

HAULLELUJAH! A SOLUTION TO PACKING A U-HAUL!

ECE 445 Design Document
TJ Lambert, Nathaniel Stoll, and Zach Wong
Group 4
TA: Stephanie Jaster
February 27th, 2020

1 Introduction

1.1 Objective

<ZnujZ MZ Vhl y{M fjt k nfb` aH aZ{aZx{b'by'Myanx{hm| xl Zt`_xnk` ank Z{n'yWannj'nx'Mjnl` ` hm| xl Zt`_xnk` fMMl b` `nfZxyZMy{n`_jt b` `ank ZSuZnujZ MZ`Mj, My'nl {aZ`k nFZ`2 nxZ` yuZVb`Mj`fSuZnujZ MZ`Mj, My`_b` Xb` `M`Z, `ujWZ`{n`Vj`'ank Z`X| x b` `{aZb`j b`Z{tk Z`Aaby`ank Z` Vh|jX`UZ`{Zk unxM`f j b`Z`MnjZ` Z`Xnxk` nx`uZxk MZI {j b`Z`Man| yZ`{n`y{M`f`M`M`k` b`f`a`1` ` k Zx b`M` Njhl ZSxn|` ajt` Pa`a`k` b`j b`l` j`M`h| {`U`P`O`A` ` k Zx b`M`y`k nFZ`Z`M`a`f`Z`M`M`j`Z`M`y`{`nl` VZ`A`U`A`?`Z`M`y`nl` y` j b`Z`k` nfb` `m`x`j`n`V`M`b` `b`{n`M`Z, `M`X`UZ`{Z`X`ank`Z`M`y`, `Z`j`M`y`u`Z`nu`j`Z`{x`b` ` `n`Z`y`{M`j`b`y`a`{a`Z`b` n, `l`an|`y`Z`anj`X`M`Z`h`y`{`a`Z`{`nu`{, `n`x`Z`M`y`nl` y`b` `M`j`nl` `j`b`{`nl` ` , a`f`u`Z`nu`j`Z`V`any`Z`{n`k` nFZ`A`U`A` AaZyZ`y`{M`b`y`X`n`l`n`{`Z`f`Z`l` `b`V`|`X`Z`u`Z`nu`j`Z`k` nfb` `b` `M`X`n`|`{n`_`{a`Z`B`l` b`Z`X`@`M`Z`y`M`y`, `Z`j`M`y` u`Z`nu`j`Z`k` nfb` ` , nxjX, b`Z`a` `W`h`x`b` ` `n`M`B`3`y`|`X`f`S`b` {a`Z`f`Z`M`Y`U`U`a`N`j`hl`Z`S`{a`Z`Z`, `Z`x`Z`M`{n`M`y` n`_Y`P`a`k` b`j b`l` `u`Z`x`y`nl` y`k` b`x`M`b` ` _x`nk` `V`h`l`|` {x`f`{n`V`h`l`|` {x`f`A`Y`A` `y`t`n`|`V`M`y`Z`Z`S`u`Z`nu`j`Z`M`Z`M`j, `M`y` nl` {a`Z`k` nFZ`a`5`l`Z`n`_`{a`Z`k` n`y`{`X`b`_`b`|`j`{`M`y`i`y`b` `k` nfb` `b`y`_`b`X`b` `M`y`M`Z`M`X`Z`_`b`Z`l`{, `M`{n` y`{n`x`Z`M`X`{x`M`i`y`unx`{t`n`|`x`U`Z`j`nl` `b` `y`a`1` ` k`Z`x`b`M`S`u`Z`nu`j`Z`k` nfb` `{a`Z`b`j`Z`k`y`U`t`x`Z`l`{b` `n`|`{` k` nfb` `{x`|`V`i`y`b`y`{a`Z`y`Z`V`h`l`X`k`n`y`{`u`n`u`|`j`M`k` nfb` `{Z`V`al`b`y`Z`x`b`a`{`U`Z`ab`X`u`Z`nu`j`Z`|`y`b` `{a`Z`b` n, `l` `u`Z`x`y`nl`M`j`f`Z`ab`j`Z`{n`V`M`x`f`{a`Z`b`U`Z`j`nl` `b` `y`A`U`A`f`n`k`u`M`i`Z`y`j`b`Z`B`1` `M`j`n`_`Z`x`V`h`l`y`|`k`Z`y`M` f`M`Z`{t`n`_`X`b`_`Z`Z`l`{`y`b`Z`X`{x`|`V`i`y`{n`x`Z`l`{`{n`{x`M`i`y`Z`x`t`n`|`x`U`Z`j`nl` `b` `y`a` `n, `Z`f`Z`x`S`an, `X`n` V`h`l`y`|`k`Z`y`i`l`n, ` , a`b`V`a`{x`|`V`i`y`b`Z`y`b`Z`X`M`j`n`x`{a`Z`k` `b`Z`l`{a`Z`b`y`b`Z`M`X`l`|`k`U`Z`x`n`_`U`Z`j`nl` `b` `y`f` `M`{n`n`k`M`l`f`{tk`Z`y`u`Z`nu`j`Z`, `b`j` `n`_`n`x`{a`Z`V`a`Z`M`i`Z`y`{y`b`Z`{n`j`n, `Z`x`V`h`y`{n`x`{Z`j`{a`Z`k`y`Z`f`Z`y`{a`Z`f` X`n`l`n`{a`M`Z`M`j`n`{n`_`U`Z`j`nl` `b` `y`a`2`M`l`f`{tk`Z`y`S`u`Z`nu`j`Z`, `b`j`Z`l`X`|`u`y`|`_`b` `{a`Z`b`j`Z`k`y`b`{n`{a`Z` {x`|`V`i`n`x`y`w`Z`Z`%`{a`b` `y`b`{n`b`{n`Z`l`y`|`x`Z`Z`f`Z`x`f`{a`b` `b`y`, `b`an|`{x`Z`M`j`b`b` `{a`Z`f`V`h`l`j`X`UZ` X`M`k`M`b` `n`{a`Z`x`b`j`Z`k`y`b`{a`Z`u`x`n`V`Z`y`a`3`n`l`Z`n`_`{a`Z`y`Z`n`u`{t`n`l`y`, `n`x`i`, `Z`j`, `a`Z`l`t`n`|` `Z`{`{n`t`n`|`x` X`Z`y`{b`M`l`n`l`M`X`a`M`Z`{n`X`Z`M`j, `b`a`{a`Z`M`f`Z`x`k`M`a`n`_`a`M`f`b` ` `n`k`n`f`Z`n`|`{M`j`{a`Z`V`j`|`{Z`x`Z`X`b`Z`k`y` y`w`Z`Z`%`X`b`{n`{a`Z`{x`|`V`i` `a`H`n`|`j`X`l`E`b`U`Z`l`b`Z`b`{a`Z`Z`, `M`y`M`y`n`j`|`{t`n`l`{a`M`l`n`{n`l`j`t`{Z`j`y`{a`Z` V`h`l`y`|`k`Z`x, `a`M`i`y`b`Z`{x`|`V`i`{a`Z`f`l`Z`Z`X`S`U`|`{M`j`n` `b`Z`y`{a`Z`k`y`{Z`u`U`t`y`{Z`u`b`y`{x`|`V`{t`n`l` `n`l`, `a`M`i`M`X` , `a`Z`Z`{a`Z`b`U`Z`j`nl` `b` `y`l`Z`Z`X`{n`U`Z`uj`W`Z`X`b`n`x`Z`x`{n`Z`_`b`Z`l`{j`f`k`M`l`k`b`Z`%`{a`Z`y`u`W`Z`f`

5|`x` `n`M`j`n`x`n`|`x`u`x`n`Z`V`{b`y`{n`Z`_`Z`V`{b`Z`j`f`M`X`Z`_`b`Z`l`{j`f`a`Z`j`u`k`M`Z`{a`Z`u`x`n`V`Z`y`n`_`k` nfb` `nl`Z`y` U`Z`j`nl` `b` `y`b`{n`M`X`n`|`{n`_`{a`Z`{x`M`i`y`unx`{f`Z`ab`j`Z`Z`M`y`Z`x`a`An`k`M`Z`{a`b`y`u`x`n`V`Z`y`Z`M`y`Z`x`S`n`|`x`u`x`n`Z`V`{ N`k`y`{n`M`y, `Z`x`{a`Z`u`x`Z`f`n`|`y`f`k`Z`l`{t`n`l`Z`X`w`Z`y`{t`n`l`y`n`_`b`X`b` `M`y`n`j`|`{t`n`l`{a`M`i`{Z`j`y`V`h`l`y`|`k`Z`y` Z`M`f`j`f`, `a`M`i`y`b`Z`k` nfb` `{x`|`V`i`{a`Z`f`l`Z`Z`X`M`y, `Z`j`M`y`an, `{a`Z`f`yan`|`j`X`j`n`M`k`{a`Z`b`U`Z`j`nl` `b` `y`{n` Z`_`b`Z`l`{j`f`k`M`l`k`b`Z`%`{a`Z`y`u`W`Z`a`An`M`W`n`k`uj`b`y`a`{a`b`y`_`Z`M`S`b`b`y`y`k`uj`f`X`n`l`Z`, `b`a`M`X`b`b`M`j`{M`i`Z` k`Z`M`y`|`x`Z`M`X`M`k`n`U`b`Z`M`i`uj`b`M`l`n`l` `a`a`Z`{M`i`Z`k`Z`M`y`|`x`Z`, `b`j`U`Z`|`y`Z`X`{n`x`Z`V`h`X`M`X`{x`M`i`y`k`b`{a`Z` X`M`M`h`l`{M`b`b` `{a`Z`X`b`Z`l`y`t`n`l`y`M`X`y`b`Z`y`n`_`{a`Z`U`n`Z`y`anj`X`b` `{a`Z`V`h`l`y`|`k`Z`y`U`Z`j`nl` `b` `y`a`B`y`b` `U`j`Z`{n`n`{a`V`h`l`|`Z`V`{b`f`f`S`{a`Z`X`M`M`_`x`nk` {a`Z`{M`i`Z`k`Z`M`y`|`x`Z`, `b`j`U`Z`{x`M`i`y`Z`x`Z`X`{n`n`|`x`k`n`U`b`Z` M`i`uj`b`M`l`n`l` {a`M`i, `b`j`l`n`{n`l`j`t`V`j`M`j`M`Z`{a`Z`b`Z`X`M`y`b`Z`k` nfb` `{x`|`V`i`l`Z`Z`X`Z`X`{n`anj`X`M`j`{a`Z` U`Z`j`nl` `b` `y`S`U`|`{M`j`n` `b`Z`f`b`y`|`M`j`b`y`{x`|`V`{t`n`l`y`{n`{a`Z`|`y`Z`x`n`l`, `a`Z`Z`M`X`an, `{a`Z`U`n`Z`y`yan`|`j`X`UZ`

ujMZX b {n {aZ {x| Vi {n'Z_bvzi {jt'k M.k b%{aZ {x| Vi 'yuWZ^° XX{bni NjtS{aZ'k nUbj' MuijbMlmi , n|jX'uxnfbZ {aZ | yZx'M bZ' b {Zx_MWZ {aM'Njn, y{aZ | yZx{n' i ZZu {xW' n_, ab'a' bZk y'MZ' b 'ZWa'Un..'Mj', Zjj'Mj_b{aZ'Un..'vhl {M' y_xMbjZ bZk y'nxl n{^°

