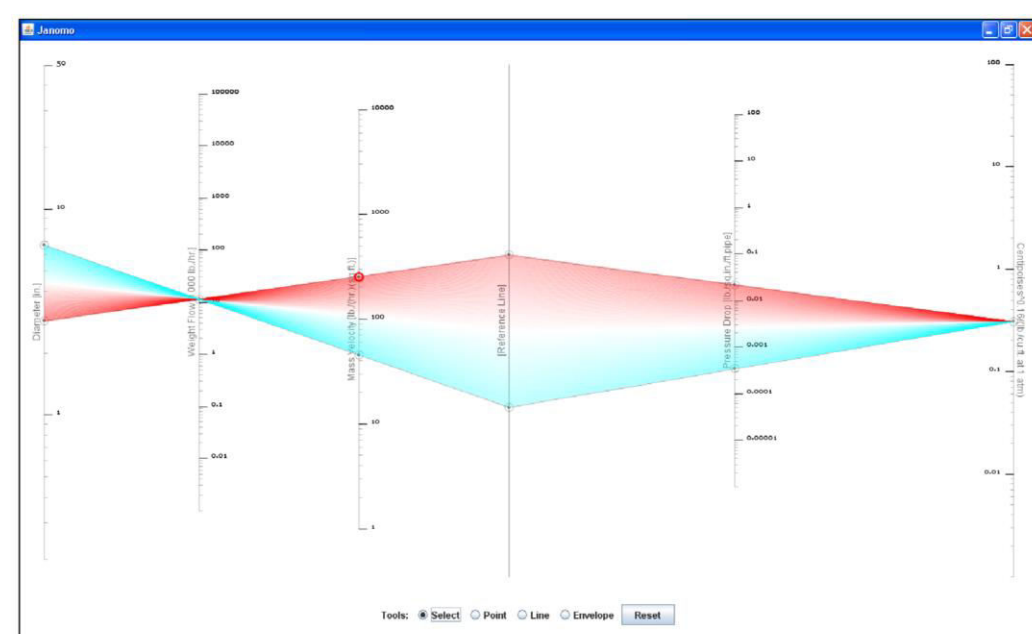
## Problem

- Nomograms generally require users to trace the lines on the diagram;
- They can be hard to use;
- It is not easy to compare results in nomograms;
- Nomograms are not universal, different nomograms represent different equations.

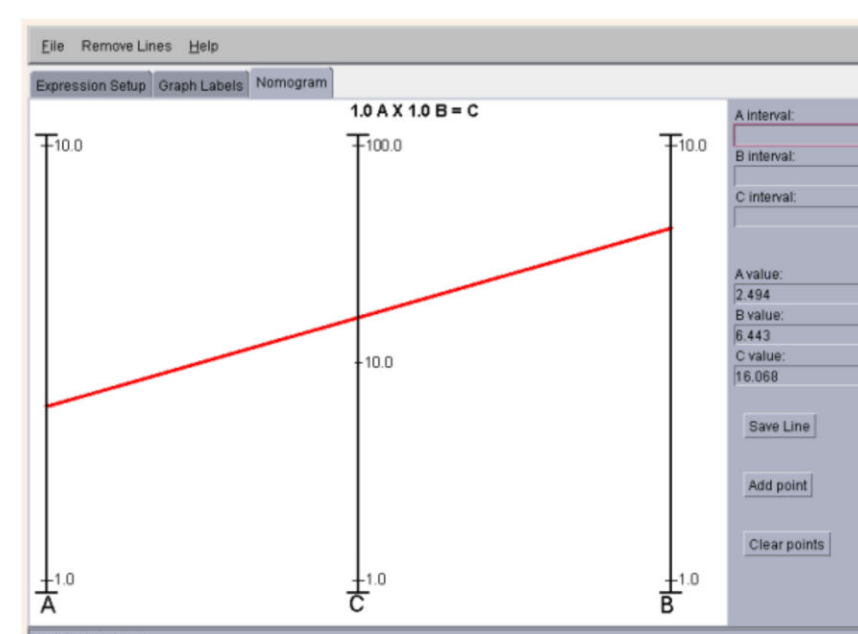
## Results

- We build physical nomograms to allow user to better interact with equations and explore the possible results.
- The Graphical User Interface allows user to customize the types of operations they are interested in.
- The Tangible User Interface gives a more intuitive feedback and more fun in exploration.

## Related Work



M. Howison



T.B. Jones et al.

## Future Work

- More Generalized nomogram
- Update algorithms to incorporate non-linear scales in nomograms.
- Come up easier way of customize different scales for better user experience.
- User studies for studying how physical nomograms would improve the user's interaction with equations