COMP 3981: Project Description (Part #1)

Problem Formulation and Graphical User Interface (GUI) Implementation

State Representation:

Black Marbles at $[x_1, y_1; x_2, y_2; x_3, y_3; \ldots \ldots \ldots \quad x_{14}, y_{14}.]$ 8

White Marbles at $[x_1, y_1; x_2, y_2; x_3, y_3; \ldots \ldots \ldots \quad x_{14}, y_{14}.]$

Initial State: (For visuals, please see end of document)

	Black Marbles [location, marbles lost]	White Marbles [location, marbles lost]
Standard Formation	$[G3, G4, G5, H1, H2, H3, H4$ $H5, H6, I1, I2, I3, I4, I5 ; 0 \text{ lost}]$	$[A5, A6, A7, A8, A9, B4, B5$ $B6, B7, B8, B9, C5, C6, C7 ; 0 \text{ lost}]$
Belgian Daisy Formation	$[G2, G3, H1, H2, H3, I1, I2,$ $A8, A9, B7, B8, B9, C7, C8 ; 0 \text{ lost}]$	$[A5, A6, B4, B5 , B6, C4, C5$ $G5, G6, H4, H5, H6, I4, I5 ; 0 \text{ lost}]$
German Daisy Formation	$[F2, F3, G1, G2, G3, H1, H2$ $B8, B9, C7, C8, C9, D7, D8 ; 0 \text{ lost}]$	$[B4, B5, C3, C4, C5, D3, D4$ $F6, F7, G5, G6, G7, H5, H6; 0 \text{ lost}]$

Goal Test:

Black Marbles: $[x_1, y_1; x_2, y_2; x_3, y_3; \ldots \ldots \ldots \quad x_8, y_8 ; 6 \text{ lost}]$

or

White Marbles: $[x_1, y_1; x_2, y_2; x_3, y_3; \ldots \ldots \ldots \quad x_8, y_8 ; 6 \text{ lost}]$

Actions (For visuals please see end of document

| #Marbles	Alignment of marbles	Actions (Given current state x_n, y_n)	Resulting State
1	N/A	*Move* towards V_1	marble at $(x - 1_n, y_n)$
1	N/A	*Move* towards V_2	marble at $(x - 1_n, y + 1_n)$
1	N/A	*Move* towards V_3	marble at $(x_n, y + 1_n)$
1	N/A	*Move* towards V_4	marble at $(x + 1_n, y_n)$
1	N/A	*Move* towards V_5	marble at $(x + 1_n, y - 1_n)$
1	N/A	*Move* towards V_6	marble at $(x_n, y - 1_n)$
2	Horizontal	Move broadside towards V_1	marbles at $(x - 1_n, y_n \; ; \; x - 1_n, y_n)$
2	Vertical	Move inline towards V_1	marbles at $(x - 1_n, y_n \; ; \; x - 1_n, y_n)$
2	Horizontal	*Move broadside* towards V_2	marbles at $(x - 1_n, y + 1_n \; ; \; x - 1_n, y + 1_n)$
2	Vertical	*Move inline* towards V_2	marbles at $(x - 1_n, y + 1_n \; ; \; x - 1_n, y + 1_n)$
2	Horizontal	Move inline towards V_3	marbles at $(x_n, y + 1_n \; ; \; x_n, y + 1_n)$
2	Vertical	*Move broadside* towards V_3	marbles at $(x_n, y + 1_n \; ; \; x_n, y + 1_n)$
2	Horizontal	*Move broadside* towards V_4	marbles at $(x + 1_n, y_n \; ; \; x + 1_n, y_n)$
2	Vertical	M*ove inline towards* V_4	marbles at $(x + 1_n, y_n \; ; \; x + 1_n, y_n)$
2	Horizontal	*Move broadside towards* V_5	marbles at $(x + 1_n, y - 1_n \; ; \; x + 1_n, y - 1_n)$
2	Vertical	*Move inline towards* V_5	marbles at $(x + 1_n, y - 1_n \; ; \; x + 1_n, y - 1_n)$
2	Horizontal	Move inline towards V_6	marbles at $(x_n, y - 1_n \; ; \; x_n, y - 1_n)$
2	Horizontal	Move broadside towards V_6	marbles at $(x_n, y - 1_n \; ; \; x_n, y - 1_n)$
3	Horizontal	Move broadside towards V_1	marbles at $(x - 1_n, y_n \; ; \; x - 1_n, y_n \; ; \; x - 1_n, y_n)$
3	Vertical	Move inline towards V_1	marbles at $(x - 1_n, y_n \; ; \; x - 1_n, y_n \; ; \; ; \; x - 1_n, y_n)$
3	Horizontal	*Move broadside* towards V_2	marbles at $(x - 1_n, y + 1_n \; ; \; x - 1_n, y + 1_n, ; \; x - 1_n, y + 1_n)$
3	Vertical	*Move inline* towards V_2	marbles at $(x - 1_n, y + 1_n \; ; \; x - 1_n, y + 1_n \; ; \; x - 1_n, y + 1_n)$
3	Horizontal	Move inline towards V_3	marbles at $(x_n, y + 1_n \; ; \; x_n, y + 1_n \; ; \; x_n, y + 1_n)$
3	Vertical	*Move broadside* towards V_3	marbles at $(x_n, y + 1_n \; ; \; x_n, y + 1_n \; ; \; x_n, y + 1_n)$
3	Horizontal	*Move broadside* towards V_4	marbles at $(x + 1_n, y_n \; ; \; x + 1_n, y_n \; ; \; x + 1_n, y_n)$
3	Vertical	M*ove inline* towards V_4	marbles at $(x + 1_n, y_n \; ; \; x + 1_n, y_n \; ; \; x + 1_n, y_n)$
3	Horizontal	*Move broadside* towards V_5	marbles at $(x + 1_n, y - 1_n \; ; \; x + 1_n, y - 1_n \; ; \; x + 1_n, y - 1_n)$
3	Vertical	*Move inline* towards V_5	marbles at $(x + 1_n, y - 1_n \; ; \; x + 1_n, y - 1_n \; ; \; x + 1_n, y - 1_n)$
3	Horizontal	Move inline towards V_6	marbles at $(x_n, y - 1_n \; ; \; x_n, y - 1_n \; ; \; x_n, y - 1_n)$
3	Horizontal	Move broadside towards V_6	marbles at $(x_n, y - 1_n \; ; \; x_n, y - 1_n \; ; \; x_n, y - 1_n)$