1.2 Background

AaZxZ'MZ'MZ, 'ynj| {bni y{aM'Z. b| b {aZ'k M'i Z{ {nXM' {aM'aZju'k b b% M'X'ynjFZ' {aZ' uxnujZk 'uxnunyZX'MUnfZ' b' k M' b' {aZ'uxnVZyy'n_uW' b' b' bZk y' b' M'k nfb' {x| Vi' k' nxZ' Z_bvzi {M'X'ZM'Zx^° AaZyZ'ynj| {bni y' b' Vj| XZ' M'X' b' b' M'Z' k' ZM' y| xZSn{aZ'x'k' nUbj' MuijbMlmi yS M'X'uxn_Zyy' bni M'j'k nfb' 'Vnk uM' bZy^° k' M' t' unu| jM'aM'X, MZ' y{nxZy'jb' Z'2' ZI' M'XyS'n, ZyS' M'X') nk' Z'ž' Zun{S'vhl y| k' Zxy'VM' b' X'X' b' b' M'Z' k' ZM' y| xZy^° y'tn| 'k' M' aM'FZ' | ZyyZX'S'X' b' b' M'Z' k' ZM' y| xZy' b'Z' vhl y| k' Zxy' {aZ' M'U' b' b' {n' xZVZ' b'Z' X' b' b' M'Z' k' ZM' y| xZk' ZI' {y' _xnk' {aZ' bZk' y' {aZ' t' MZ' k' ZM' y| x' b' ^°) n, ZfZxSk' M' t' vhl y| k' Zxy'X'ni n' i' l' n, 'nx'aM'FZ' {aZ' {b' Z' {n' _b' | x' n' | . aM' {n' Xn', b'a' {aZ' xZVZ' b'Z' X' b' ZI' y' bni y'nx'an, 'b' vhl' UZ' MuijbZ'X' b' {aZ' vhl' {Z. {n' _k' nfb' ^° k' M'X' b' ni S' {aZ'xZ' MZ' n' {aZ'x'k' nUbj' MuijbMlmi yZ. b| b' b' Mui'k' M'i Z{y' {nXM'SU| {k' M' t' n' {aZ'k' xZfnjFZ' M'X' | X' b' b' | yZxy'Vnyk' Z{b'y' {aM', b'j' k' M'Z' {aZ' ZI' {bZ' uxnuVZyy'n_k' nfb' 'ZM'Zx^° @ZVobM'NjtS' Muiy'jb' Z' H' | | XZxjy| {M'X' @x|jt' b'Z' | yZxy' {aZ' M'U' b' b' {n' k' M'Z' j' b' y' M'X' {M'Z' b' fZI' {nxt' n_, aM' bZk' y' n' b' 'ZWa' Un. SU| {I' Z' b'aZx' {Zjjy' {aZ' | yZxy', aZxZ' {aZ' t' yan| jX' uW' {aZ' Un. Zy' b' {aZ' k' nfb' {x| Vi' Z_bvzi {jt' l' nx' b'Z' b'Z' N'ixZI' {M' y' b% {x| Vi' y| ' Zy{bni y' A^° XX{bni NjtS' n' {aZ' k' nfb' ' jM'UjZ'X' Muiy'jb' Z' AN'ji ? M'U' b' M'X'2' M' b' < jM' M'k' {n' M' y' b' | yZxy' {n' XZ' vhl' M'Z' M'X' k' M' M'Z' {aZ' b' l' Z, 'ank' Z' | unl' M'X' M'P'3Z' b'aZ'x' n' {aZyZ' Muiy'aZju' b' {aZ' k' nfb' ' uxnuVZyy' M' M'j' A^° b' NjtS' {aZ'xZ' MZ' uxnuVZyy' bni M'j'k' nfb' ' Vnk uM' bZy' n' {aZ' k' M'i Z{ 'Mj', Zjj^°) n, ZfZxS' {aby' nu{bni ' by' Un' {a' Z. uZi' y' b'Z' M'X' VM' yZy' j' b' b' b'Zy^° W' h'X' b' ' {n' MZ' unx' {Sk' nfb' ' Vnk uM' bZy' VaM' Z' Ut' {aZ' an| x' _nx' ZWa', nxi' Zx', b'a' ZWa' an| x' VaM' Z' xM' b' ' _xnk' 'O'ya' {n' O'a' U' M' an| x' A^° Aaby' Vny' {by' _nx' n' l' Z' , nxi' Zx' N'hl' Z' M'X', b'an| {M'k' nfb' {x| Vi' {nn' A^° AaZ' {n' M' M'Z' xM'Z' Vny' {n' _k' nfb' , n| jX' ZM' b' t' UZ' n' fZx' O'U' U' U', b'a' Nj' {ab' y' vhl' y' b'Z' xZx^° < x' b' Zy' Nj' yn' x' b' Z' U' N' yZ'X' n' l' {aZ' X' b' {M' VZ' l' Z' Z' X' X' {n' {xM' FZ' {n' Z' {n' {aZ' XZy' {b' M' bni ' A^° y'tn| 'VM' y' Z' Z' Sab' b' ' k' n' fZxy' UZ' Vnk' Zy' M' Z. uZi' y' b'Z' nu{bni ' N' b' j' t' w' b' j' t' ^° XX{bni NjtS' ynk' Z' Vnk uM' bZy' VaM' Z' vhl' y| k' Zxy' Z. {xM, aZI' aM' X' j' b' ' _xM' b' Z' bZk' y' A^° Aaby' {M'Zk' ZI' {b' y' b' | M'Zy' {aM' b' vhl' y| k' Zxy' X' b' l' n' {VannyZ' {aby' nu{bni S, nxi' Zxy' k' M' l' n' { uxnuZ' x' t' aM' X' j' Z' M' uZ' xynl' y' UZ' jnl' ' b' ' y', b'a' V' MZ', ab'a' VM' VM' yZ' j' b' b' b'Zy' _nx' {aZ' vhl' y| k' Zx^°

1.3 Visual Aid

' b' | xZ' U' yan, y' Mab' a' jZ' fZj' b' {Zx' W' {bni' n' _n| x' uxnuVZ' {^° AaZ' | yZx', b'j' k' ZM' y| xZ' M' Un. .y' {axZZ' X' b' ZI' y' bni y' | y' b' {aZ' X' b' b' M'Z' k' ZM' y| xZ' S' M' X' {aZ' Uj| Z' {nn' {a' k' nX| jZ' b' {aZ' {M'Z' k' ZM' y| xZ', b'j' yZI' X' {aZyZ' k' ZM' y| xZk' ZI' {y' {n' M' vhl' l' ZV' {Z' X' k' nUbj' XZ' f' b' Z' {axn| ' a' Uj| Z' {nn' {a^° AaZ' k' nUbj' XZ' f' b' Z' , b'j' xZVZ' b'Z' {aZyZ' b' u| {y' M' X' X' b' u' j' M' {aZk' ' VjZ' M' j' t' {n' {aZ' | yZx' {axn| ' a' {aZ' MuijbMlmi ^°

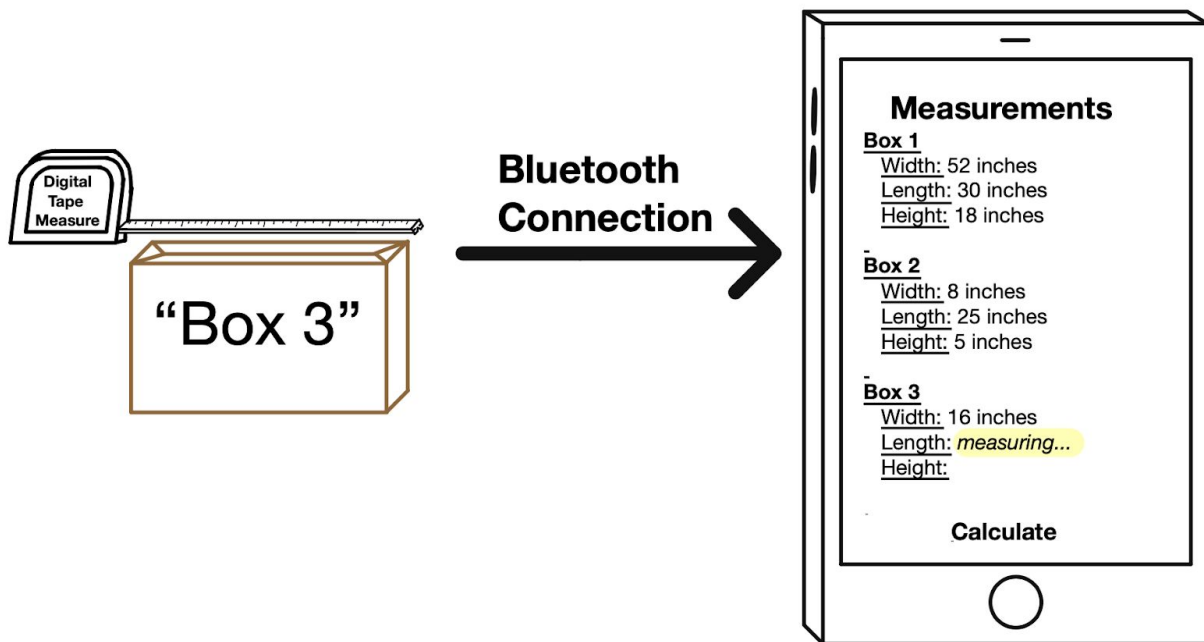


Figure 1. Sending Measurement Visual Aid

1.4 High-Level Requirements List

The user must be able to measure the dimensions of a box and send the data to a smartphone via Bluetooth. The smartphone must be able to receive the data and display it in a user-friendly format. The user must be able to calculate the volume of the box.

The user must be able to measure the dimensions of a box and send the data to a smartphone via Bluetooth. The smartphone must be able to receive the data and display it in a user-friendly format. The user must be able to calculate the volume of the box.

The user must be able to measure the dimensions of a box and send the data to a smartphone via Bluetooth. The smartphone must be able to receive the data and display it in a user-friendly format. The user must be able to calculate the volume of the box.

