Add two strings representing numbers

Need:

\[
\begin{align*}
n &= '8877463' \quad \% \text{A number as a string} \\
\text{length}(n) &\quad \% \text{The number of digits in } n \\
\text{n(length(n))} &\quad \% \text{The LSD – in this case 3} \\
\text{n(length(n)-i+1)} &\quad \% \text{The } i^{\text{th}} \text{ LSD} \\
n1 &= n(x) - '0' \quad \% \text{Convert a char to a number} \\
s &= n1 + n2 \quad \% \text{Now we can add} \\
\text{mod}(s,10) &\quad \% \text{LSD of the add} \\
\text{floor}(s/10) &\quad \% \text{Carry digit} \\
\text{char}(s+'0') &\quad \% \text{Convert to a char}
\end{align*}
\]
Add two strings representing numbers

S1 =

+ 8 4 2 1 5

S2 =

7 3 6 8 9

S3 =

carry = 0
Add two strings representing numbers

| S1   | 8 | 4 | 2 | 1 |
| S2   | 7 | 3 | 6 | 8 | 9 |

First iteration \((i=1)\):

\[
\text{n1} = \text{S1(\text{length(S1)}-i+1)} - '0';
\]
Add two strings representing numbers

\[
\begin{align*}
S1 = & \quad \begin{array}{c}
8 \\
4 \\
2 \\
1 \\
\end{array} \\
+ & \quad \begin{array}{c}
7 \\
3 \\
6 \\
8 \\
\end{array} \\
\hline
S3 = & \quad \begin{array}{c}
\quad \\
\quad \\
\quad \\
\quad \\
\end{array} \\
\text{carry} = & \quad 0
\end{align*}
\]

First iteration \((i=1)\):

\[
n2 = S2(\text{length}(S2)-i+1)-'0';
\]
Add two strings representing numbers

First iteration ($i=1$):

$$n = n1 + n2 + \text{carry};$$
Add two strings representing numbers

\[ S1 = \begin{array}{cccc} 8 & 4 & 2 & 1 \\
\end{array} \]

\[ + \]

\[ S2 = \begin{array}{cccc} 7 & 3 & 6 & 8 \\
\end{array} \]

\[ \text{S3} = \begin{array}{cccc} \hline \hline \hline \end{array} \]

First iteration (\( i=1 \)):

\[ \text{carry} = \text{floor}(n/10); \]
Add two strings representing numbers

S1 =  
+  
S2 =  

First iteration \((i=1)\):

\[
\text{tmp} = \text{char}\left(\text{mod}(n,10) + '0'\right);
\]
Add two strings representing numbers

S1 =

+  
S2 =

———
S3 =

carry = 1

First iteration (i=1):

S3 = [tmp S3];
Add two strings representing numbers

\[
\begin{array}{c}
S1 =  \\
8 \ 4 \ 2 \ 1 \ 5  \\
+  \\
S2 =  \\
7 \ 3 \ 6 \ 8 \ 9  \\
\hline  \\
S3 =  \\
\text{carry} = 1  \\
\end{array}
\]

Second iteration \((i=2)\):
Add two strings representing numbers.

\[ S1 = \begin{array}{cccc} 8 & 4 & 2 & 5 \\ \end{array} \]
\[ + \]
\[ S2 = \begin{array}{cccc} 7 & 3 & 6 & 8 & 9 \\ \end{array} \]

\[ S3 = \begin{array}{cccc} \phantom{0} & \phantom{0} & \phantom{0} & 4 \end{array} \]

\[ \text{carry} = 1 \]

Second iteration \((i=2)\):

\[ n1 = S1(\text{length}(S1)-i+1)-'0'; \]
Add two strings representing numbers

S1 = 8 4 2 5

+ 

S2 = 7 3 6 9

-----------------

carry = 1

Second iteration (i=2):

\[ n2 = S2(\text{length}(S2)-i+1)-'0'; \]
Add two strings representing numbers

\[
\begin{array}{c}
S1 = \\
\hline \\
| 8 | 4 | 2 | 5 |
\end{array}
\quad + \quad \\
\begin{array}{c}
S2 = \\
\hline \\
| 7 | 3 | 6 | 9 |
\end{array}
\quad = \quad \\
\begin{array}{c}
S3 = \\
\hline \\
| 1 | 0 |
\end{array}
\]

Second iteration \((i=2)\):
\[
n = n1 + n2 + \text{carry};
\]
Add two strings representing numbers

\[
\begin{array}{cccccc}
S1 &=& 8 & 4 & 2 & 5 \\
S2 &=& 7 & 3 & 6 & 9 \\
S3 &=& & & & 4 \\
\end{array}
\]

\[
1 \\ 8 \\ 10
\]

carry = 1

Second iteration (i=2):

carry = floor(n/10);
Add two strings representing numbers

S1 = 8 4 2 5

+ 7 3 6 9

S2 = 7 3 6 9

S3 = 4

carry = 1

Second iteration (i=2):

tmp = char(mod(n,10)+'0');
Add two strings representing numbers

S1 = 

| 8 | 4 | 2 | 5 |

S2 = 

| 7 | 3 | 6 | 9 |

S3 = 

|   |   |   | 0 | 4 |

carry = 1

Second iteration (i=2):

S3 = [tmp S3];
Add two strings representing numbers

\[
\begin{array}{cccccc}
S1 &=& 8 & 4 & 2 & 1 & 5 \\
+ \\
S2 &=& 7 & 3 & 6 & 8 & 9 \\
\hline
S3 &=& & & 0 & 4 & \text{carry} = 1
\end{array}
\]

Third iteration (i=3):