Resources:
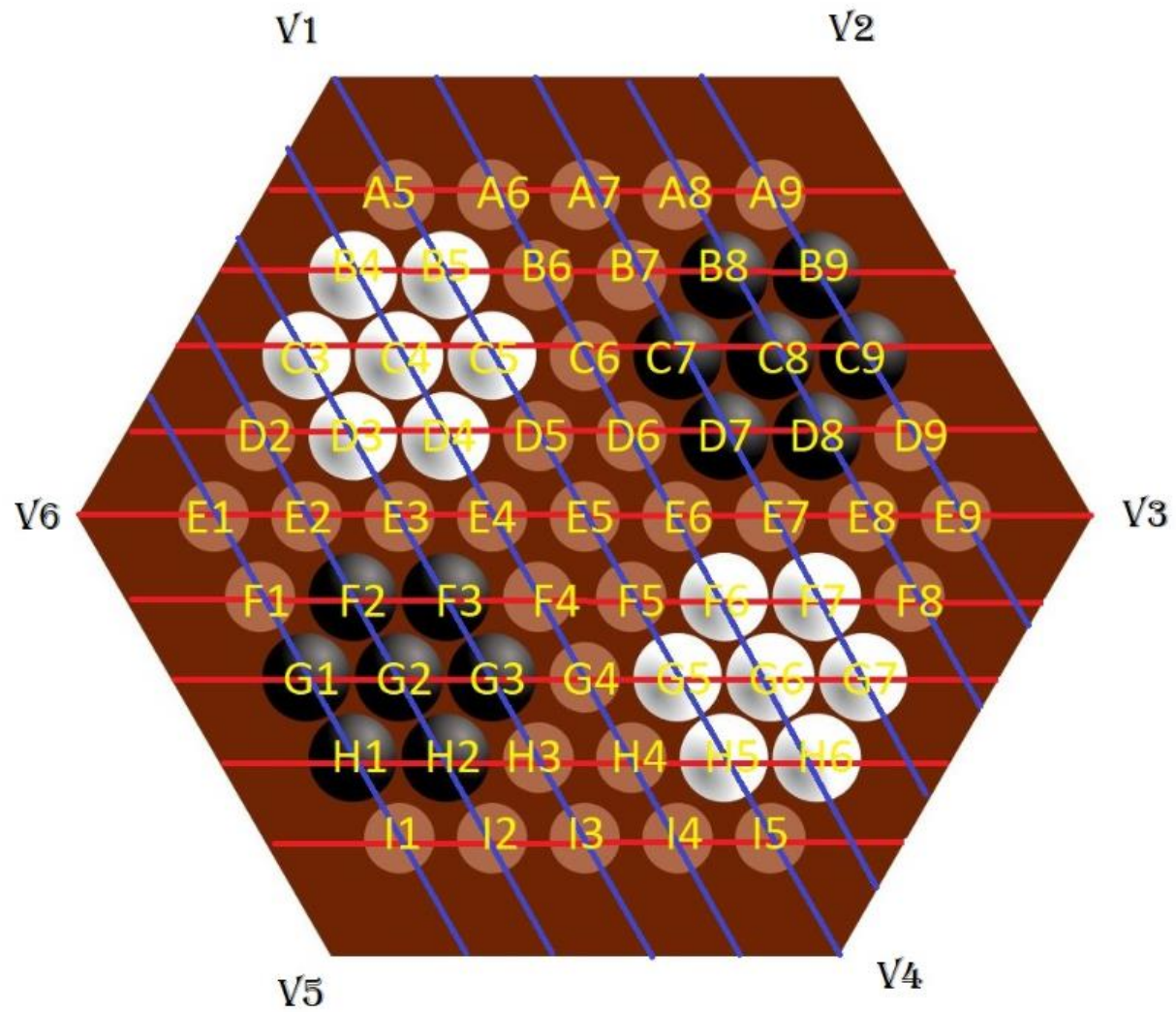
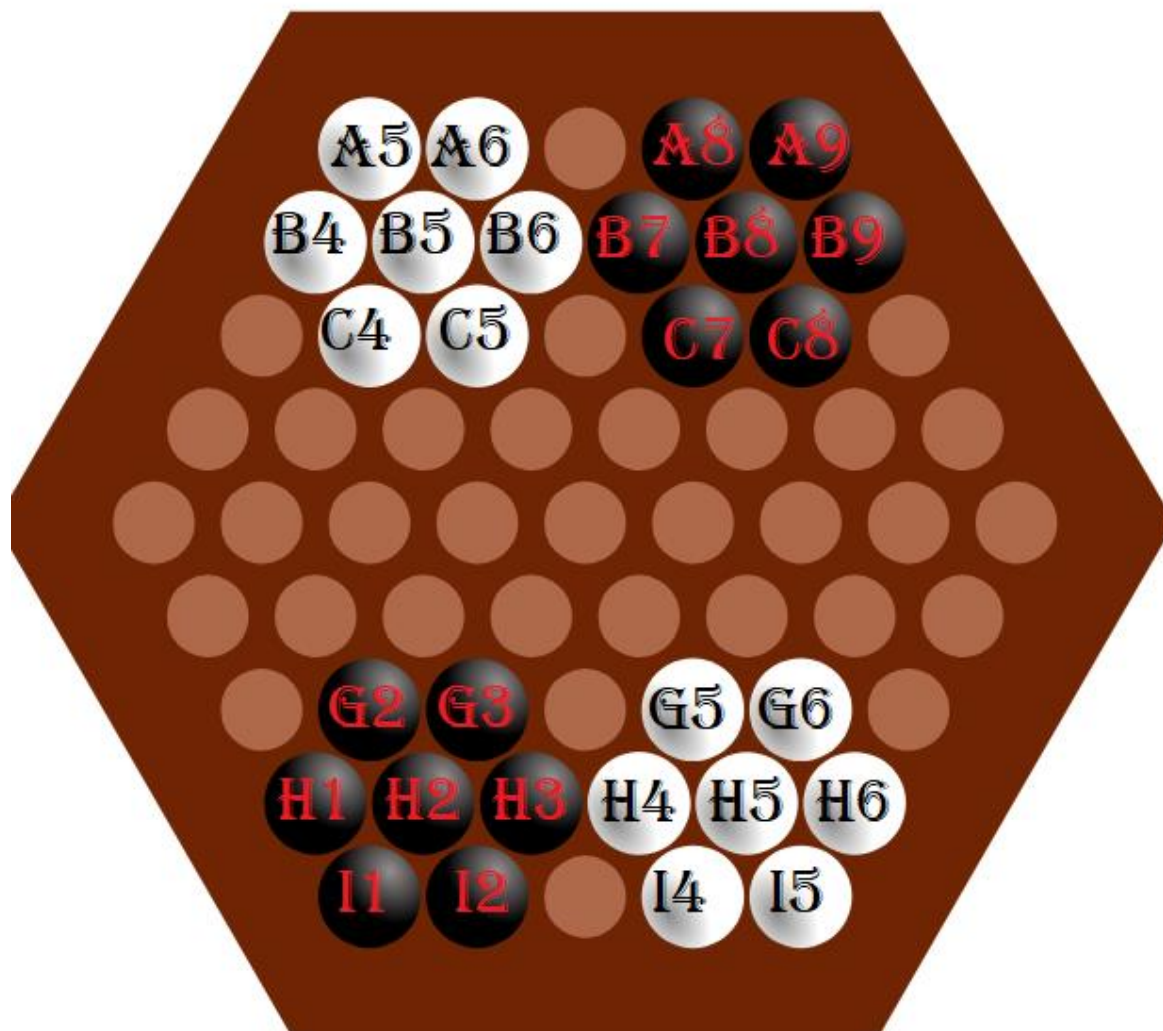*Figure 