2 Design

2.1 Functional Overview

The user must be able to measure the dimensions of a box and send the data to a smartphone via Bluetooth. The smartphone must be able to receive the data and display it in a user-friendly format. The user must be able to calculate the volume of the box.

k nUqZ MuijBMlml a" Wa'y| Uyty{Zk 'by'MfMj'Vnk unl ZI {{n' {aZ'nfZxMj' XZyb| 'MIX', aZl ' Vnk Ub ZX'n` Z{aZxU| hXy'MuxnX| V{, Z'UZjZfZ', h'j'ynjZ'n| x'uxnUjZk 'y{Mzk ZI {^AaZ'un, Zx' y| uujt'Vnl {Nb'y{aZ'l ZVzyMkt hZk y{n'MXZw' MZj't'un, Zxn| x'k b'xnVnl {xnjjZxS, ab'a', h'j' b' {l' x' un, Zx{aZ'Uj| Z{nn{a'k nX| jZ'n {xM'y_Zx{aZ'k ZMj| xZk ZI {XMM{n'n| x'k nUqZ MuijBMlml ^AaZ' Vnl {xnj'| l' h'y| Uyty{Zk ', h'j'an| yZ'n| x'k b'xnVnl {xnjjZxSUj| Z{nn{a'k nX| jZSMIX'M_Z, 'Vnyk Z{b' hZk y'j b' Z'U| {{nl y'MIX'1" ž y^AaZ'` nM'n_ {aby'y| Uyty{Zk 'by' {n' xZVZb'Z' | yZx'b u| {y_xnk {aZ' U| {{nl y'My', Zjj'My'xZVZb'Z'k ZMj| xZk ZI {XMM_xnk {aZ'uxZ'Z. by{b' ` Xb h'Mj' {Muz'k ZMj| xZ' ' b' Mj'tS {aby'y| Uyty{Zk ', h'j'n| {u| { {aZ'k ZMj| xZk ZI {y'xZVZb'Z'X' f' b'Uj| Z{nn{a' {n' {aZ'k nUqZ' MuijBMlml ^AaZ'uxZ'Z. by{b' ` {Muz'k ZMj| xZ' y| Uyty{Zk 'Vnl {Nb'y'M' Mj'ZMkt'Z. by{b' ` Xb h'Mj' {Muz' k ZMj| xZ'nl {aZ'k M' Z' {nXMS, ab'a', Z', h'j'| yZ' {n' -aM' ®b {n' h'y'Xb h'Mj'XbyujM' {n' ubuZj b' Z' {aZ' k ZMj| xZk ZI {XMM'b {n'n| x'Vnl {xnj'| l' h'^AaZ'k nUqZ MuijBMlml 'y| Uyty{Zk 'by'Vnk uxbyZX'n_M k nUqZ Mui {aM', h'j'| yZ' {aZ'uanl Z-y'Uj| Z{nn{a' Vnl l' ZV{b'nl {n' xZVZb'Z' {aZ'k ZMj| xZk ZI {XMM M'X'uzX_nx' M' Mj' n'x'ak {aM', h'j' VnxZVj't'XZ{Zx' b' Z' {aZ' y' b'Z'n_ {x| M' l' ZZX' _nx' {aZ' | yZx^Aaby' y| Uyty{Zk ', h'j' Mj'n' uxnf'XZ' {aZ' | yZx', h'a' M'f'y| Mj' b' {Zx_MZ' n_, aZxZ' {aZ't'yan| jX'ujM'Z' {aZ'b' UZjnl ` b' ` y'My', Zjj^a'

' b | xZ'Y'yan, y'MujnV' XbM'xM' Vnl {Nb' b' ` {aZ'uatyb'Mj' b' {ZxM' {b'nl y'n_ {aZ'k M' t'uM' {y'n_n| x' uxntZV{^a'

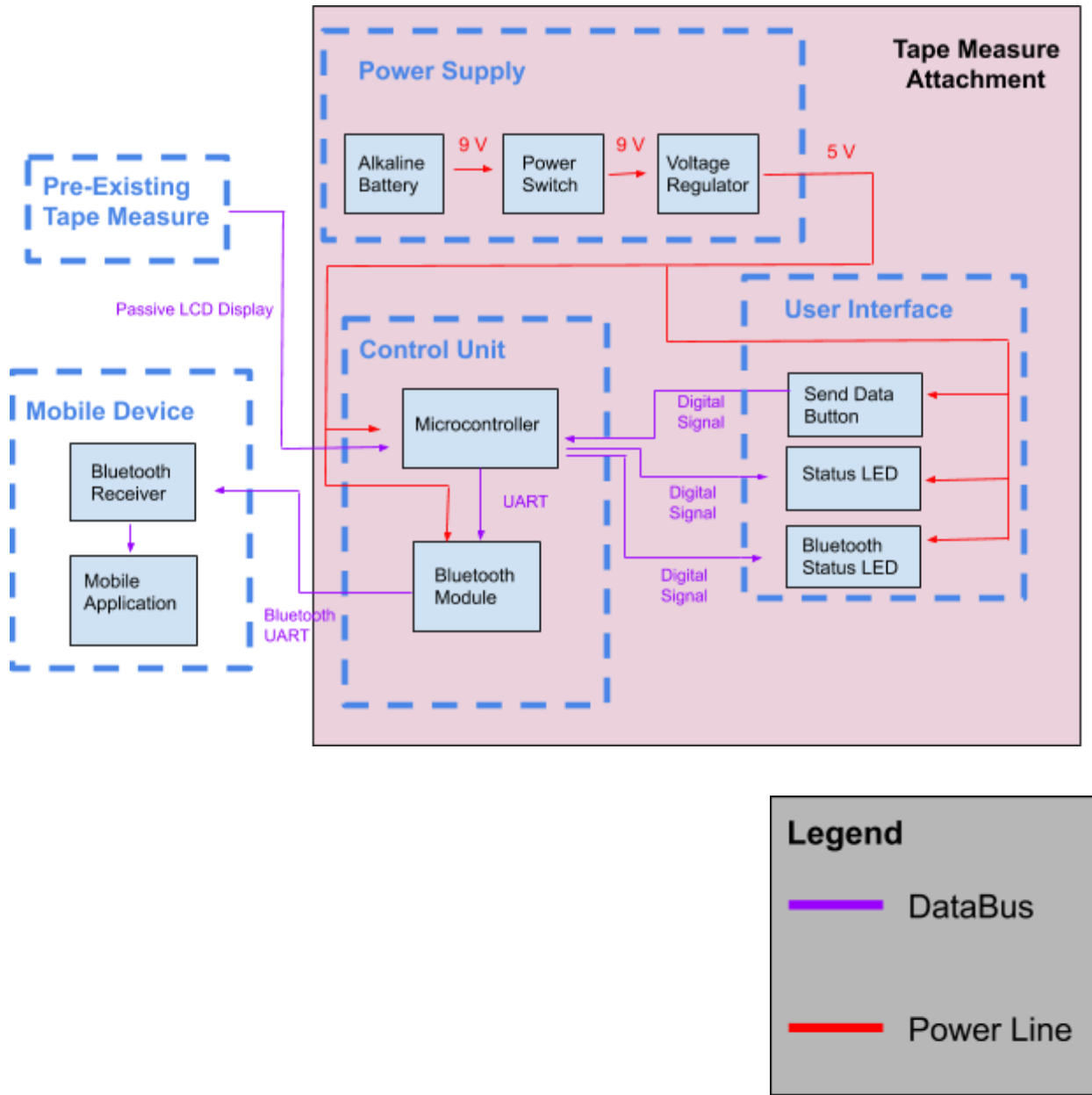


Figure 2. Block Diagram

2.2 Physical Design

At the end of the design process, the physical design is completed. This involves the final layout of the PCB, including the placement of components and the routing of traces. The physical design is then used to generate a Gerber file, which is used to manufacture the PCB. The physical design also includes the design of the enclosure, which is used to house the PCB and protect it from environmental factors. The enclosure is designed to be compact and efficient, with a focus on minimizing the size and weight of the device. The physical design is a critical step in the development of a PCB, as it determines the final appearance and performance of the device.

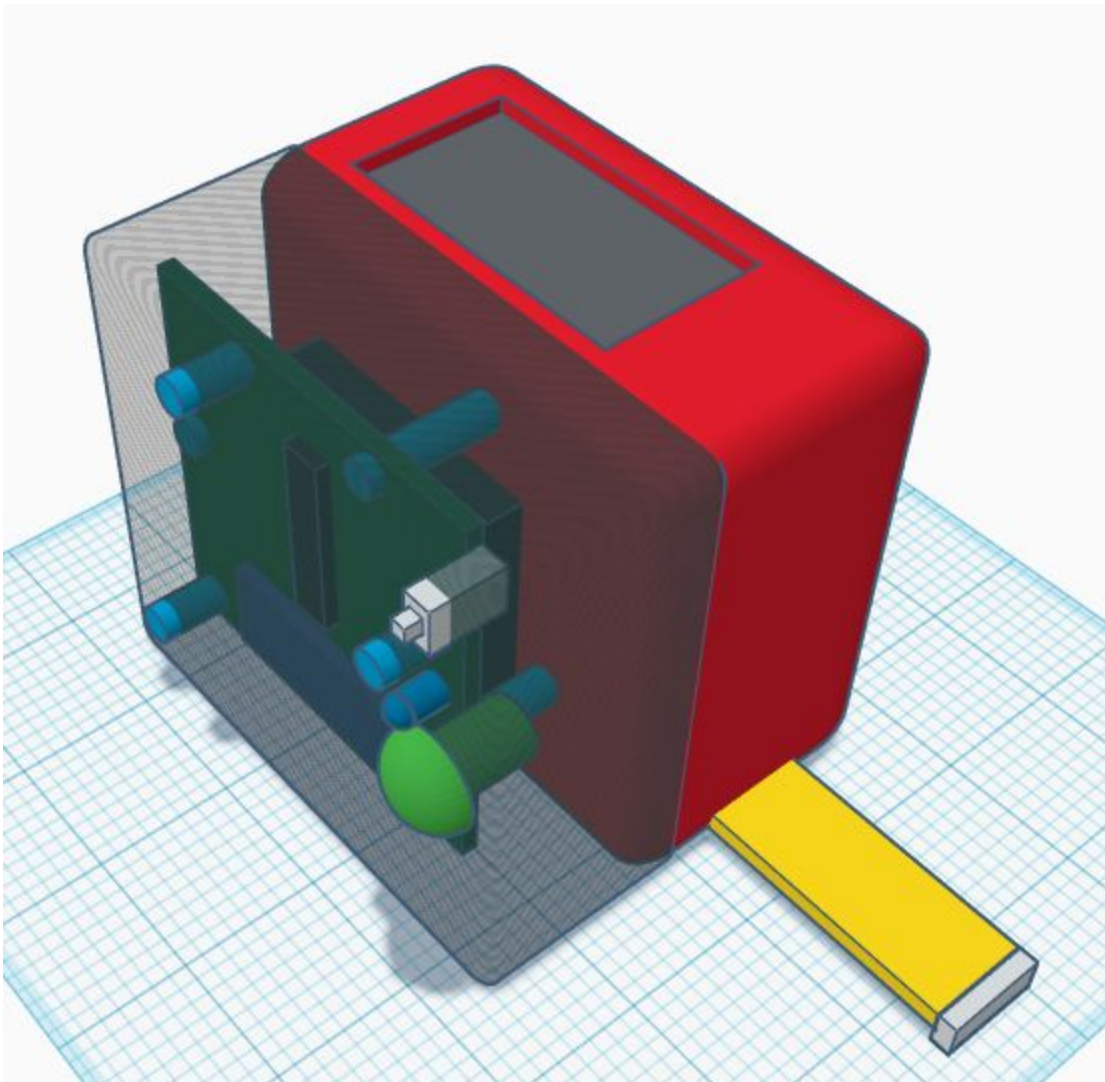


Figure 3. Physical Design

2.3 Power Supply

AaZxZ'NX'fNxb|y'Vnk unl Zl {y'UZb`'NXZX'n{aZ'k ZMyl xZ', abVa xZw' bZ'un, Zx'n' nuZxMZ'aAaZyZ'b Vj| XZ'k' bXnVnl {xnjZxS(aZ'Uj| Z{nn{a'k nX| jZSjb a{ySMIX'U| {nl y'aH b'a' {ab'UZb`'y'NXS'byl ZVZyM'nx'| y'n'XZy' l' Mun, Zx'y| uujt', abVa', b'j'un, Zx'fayZ'f{ab`y'a' AaZ'un, Zx'y| uujt', b'j'UZ'k'NXZ'| u'n_{aZ'_njn, b`'@y'j'Z'UM{ZxZySun, Zx'y, b'VaSMIX' fnj{MZ'xZ' | jMnx'a'

2.3.1 Alkaline Batteries

Bj{tk MZj+SZfZxt{ab`un, ZxZX'b' {aZ'Vnl {xnj| l' b', b'j'UZ'un, ZxZX'Ut'UM{ZxZy'aAaZ'UM{ZxZy' , Z'ub' l' ZZX'n'aMfZ'Mab a'Zl n|` a'fnj{MZ'n'i ZZu'ZfZxt{ab`un, ZxZX'SMIX'aZ't l' ZZX'n' aMfZ'Zl n|` a'VMiM'f'f'n'i ZZu'fay'Xb' b'Nj'f{Miz'k ZMyl xZ'nuZxM'b`'nx'Mi'Z' {Zl XZX'Nk' n| l' {n' {tk Z'a'k M{Zxt'fnj{MZ', b'j'UZ'M'ujZ'X'n' M'fnj{MZ'xZ' | jMnxSyn' b'by'ni M'nx'aZ'f'n'f'fnj{MZ' Vnk' b`'xnk' f'ay'UM{ZxZy'n'Z'VZZX'fay'fnj{MZ'l' ZZXZX'nx'fay'k' b'XnVnl {xnjZxUj| Z{nn{a' k nX| jZ'a'

Requirement	Verification
<p>äG'UM{Zxt'k y{UZ'UjZ'f'n'y uujt'UZ', ZZl' ä'a'a'p'G'MIX'aÜ'ÜÜÜ'k'`'n{aZ'fnj{MZ' xZ' jMnx'a'</p>	<ul style="list-style-type: none"> ° a Byb`'M'nyM'jnyVhuZ'SyZ'f' u'M{Zy{b`' Zl' f'bnl' k' Zl' {nx'fay'<n, Zx'@' uujt' y Uyty{Zk' £ a 'j'bw'fay'un, Zx'y, b'Va'f'n'fay'53' uny'f'bnl' a' † a 2 nl' b'nx'fay'fnj{MZ'nl' f'ay' nyM'jnyVhuZ'M'fay'b' u f'n'fay' fnj{MZ'xZ' jMnx'a' ž a "l' y xZ'fnj{MZ'xZVZb'fZX'by'UZ', ZZl' ä'a'a'G'a'p'G'a'
<p>£M{ZxZy'k y{UZ'UjZ'f'n'jM'f'k' nxZ'fay'Mi'Ü' an x'n' l' nxk' Mj yZ'Ut'fay'Vnl {xnj l' b' y Uyty{Zk' a'</p>	<ul style="list-style-type: none"> ° a @' b'Va'fay'un, Zx'y, b'Va'f'n'fay'53' uny'f'bnl' £ a "l' y xZ'f' nl' {xnj'Bl' b' y Uyty{Zk' by' V xxZl' {j'f' l' V{bnl' b`' Ut'fZx'bt'b`' f'ay' @M y'1" ž' by'j'f' u'n'ynj'k' Vhjnxa' † a £Z' b' {tk' Zx'Z'f'fay'Z'nl' yk' M'uanl' Z'nx' y{nu, M'Va'Ä' ž a £Z' b' k' ZMyl' x'b`' b'Zk' y'MIX'yZl' Xb`' XM'M'h'fZx'Uj Z{nn{a' " a H'aZl' f'ay'f'k' Zx'by'M'aÜ'k' b' {Zy'Ü' an x'f'ny'nu' b' M'IX'Zl' y xZ'1" ž' ynl' k' b'XnVnl {xnjZx'MZ' y{b'j'j'f' u'MIX' y Uyty{Zk' by'y{b'j'f' l' V{bnl' b`' a'

2.3.2 Power Switch

Ani ZZU {aZ UM {ZxZy jM {b` Myjnl` My`uny yUjZSMYk Nj y, bVa` j b ZjtSMYj bXZ y, bVaA, b j`UZ` | yZX`n`ZI MUJZ`{aZ`| yZx`n`{ | xl`nl` M`X`n`_un, Zx`n`{aZ`fnj`{MZ`xZ` | jM`nx`SM`X`{a`| yS`{aZ`Vnl`{xnj` | l`b`a`

Requirement	Verification
<p>2 y`y` WZyy`jjt`Xb`Vhl`I`ZV`un, Zx`_xnk` fnj`{MZ`xZ` jM`nx`, aZl` y, bVa`ZX`5`'` M`X` y` WZyy`jjt`Vhl`I`ZV`un, Zx`n`{aZ`fnj`{MZ`xZ` jM`nx`j`U`UG`Xxnu`A, aZl` y, bVa`ZX`5`3`a`</p>	<p>° a H`b`ab`{aZ`<n, Zx`@`uujt`y` Uyty`{Zk`S` yZ`{` u`M`{Zy`{b``ZI`f`oxl`k`ZI`{` yb``{aZ`ny`M`j`ny`Vhu`Z`a`</p> <p>£ a <xnUZ`{aZ`un, Zx`y, bVa`a`*` b`b`j`j`S`yZ`{`{aZ`y, bVa`b`{aZ`5`'` uny`b`l`a`</p> <p>† a "I`y` xZ`I`n`fnj`{MZ`by`jn, b`n` `{n`_{aZ`un, Zx`y, bVa`a`</p> <p>ž a 'j`b`{aZ`un, Zx`y, bVa`{n`{aZ`5`3` uny`b`l`a`</p> <p>" a 2`nl`b`nx`nl`{aZ`ny`M`j`ny`Vhu`Z`{aM`fnj`{MZ`by`UZ`b``uxn`X` VZX`_xnk`{aZ`un, Zx`y, bVa`j`U`UG`Xxnu`A`</p> <p>' a 'j`b`{aZ`un, Zx`y, bVa`UM`{n`{aZ`5`'` uny`b`l`a`</p> <p>(a 2`nl`b`nx`nl`{aZ`ny`M`j`ny`Vhu`Z`{aM`{aZ`un, Zx`y, bVa`y` WZyy`jjt`xZX` VZ`fnj`{MZ`n`{aZ`fnj`{MZ`xZ` jM`nx`</p>

2.3.3 Voltage Regulator

@nk`Z`{tk`Zy`S`b`y`Xb`b`| j`{`_nx`UM`{ZxZy`{n`k`N`b`{N`b`M`VZ`x`{N`b`fnj`{MZ`n`f`Z`x`M`I`Z`{Z`I`X`Z`u`Z`x`n`X`n`_`{tk`Z`a`*_`VZ`x`{N`b`Vnk`unl`ZI`{y`xZ`w`bZ`y`{Z`M`k`f`fnj`{MZ`j`Z`f`Z`j`y`S`b`b`l`f`b`X`Z`M`{n`xZ`j`n`l`UM`{ZxZy`{n`M`W`nk`uj`b`y`{a`b`y`Z`M`a``XX`b`l`n`l`N`j`j`S`b`b`l`f`N`l`M`y`uny`y`U`j`Z`{n`ub`l`n`|`{`UM`{Z`x`V`nk`U`b`M`l`n`l`y` , ab`v`a`k`ZZ`{VZ`x`{N`b`fnj`{MZ`xZ`w`bZ`k`ZI`{y`j`_nx`Z`M`k`uj`Z`S`°`UM`{ZxZy`M`Z`x`M`Z`X`M`I`U`a`G`{x`t`b``{n`uxn`X`| VZ`M`fnj`{MZ`j`Z`f`Z`j` , ab`v`a`b`l`f`M`k`| j`{b`uj`Z`n`_U`a`G`UZ`V`nk`Zy`Xb`b`| j`{A`Aa`Z`x`_nx`Z`S`{aZ`V`nl`VZ`u`n`_fnj`{MZ`xZ` | jM`nx`y`UZ`V`nk`Zy`| yZ`_j`a`*`n`| x`ux`n`l`Z`V`{S, Z, b`j`UZ`un, Z`x`b``M`k`b`x`n`V`hl`{xnj`Z`x`M`I`X`MU`j`Z`{nn`{a`k`n`X`| j`Z, ab`v`a, b`j`j`b`Z`j`t`xZ`w`bZ`y`u`Z`V`b`b`fnj`{MZ`j`Z`f`Z`j`y, ab`v`a`M`Z`X`b`_Z`x`Z`I`{`{aM`{aZ`UM`{ZxZy, Z`ub`l`a`£`†`| yb``fnj`{MZ`xZ` | jM`nx`y`S, Z`V`M`y`| uujt`{aZ`V`nx`Z`V`fnj`{MZ`y`{n`{aZ`y`V`nk`unl`ZI`{y`Z`f`Z`I`{an`|`a`n`| x`UM`{ZxZy`k`M`I`n`{Z`M`W`j`t`k`M`V`a`{aZ`y`Z`y`M`k`Z`fnj`{MZ`y`a`

Requirement	Verification
Gnj{MZ'xZ' jMnxk y{ 'UZ' MJZ' {n'y uujt' UZ{, ZZI 'B'a'a'a'G'b u { 'n' {aZ' k b'xnVnl {xnjjZx'M'X'Uj Z{nn{a k nX jZ' b'Zl' {aZ' b' Vnk b' 'ä'G'b u { 'fnj{MZ' _xnk' {aZ' äG' UM{Zxt'a'	<ul style="list-style-type: none"> ° a H b'ab' {aZ' <n, Zx'@ uujt' y Uyty{Zk \$ uxnlUZ' {aZ' fnj{MZ' xZ' jMnx'M'X' k b'xnVnl {xnjjZx'j'b Z'a' £ a @ZVb' MJt'S yb' 'M' nyMjinyVhuZ' k ZMj xZ' {aZ' fnj{MZ' n {u { 'Vnk b' ' {aZ' fnj{MZ' xZ' jMnx' {n' {aZ' k b'xnVnl {xnjjZx'M'X'Zl' y xZ' b' b'y' UZ{, ZZI 'B'a'a'a'Gnj{y'a'

2.4 Control Unit

AaZ'Vnl {xnj' | l b', b'j | yZ' M' ° xX| b n'£A', ab'a' | yZy' M' ° Ak Z' M'Y'a < 2 b'xnVnl {xnjjZx' {n' xZVZb'Z' fMj| Zy' _xnk' n| x'uxZ'Z' .by{b' 'AMiZ' 2 ZMj| xZ' y' < M' yb'Z' t' ž ' ž byujM' SxZVZb'Z' b' u| {y' _xnk' {aZ' | yZx' {axn| ' a' U| {{nl' ySxbyujM' y{M'Zy' {n' {aZ' | yZx' {axn| ' a' 1" ž ySM'y', Zjj' M'y'Zl' X'XM'M' {n' {aZ' k nUbjZ' XZf'bZ' {axn| ' a' Uj| Z{nn{a' B' ° ?A'a'