1- German Daisy layout with coordinates and vectors.*
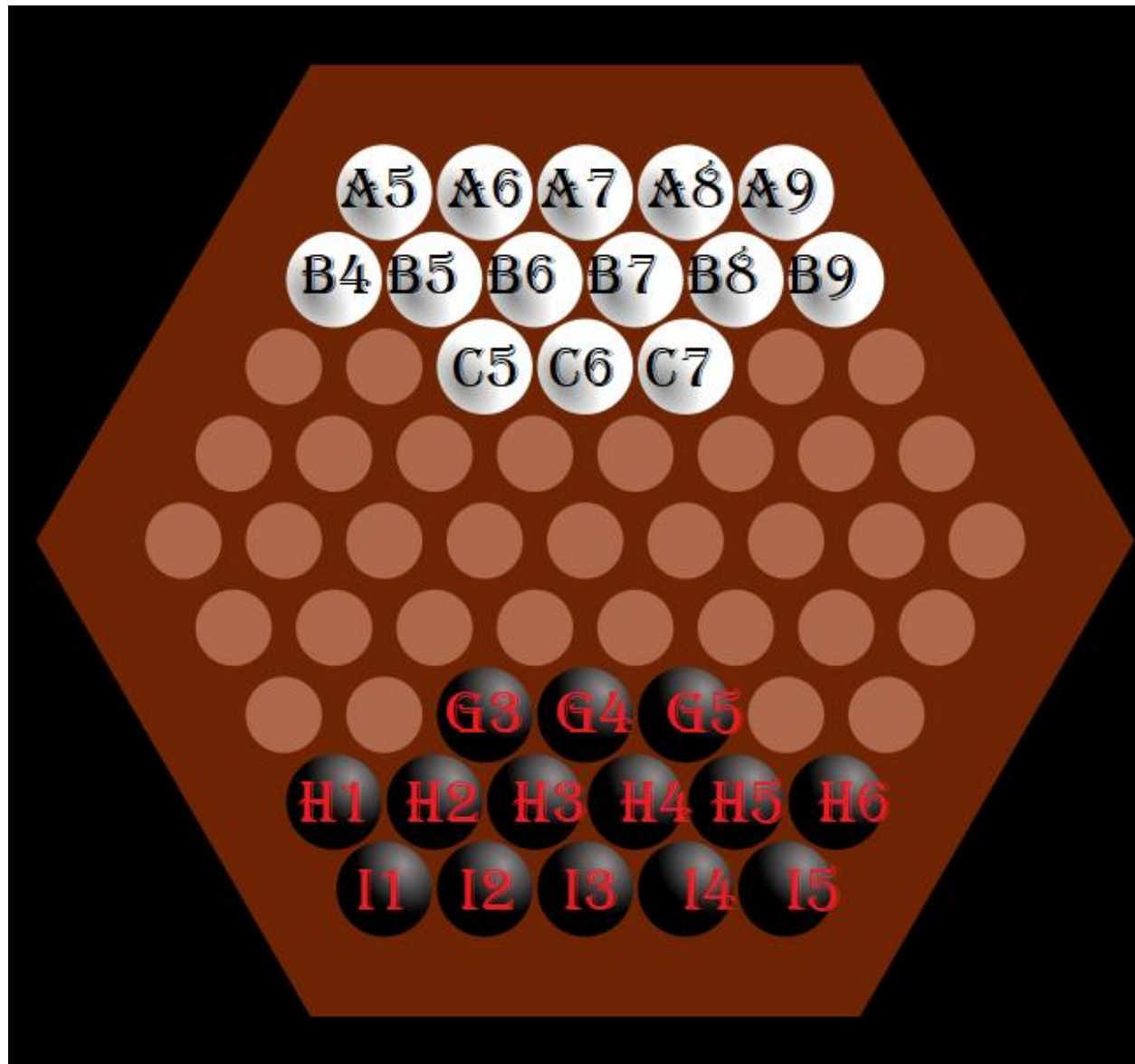
Figure 2- Belgian Daisy Layout with coordinates.

Figure 3- Standard Layout of the board with coordinates.