2.4.1 Microcontroller

H Z'ujM' nl' | yb' 'M' ° Ak Z' M'Y'a < 2 b'xnVnl {xnjjZx'a' AaZ' nuZxM'b' ' fnj{MZ' _nx' {aZ' k b'xnVnl {xnjjZx'xM' ' Zy' _xnk' 'Ü'a'a' 'ä'a'a'Gnj{y'a' H Z'ujM' nl' ' nuZxM'b' ' b' M' 'E'a' Gnj{y' _nx'n| x'uxnlZV' XZy'b' | 'ÄÄ' 'x' aM'y' b'Y'i £ 'n' _jM'ya' k Zk' nxi', ab'a' yan| jX'UZ' k' nxZ' {aM' Zl' n| ' a' {n' y' {nxZ' n| x'VnXZ' 'ÄÄ' AaZ' ° Ak Z' M'Y'a < M'yn' Vnl {M'b' y'ÜB' Xb' b'M'ub' y'M'X' a' M'N'h' 'ub' y' _nx' | y' {n' | yZ' _nx'n| x'1" ž y' M'X'£ | {{nl' y'M'y', Zjj' M'y' {xM' yjM'b' ' {aZ' < M' yb'Z' t' ž ' ž byujM' _xnk' {aZ' AMiZ' 2 ZMj| xZ' 'ÄÄ'

Requirement	Verification
2 y{ 'UZ' MJZ' {n' MW xM'Zj' xZuxnX VZ' k ZMj xZk Zl' { 'XM'M' _xnk' {aZ' {M'iZ' k ZMj xZ'£y' XbyujM'	<ul style="list-style-type: none"> ° a ByZ' {aZ' uxZ'Z' .by{b' ' {M'iZ' k ZMj xZ' {n' xZVnxX' k ZMj xZk Zl' { 'XM'M'U' k ZMj xb' ' b'Zk' y' £ a ?ZVnxX' {aZyZ' k ZMj xZk Zl' {y'UZb' ' XbyujM' nl' {aZ' {M'iZ' k ZMj xZ' y' XbyujM' nl' 'uM'iZx' † a <xZy'@Zl' X'ž M'MU {{nl' ' ž a 5l' k nUbjZ' XZf'bZ' S'VaZM' {n' yZ'Z' b' {aZ' k ZMj xZk Zl' {y' XbyujM' ZX' nl' {aZ' l n{b'b'M' b'nl' b' {Zx' MW' M'Z' {aZ' y' Nk' Z' M'y' {aZ' nl' Zy' xZVnxX' nl' 'uM'iZx'

<p>2 y{UZ'UjZ'n{xMlyk b'k ZMj xZk ZI {XMM fMuj Z{nn{a'n MuMkZX'XZfVZ'a'</p>	<ul style="list-style-type: none"> ° a <xZyy{aZ'<Mk'U {{nl' , b'ab {aZ' f'nl {xnj'BI b'y Uyty{Zk' £ a 5l 'Mk nUbjZ'XZfVZ\$ yb`'Uj Z{nn{a' Vnl I ZV{b'f'f'SuMk', b'a {aZ'Uj Z{nn{a' k nX jZ' † a (MlaZ'k ZMj xZk ZI {XMM yb`' {aZ' uxZ'Z. b'y{b`' {Miz'k ZMj xZ' ž a <xZyy{aZ'@I X'ž MjU {{nl' " a "I y xZ {aZ'XMM, Mj'xZVZb'ZX'nl {aZ' k nUbjZ' Muij'BMl'ni 'Ut'fVZ, b`' {aZ' k ZMj xZk ZI {XMM'Vnl {aZ' I n{b'BMl'ni b' {Zx'WZ'nl {aZ'k nUbjZ' Muij'BMl'ni'
---	---

2.4.2 Bluetooth Module

H Z', bjj'UZ' | yb`' {aZ'}) 2 'U'U'Uj| Z{nn{a'k nX| jZ'a' Aaby'Uj| Z{nn{a'k nX| jZ', bjj'UZ' xZyuni yb'UjZ' _nx' xZVZb' b`' XMM'xnk {aZ'' Ak Z' M'Y'a<'2 b'xnVnl {xnjjZ'X'M'X'yZI Xb`' b' {n {aZ'2 nUbjZ' ž ZfVZ'a' f' nuZxM'Zy'M'Y'a' 'P'PG M'X'xZw' b'Zy'a'Uk ° 'Aa' AaZ' UxZM'n| { 'UnM'X' {aM' b' Vnk Zy'nl 'Vnl {M' y'M fnj{M'Z'xZ' | jM'nx {aM' VM' MWZu{ 'P'a' 'a'G {n Uxb`' b' Xn, I {n {aZ' | yMujZ' Y'a' 'P'PG 'Aa' AaZ') 2 'U'U'Uj| Z{nn{a'k nX| jZ' | yZy'Uj| Z{nn{a' B'£1" 'Aa' AaZ'

Requirement	Verification
<p>£j Z{nn{a'k nX jZ'k y{UZ'UjZ'n'yZI X' k ZMj xZk ZI {y{n {aZ'yk M'uanl Z'NW xMjZ'j' , b'a M{xM'y_Zx'yuzZX'n_M'jZMj{ 'Y'2 Uuy'a'</p>	<ul style="list-style-type: none"> ° a ž Zybl 'M'X' b'k ujZk ZI {M'Zy{ 'uxn' xM' yb`' {aZ'' xX b'n'yn' , M'Z' {aM', bjj' uxh' {n {Uj Z{nn{a' {xM'y_Zx'xMjZ' {n' yZx' b'k'nl b'nx' £ a ? {aZ' {Zy{ 'uxn' xM' † a "I y xZ {aZ' {xM'y_Zx'xMjZ' _xnk {aZ' Uj Z{nn{a'k nX jZ' b'n_M'jZMj{ 'Y'2 Uuy'

2.4.3 Send Data Button

Aaby'U| {{nl' , bjj'UZ' xZyuni yb'UjZ' _nx' xMjU' b`' {aZ' V| xZl {k ZMj| xZk ZI { _xnk {aZ' uxZ'Z. b'y{b`' {Miz'k ZMj| xZSM'X' , aZl 'uxZyyZX', bjj' yb' I M'f'n {aZ' Uj| Z{nn{a'k nX| jZ' {n'yZI X'k ZMj| xZk ZI {y{n' {aZ'yk M'uanl Z'a''

Requirement	Verification
H aZl uxZyyZXS{aZ'yZl X'XMIMU {{nl 'k y{ yb M {aZ'Uj Z{nn{a'k nX jZ{n'yZl X'XMIM\$ MIX{aZ'Uj Z{nn{a'k nX jZ'k y{ 'l n{yZl X' XMIMh{aZx, byZ ^a	<ul style="list-style-type: none"> ° ^a <xZyy@Zl Xž MIMU {{nl ^a y xZ'č' XnZy n{` Z{y{ M ^a č ^a 5l 'Mk nUčZ XZfVZSVaZV {n'yZZ'č' l n{bMIMl b {Zx_MWZ'MiuZMx'My' b`' {aZ' yZx{n' _bj} b' XZ{M'by' b' xZ' MxY{n' {aM'yuZVbV'Un..; ča' {aZ'yZl {n'fZx' XMIMk Zl yčl y^a ř ^a ž n' l n{ uxZyyXMIMU {{nl` ž ^a 5l 'k nUčZ XZfVZSZl y xZ' l n' l n{bMIMl b {Zx_MWZ'XnZy n{ 'MiuZMx' {n' yZx'

2.4.4 Status LED

Aaby'1" ž` , bj'UZ'jb' , abZ' {aZ'XZfVZ'by'un, ZxZX'nl 'MIX' l n{jb' , abZ' {aZ'XZfVZ'by' | xl ZX'n^a

Requirement	Verification
2 y{ 'UZ'jb' , abZ' {aZ'XZfVZ'by'n' l 'MIX' l n{jb' , abZ' {aZ'XZfVZ'by'n ^a 2 y{ 'UZ'fby'UjZ' _xnk 'Ü' k Z{Zx'M' M'	<ul style="list-style-type: none"> ° ^a 2 ZM xZ'n {Ü'k Z{Zx'M' M' _xnk '1" ž` č ^a "l y xZ'XZfVZ'by'n'_MIX'Zl y xZ'1" ž` by' l n{nl` ř ^a A xl 'XZfVZ'nl` ž ^a "l y xZ'1" ž` by'n_ynjč' VnjnxMIX'fby'UjZ'

2.4.5 Bluetooth Status LED

Aaby'1" ž` , bj'UZ'ynjč'jb' , abZ' {aZ'Uj| Z{nn{a'k nX|jZ'by'Vnl | ZV{ZX' {n'Mk nUčZ'XZfVZ'Sl n{jb'
, abZ' {aZ'Uj| Z{nn{a'k nX|jZ'by' l n{Vnl | ZV{ZX' {n'Mk nUčZ'XZfVZ'MIX' l n{jn'ni b` _nx'Mk nUčZ'
XZfVZ'SMIX'Uj b i b` , abZ' {aZ'Uj| Z{nn{a'k nX|jZ'by' , Mčb` {n'UZ'uMxZ' {n'MXZfVZ'čM{Zx' , Z'
uxZyy{aZ'uMxU| {{nl ŠU| {UZ'_nxZ' , Z'Vnl | ZV{č' {n'Mk nUčZ'XZfVZ'A^a

Requirement	Verification
2 y{ 'UZ'jb' , ča' Mynjč' Vnjnx' , abZ' Uj Z{nn{a' k nX jZ'by'Vnl ZV{ZXŠUj b i b` , abZ'	<ul style="list-style-type: none"> ° ^a ž n' l n{ uMxUj Z{nn{a'k nX jZ' , ča' k nUčZ'XZfVZ'^a č ^a 2 ZM xZ'n {Ü'k Z{Zx'M' M' _xnk {aZ'

Uj Z{nn{a'k nX jZ'byZM'ab`_nx'Mk nUqZ' XZfVZSMIXI n{jk'n{aZx, byZ^2 y{UZ'fbyUjZ' _xnk 'Ük Z{ZxM, M^a	1" ž' † ^ "l y xZ'1" ž' 'by'Uj b i b` 'fbyUj†' ž ^ <M'Uj Z{nn{a'k nX jZ', k'a'k nUqZ' XZfVZ' " ^ "l y xZ'1" ž' 'by'n_ynj b' Vnjnx'MIX'fbyUjZ'
---	--

2.5 Mobile Device

AaZ'Vnl {xnj|l k', bjj'yZl X'XMIM{axn|`a'Uj|Z{nn{a'B°?A{n{aZ'k nUqZ'XZfVZ^aAaby'XZfVZ', bjj'
xZVZbZ'fVj| ZySy{nxZ {aZk 'b' M'k nUqZ'MuujbMl bnl Sb u| {aZk 'b {n'MI M' nxdak SMI X'XbyujM'
{aZk 'b M'fby| M'_nx{aZ'|yZx{n'i l n, ', aZxZ'n'y{nxZ {aZ'kZk y'MIX'an, 'k | Va'yUWZ', bjj'UZ'
xZw| bZX^a''

2.5.1 Bluetooth Receiver

AaZ'|yZx', bjj'aMfZ'MI Z.by{b`yk M{uanl Z{aM', bjj'UZ'MUjZ'n'uMk{n'n|xUj|Z{nn{a'k nX|jZ'b'
n|x'Vnl {xnj|l k^a''

Requirement	Verification
†j Z{nn{a'xZVZbZx'n ` yZx'y'k M{uanl Z' k y{UZ'MUjZ'n'Vnl I ZV{`n'Uj Z{nn{a'k nX jZ' fVUj Z{nn{a'Vnl I ZV{b'†	° ^ 5l 'M'k nUqZ'XZfVZ'SnuZl 'Uj Z{nn{a' Vnl I ZV{b' y' b {Zx_WZ' † ^ 'b X{aZ'VhxxZyuni Xb`'Uj Z{nn{a' k nX jZ'XZfVZ'I M'Z'n {aZ' Vnl I ZV{b' y' b' † ^ 5l {aZ'k nUqZ'XZfVZ'S{M'`n' Vnl I ZV{µMk, k'a {aZ'Uj Z{nn{a' k nX jZ' ž ^ "l y xZ'Vnl I ZV{b' 'by'k M'Z{axn `a' l n{bMl ynl {aZ'y'k M{uanl Z'y' b {Zx_WZ^a''

2.5.2 Mobile Application

5|x'k nUqZ'MuujbMl bnl ', bjj'xZVZbZ'fVj| Zy_xnk {aZ'Uj|Z{nn{a'xZVZbZxSy{nxZ {aZk 'b {aZ'MiuS
x|l 'MI M' nxdak {aM'jnni y'_nx{aZ'UZy{ujWZy'n'y{nxZ {aZ'Un.Zy'b {aZ{x| M S{Zj|{aZ'|yZx', aM'
y%o{x| M 'by'xZw| bZXSMIX'yan, 'M'fby| M'_n_, aZxZ'n'y{nxZ {aZ'kZk y'b {aZ{x| M ^a''

Requirement	Verification
<p>AaZ`Nj nxdak `l ZZxy{n XZVbXZ`, aZxZ`bZk y` k y{`UZ`ujWZX`MIX`{MIZ`jZyy`{aM`Y`k`b` `{Zy` {n`Vnk`u` `{Z`a`</p>	<p>° a 5l`k`nUbj`XZ`fVZ`S`l`y` `xZ`Nj`XMM` k`ZM` `xZk`Zl`{`by`yZl`{`Uf`uxZ`yyb``{aZ` @l`X`ž`M`M`U` `{nl` t`a` ?` `l`{aZ`Nj`nxdak` f`a` ByZ`My`{nu,`M`Va`M`X`y`{M`{b` ž`a` @nu`{aZ`y`{nu,`M`Va`,`aZl`{aZ` l`n`{b`b`M`l`n`l`b`{Zx`WZ`X`byuj`M`y`n`l`{aZ` k`nUbj`XZ`fVZ`y`{M`b``Nj`nxdak`by` Vnk`ujZ`{Z` "a` "l`y` `xZ`y`{nu,`M`Va`{b`k`Z`by`jZyy`{aM`Y` k`b` `{Zy`</p>
<p>AaZ`Nj nxdak`k` `y`{`UZ`M`UjZ`{n`xZunx`{aZ` yk`Nj`Zy`{unyy`UjZ`y`bZ`{x` `V`i`l`ZZXZ`_`nx`{aZ` `yZx`{n`y`{nxZ`{aZ`b`bZk`y`a`</p>	<p>° a 5l`{aZ`k`nUbj`XZ`fVZ`S`l`n`{b`b`M`l`n`l` yan` `jX`M`u`Z`M`{aM`{aZ`Nj`nxdak`by` Vnk`ujZ`{Z`a` t`a` ByZxy`yan` `jX`{aZl`UZ`M`UjZ`{n`yZZ` xZy` `j`{y`n`_`{aZ`Nj`nxdak` f`a` GbZ,`xZy` `j` ž`a` l`nni`n`l`{aZ`u`M`l`b``{x` `V`i`,`ZUy`bZ` ž`a`B1`M`jA`{n`Zl`y` `xZ`{aZ`xZy` `j` xZVZ`bZ`X`,`M`y`l`n`{`aZ`Ub`Zy`{x` `V`i` y`bZ`a`</p>
<p>AaZ`Nj nxdak`k` `y`{`X`byujM`n`l`Z`ynj` `{b`l`_`nx` {aZ`k`ny`{Z`_`bZl`{,`M`{n`u`M`l`{aZ`{x` `V`i`a`</p>	<p>° a 5l`{aZ`k`nUbj`XZ`fVZ`S`l`yZxy`yan` `jX` xZVZ`bZ`l`n`{b`b`M`l`n`l`y`{M`b``{aZ` Nj`nxdak`by`Vnk`ujZ`{Z`a` t`a` Bunl`Vnk`ujZ`{b`l`n`_`{aZ`Nj`nxdak`S` k`nUbj`M`u`j`b`M`l`n`l`yan` `jX`X`byujM`{n` {aZ` `yZx`M`j`b`{n`Z`_`bZl`{u`M`l`b`` ynj` `{b`l`y` f`a` ByZxy,`b`j`{aZl`a`M`FZ`{aZ`nu`{b`l`{n` fZ,`Nj`unyy`UjZ`ynj` `{b`l`y`M`I`X`VannyZ` M`Vhx`X`b``j`f`{aZ`UZy`{ynj` `{b`l`{aZ`t`yZ`Z` _`b`</p>

2.6 Pre-existing Tape Measure

5 | x`M`u`j`b`M`l`n`l`l`ZZXy`n`UfZV`{y`-X`b`Zl`y`n`l`y`b`n`xZx`{n`V`y`M`|`j`M`Z`{aZ`UZy`{,`M`{n`u`M`l`bZk`y`b`M`
Vnl`_`b`ZX`y`u`WZ`a`AaZyZ`X`b`Zl`y`n`l`y`S`|`j`{b`k`M`Z`j`f`S,`b`j`UZ`Zl`{ZxZX`b`Uf`{aZ`|`yZx`n`n`|`x`M`u`j`b`M`l`n`l`a`
AaZ`w`b`M`Zx`{aZ`|`yZx`V`M`l`_`b`|`xZ`n`|`{X`b`Zl`y`n`l`y`n`_`{aZ`{ab``y`aZ`p`yaZ`by`k`n`f`b``S`{aZ`k`nxZ`|`yZ`_`j`

n|x'MuujbMl' ; bj'UZ{n'atk paZx^a5|x'ynj|{nl' {n'k b'k b'z{aZ'M' n| | {n'_{tk' Z'nx' {aby'uxnVZyy' by' {n' | yZ'MuxZ'Z. by' {b' `Xb' b'Nj' {Miz'k ZMj' xZSxn| {Z' {aZ'k ZMj' xZk ZI {xZM' b' `y' _xnk' b'SM' X'yZi' X' {aby'XM'Vh'fZx'Uj| Z{nn{a' {n'n| x'MuujbMl' ^a

Requirement	Verification
<p>AaZ' k UZx'n_XMM' b' Njy' yZ'X'Ut' {aZ' {Miz' k ZMj' xZ' yan jX'UZ' jZyy' {aM' n'x'Zw' Mj' {n' {aZ' k UZx'n' b' u {y' M' Nj' Mj' Z' nl' n' x' k b'xnVnl' {xnjjZx^a</p>	<p>^a ž ZVnl' y{x V{uxZ'Z. by' {b' ` {Miz' k ZMj' xZ' ^t a GZ, `Z. by' {b' ` ZjZV{xnl' b'y'n'_{Miz' k ZMj' xZ' SyuZVb' b' Nj' t' XM' Nj' b' Zy' {aM' xn {Z' {n' X'byujM' nl' {Miz' k ZMj' xZ' ^f a ž aZV' {aZyZ' yb' Njy' {n' yZ'Z' b' , Z' MZ' Mj' jZ' {n' xZ'xn {Z' {aZ'k' {n'n x'Uj Z{nn{a' k nX jZ'</p>
<p>AaZ' k UZx'n_XMM' b' Njy' yZ'X'Ut' {aZ' {Miz' k ZMj' xZ' yan jX'UZ' jZyy' {aM' n'x'Zw' Mj' {n' {aZ' k UZx'n' b' u {y' M' Nj' Mj' Z' nl' n' x' k b'xnVnl' {xnjjZx^a</p>	<p>^a ž ZVnl' y{x V{uxZ'Z. by' {b' ` {Miz' k ZMj' xZ' ^t a ž aZV' b' Z. by' {b' ` XM' Mj' b' Njy' nl' {Miz' k ZMj' xZ' MZ' jZyy' {aM' k UZx'n' b' u {y' nl' k b'xnVnl' {xnjjZx'Ut' Vn {b' ` {aZ' XM' Nj' b' Zy'</p>

2.7 Schematics

<ZaM'ynl' Z'n_{aZ'k nxZ' VaMj'Zi' ` b' ` uM' {y'n'_{aby'uxnl'ZV' by' {aZ' _M' {aM' {aZxZ' MZ' M' | k UZx'n' VxV| b' ZjZk ZI {y' , ab'a'k | y' {UZ' Vnl' | ZV{ZX' {n' Z' {aZx' b' M'yk' Nj' MZM' ' M' Z' nx' {n' yan, 'an, ' {aZyZ' ZjZk ZI {y' MZ' Vnl' | ZV{ZX' {n' nl' Z' M' n' {aZx' S' {aZ' y' VaZk' M' b'y' VhxxZy' un| Xb' ` {n' Z' W'a' k nX| jZ' VM' UZ' _n| | X'UZjn, ^a

2.7.1 Power Module Schematic

' b | xZ' B'UZjn, 'n| {jb' Zy' {aZ' <n, Zx'2 nX| jZ' @VaZk' M' b' Vnl' {M' b' ` {aZ' aG' UM' {Zxt' S' {aZ' yj' bZ' y, b' Va' SM' X' {aZ' aG' j' b' ZM' f' nj' {MZ' xZ' | jM' n' x' AaZ' UM' {Zxt' ' by' | yZ' X' M' y' {aZ' un, Zx' yn| xVZ' nx' Mj' n' {aZ' M' XZ' X' ZjZV{xnl' b'y' S' {aZ' yj' bZ' y, b' Va' by' | yZ' X' {n' { | xl' nl' M' X' n' _un, Zx' {n' {aZ' M' XZ' X' ZjZV{xnl' b'y' SM' X' {aZ' f' nj' {MZ' xZ' | jM' n' x' y' {Zuy' Xn, | {aZ' f' nj' {MZ' jZ' fZ' j' _xnk' aG' {n' aG^a

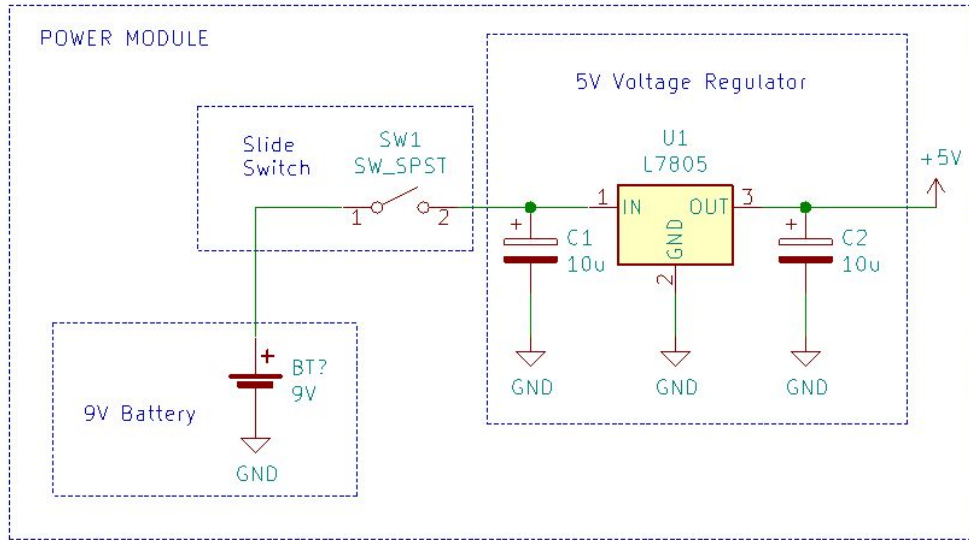


Figure 4. Power Module Schematic

2.7.2 Control Unit Schematic

' b | xZ`à UZjn, `n | j b Zy{aZ`† nl {xnj`BI b`@vZk MlV`Vnl {N b` b` {aZ`k b`xnVnl {xnjjZxS{aZ` Uj| Z{nn{a`k nX| jZSMIX`{aZ`XMIMyb | Njy`Vnk b` ` _xnk` {aZ`{MlZ`k ZMj| xZ`aAaZ`k b`xnVnl {xnjjZx` yZxfZy`Mj`Mk b`XjZ`k Ml`UZ{, ZZI` {aZ`XMIMyb | Njy`MIX`{aZ`Uj| Z{nn{a`k nX| jZ`2 nxZ`yuZVb`Mj`†S b` b` {ZxuxZ`y`{aZ`XMIMMnk b` ` _xnk` {aZ`{MlZ`k ZMj| xZSMIX`| yZy`{aZ`Uj| Z{nn{a`k nX| jZ`Mj`M k ZMj`{n`Vnk k | I b`MjZ`, b`a` {aZ`uMZX`Uj| Z{nn{a`XZ`fVZ`a`

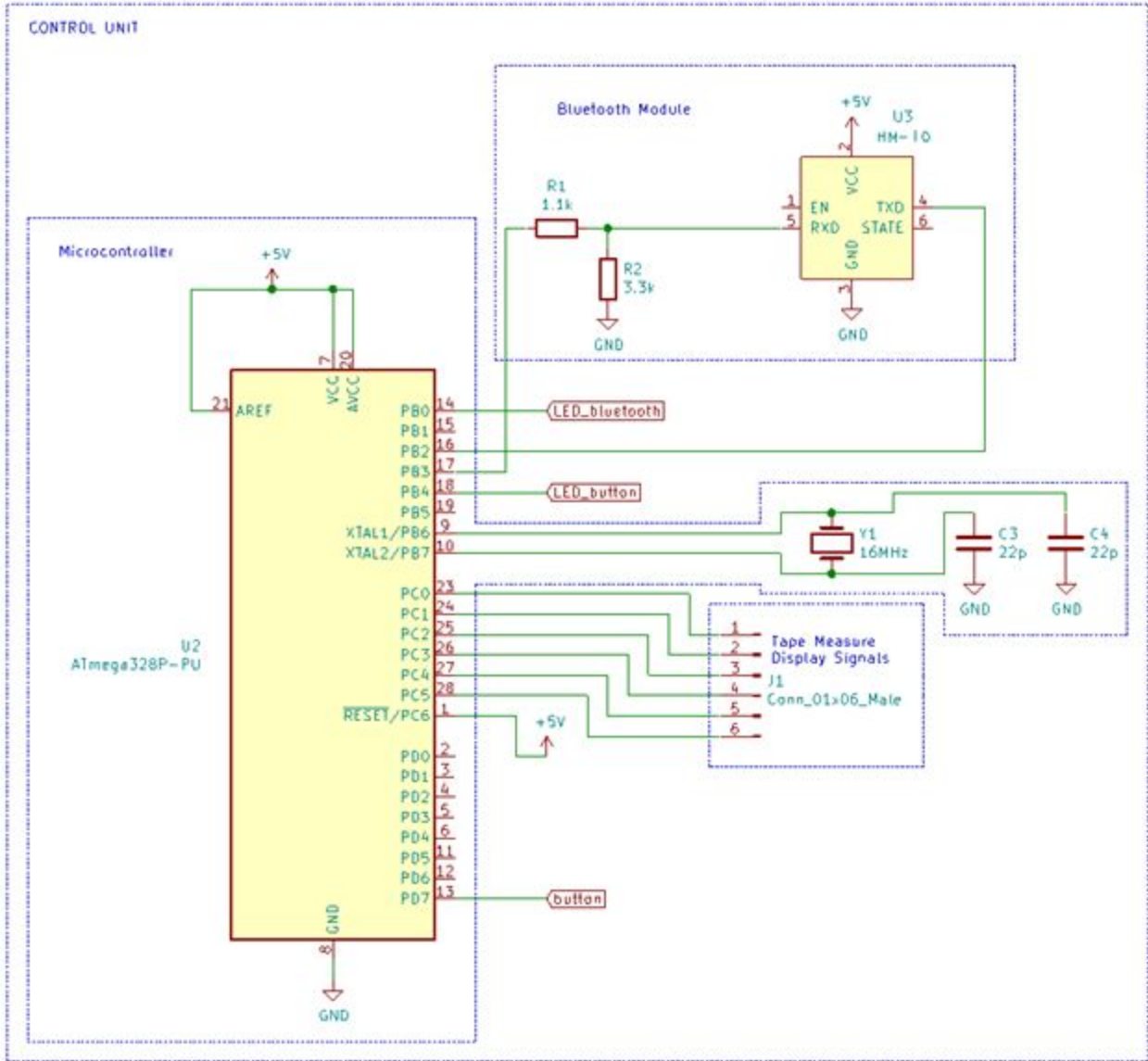


Figure 5. Control Unit Schematic

2.7.3 User Interface Schematic

' b | xZ ' á UZjn, ' n | j b Zy { aZ ' ByZx ' i { Zx ' WZ ' @ / aZk M | b ' VnI { N b ' b ' { aZ ' 1 " ž y ' M X { aZ ' U | { { nI ' a ' AaZ ' 1 " ž y ' M X ' | yZ X { n ' uxn / b XZ ' fby | M | b ' _nxk M | b | { n { aZ ' | yZx ' xZ ' M Xb ' ' 53µ5 ' ' y { M | y ' M X ' Uj | Z { nn { a ' VnI | ZV { b | y { M | y ' a ' AaZ ' U | { { nI ' , b j ' UZ ' | yZ X { n ' yb | M | { n { aZ ' k b ' xnVnI { xnjjZx ' , aZ | { n ' yZ | X X M | M { n { aZ ' uM XZ ' k nUjZ ' XZ ' fVZ ' a ' 3n { ZSMj ' n { aZyZ ' Vnk unI ZI { y ' M X ' VnI | ZV { ZX { n ' Xb ' b ' M | ub ' y ' n { aZ ' ° A2 " (° bYā < ^

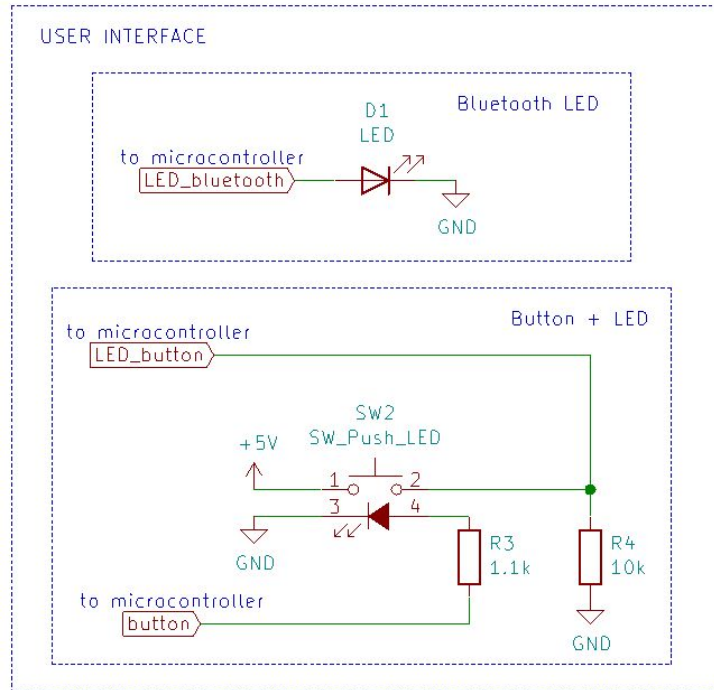


Figure 6. User Interface Schematic

2.8 Software

AaZ`{Muz`k ZNy| xZ`b {ZxW(y, k`a {aZ`k nUjZ`MuujbMl`l {axn|`a {aZ`Uj| Z{nn{a`k nX| jZ`b`n|x` Vnl {xnj}| l k`a` ab`a`jZfZj`nfZxfZ, `n_{a`b`b {ZxW{l`l`b`y`X`byujMZX`b`_b|xZ`B`a`

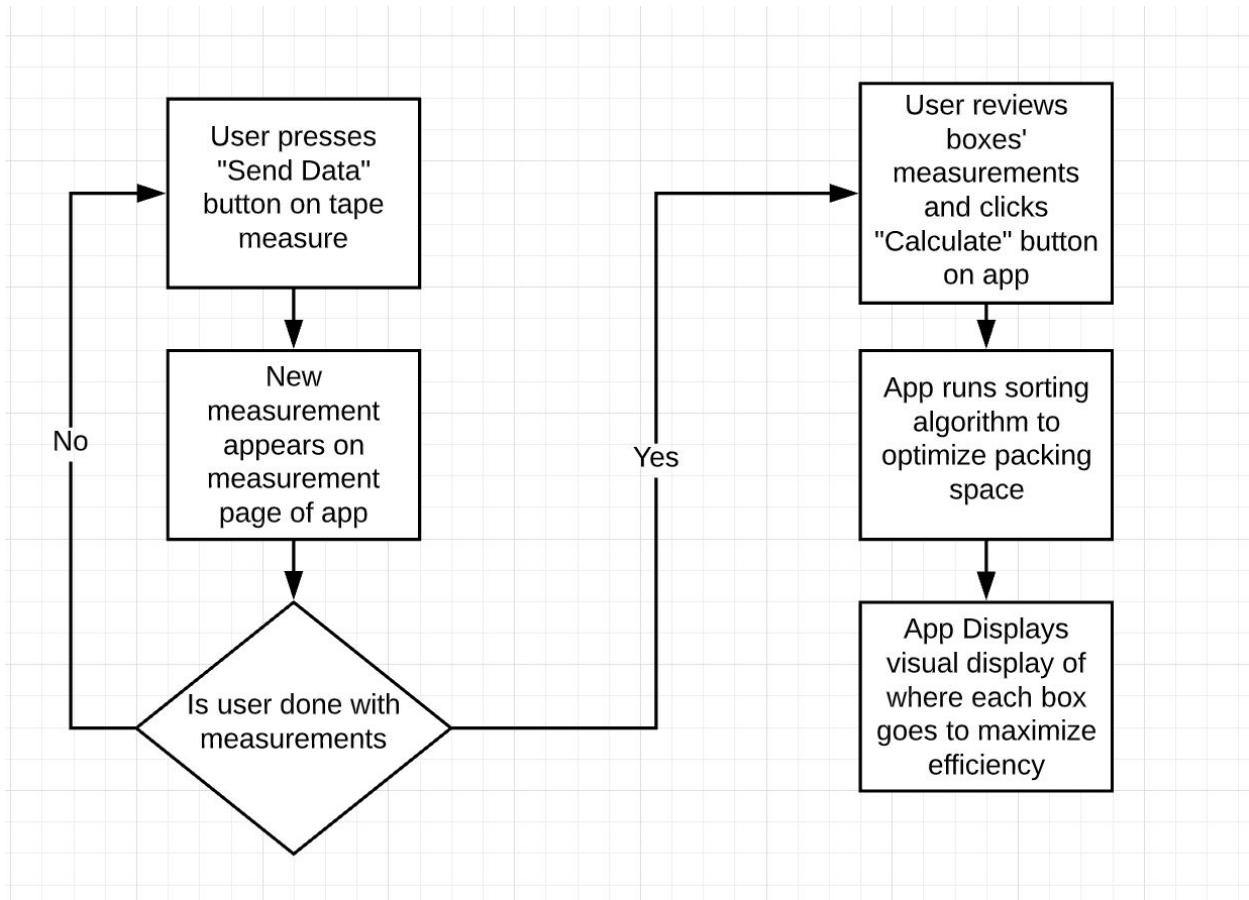


Figure 7. High-level Tape Measure and App Interaction

2.9 Fault Tolerance

<ZxaMiy'nl Z'n_{aZ'Ub`Zy{nUy{MjZy', ab/a', bjj'UZ'_MZX'b' {aby'uxnlZV{ by'XZVnXb` {aZ' k ZMj| xZk ZI {yb' I Mjy', ab/a' MZ' yZI {n' {aZ' XbyujM' n_{aZ' {Muz' k ZMj| xZ^a' AaZxZ' MZ' k | j{bujZ' xZMj'nI y', at' {aby'Vn| jX'UZ' MvaMjZl `Z^a' by{Syb' VZ', Z'aMjZ' l n{tZ{ aMj' {aZ' nuunx{| | b{t' {n' jnni' b' ybXZ' {aZ' {Muz' k ZMj| xZ', Z'ujM' {n' | yZ' {aZ' ZAMuzUa' AUPAS{aZxZ' by'Mj'n{ n_| | VZx{Mb' {t', b'a' , aMj'ZjZV{xnl by', Z', bjj' b' X'b' ybXZ^a' H b'a' {aby'UZb' ` yMj'S{an| ` a\$, Z' aMjZ' aMj' {aZ' nuunx{| | b{t' {n' nuZI | u' Mxb_zxZI {Muz' k ZMj| xZ', ab/a' aMj' Mxb' b{Mj' XbyujM'S' b' b' ` | y'Mkn| ` a' bXZMh_, aMj' , Z' VM' j'b' Zjt' Z. uZV{ {n' b' X'b' ybXZ' {aZ' nl Z', Z' anuz' {n' | yZ^a' n' xZ' ZxZI VZSub{| xZ'n_{aby' {Muz' k ZMj| xZ' VM' UZ' _n| | X'b' ` uuZI Xb.: ` j' b| xZy'a' UUA^* {aZ' {Muz' k ZMj| xZ', Z', ZxZ' MjZ' {n' XbyMjyZk UjZS, Z'_n| | X' {aZ' XbyujM' by'VnI | ZV{ZX' {n' {aZ' k Mb' <t' E' fBMVUB' ub' xWUnI' VMjZ' n_ , ab/a' nl jt' a' ub' y'MduZMj' {n' UZ' | yZX^a' VM' UZ' Mjy| k ZX' {aMj' , n'n_{aZyZ' ub' y'MZ' j'b' Zjt' | yZX' {n'

un, Zx{aZ'XbyujM'jZMf' á'ub'y{n'UZ'|yZX'nx'Vnk k | I bMl'ni 'u| xunyZy'a'1nni b' 'M' wj Ml'ni 'US {aZxZ' MZl -f' k M'f' | k UZxy', ab'va VM 'UZ' xZuxZyZl {ZX'|y' b' 'ni j' t' á' U'á'y©

....."Ncti gw'F geko cniTgrt gupvc vkpp" ? "4^{%dku} ? 4⁸ ? 86" "w'Ü"

AaZxZ'nxZSb' VM 'UZ' M'y| k ZX'uM'VjZ' Vnk k | I bMl'ni 'by' | n{ {aZ'ux'k M'k Z{anX', á'a', ab'va {aZ' ni 'UnM'X'k b'xnVnl {xnjjZx{M'f' y{n {aZ'XbyujM'SU| {xM'aZxSyZx'by'Vnk k | I bMl'ni 'k | y{ 'UZ' b' VnxunxM'Z'X'ynk Zan, 'AabyjZNM'x'y'b {n {aZ'yZVnl X'un{Zl {b'Vj'uxnUjZk ©'b | x'b' 'n| {', ab'va {tuZ' n_yZx'by'Vnk k | I bMl'ni 'by' | yZX'aAaZxZ' MZ' k M'f' Vnk k ni 'yZx'by'Vnk k | I bMl'ni 'uxn{nVnjy' , ab'va Z' by' {aAaZyZ' b' Vj| XZ' ? @Y'P'Y'S@<'S' f' SM'X'B' ? AS{n' l' M' Z' M'Z', 'ÁÜB'Á'aAaZxZ' 'by' | n' ' | M'M' {ZZ'San, ZfZxS{aM' M'f' n_{aZyZ' MZ' | yZX'Ut {aZ'Xb' b' M'f' {M'Z' k ZM'y| xZ'aAaZxZ'nxZS, Z', b'j' j'b' Zj' t' l' ZZX' {n' ux'nUZ' {aZ' b' X' b' X' | M'f' u' b' y' n_{aZ' x' b' U'nl' 'VM'jZ' {n' b' | x'Z' n' | {an, 'Z'N'W'a' y'b' l' M'f' k' u' M'f' {y' aZ' n' | {u' | {n' l' {aZ'XbyujM'a'2' nxZ' yuZV'b' M'f' t' S, Z', b'j' 'UZ' j'nni b' 'M'f' {aZ' y'b' l' M'y' -f' n' j' {MZ' jZfZjyS{aZ' M'u' MZl' { 'UM' X' x' MZ' ; XZ' Z' x' k' b' ZX' Ut' " wj Ml'ni 'Y' Á'Sy{M'f' {y' {nu' U'á' u' M'f' {Zl' y' SM' X' x' M' b' ' u' M'f' {Zl' y' j' Zl' ' áy' {n' {x' t' {n' Va' M' M'f' {Zx' S' Z', ab'va' ux'n{nVnj' k' b' a' {UZ' | yZX'UZ', ZZl' {aZ' {M'Z' k' ZM'y| xZ' -y' k' b'xnVnl {xnjjZx' M' X' b' -y' X'byujM'a' "

....."Dcw'f'Tcv'g ? $\frac{\%uf' o' dqu}{3'ugeqpf}$? $\frac{3}{rgt'kfj}$. "cu'umo kpi '*3'dk'r'gt'uf' o' dqu" "w'Ý"

5l' Z' b' M'f' Vnl' VZl' {n' l' n{ 'aZ'xZ' 'by' {aZ'ua'ty'by'Vnl' {Zx' M'f' {nl' 'UZ', ZZl' {aZ' {M'Z' k' ZM'y| xZ' -y' X'byujM' y'b' l' M'y' M' X' {aZ' " A2 " (° P'Y'á<-y' b' u' | {y'a' AaZxZ' 'by' M' nnX' Va' M' VZ' {aZ' f' n' j' {MZ' {aZ' {M'Z' k' ZM'y| xZ' | yZy'nx'Vnk k | I bMl'ni 'by' | n{ 'áG'j'n' b' j' b' Z' {aZ' b' u' | {y' {n' {aZ' " A2 " (° P'Y'á<'a' 5l' Z' uny' y' b' j' Z' , nxi' M'n' | l' X'nx' {aby', n| jX'UZ' {n' | yZ' {aZ' M' M'f' n' b' u' | {y' n' l' {aZ' " A2 " (° P'Y'á<' b' y' {Z' M' n'_{aZ' X'b' b' M'f' n' l' Zy' M' X' k' M'f' {aZ' f' n' j' {MZ' x' M' Z' {n' y' n' k' Z' {ab' ' k' nxZ' XZy' b' M' j' Z' a' AaZ' by' j' Z', á'a' {aby' S an, ZfZxS' b' y' uZx'nxk' b' 'M' M' M'f' n' ? Z' N' X' Á' Vnk k' M' X' x' n' k' {aZ' " x' l' b' n' ° l' M'f' n' ' µ5' j' b' x' M' t' Á' Ü' á' Á' {M'Zy' M' M'f' t' y'b' l' b' b' M'f' {M' k' n' | l' {n'_{b' Z' a' W' n' x' b' ' {n' Á' Ü' á' S' b' {M'Zy' M' n' | { 'ÜÜÜ' k' b' x' n' y' Z' Vnl' Xy' {n' V' M' j' M' M'f' n' ? Z' N' X' Á' n' l' VZ' a' @Z' b' ' M'y' {aZ' xZ' k' M' UZ' k' nxZ' {aM' n' l' Z' y'b' l' M'f', ab'va', n| jX' l' ZZX' {n' UZ' M' M'f' t' S' {aZ' {n' {M'f' n' k' n' | l' {n'_{b' Z' b' , n| jX' j' b' Zj' t' {MZ' {n' M' M'f' t' S' l' y'b' l' M'y' by' b' fZl' b' " wj Ml'ni ' p©

....."VqwnTgcf"Vko g ? $\frac{322'' u}{3''iki' pcn}$? "%iki' pcn" "w'P"

AM' b' ' {aZ' b' fZxyZ' n_{aby' xZy| j' {uxnX| VZy' {aZ' k' M' k' | k' 'UM' X' x' MZ' ; M' M' S' M'y| k' b' ' Ü' U'á' uZx' ytk' Unj' Á', ab'va' {aZ' " A2 " (° P'Y'á<' Vn| jX' {aZ' n' xZ' {b' M' j' t' b' {ZxuxZ' S' b' fZl' b' " wj Ml'ni ' B©

....."O cz'Dcw'f'Tcv'g ? $\frac{3}{VqwnTgcf"Vko g}$? $\frac{3''iki' pcn}{322'' u}$ " "%iki' pcn" "w'ß"

* {aZ'ZfZl' { {aby' y' M' k' u' j' b' ' xZw' Zl' Vt' by' -f' wj M' Zl' n' | ' aS' k' M' UZ' UZy' {n' {x' t' M' k' u' j' b' t' b' ' {aZ' y'b' l' M'y' Vnk' b' ' x' n' k' {aZ' {M'Z' k' ZM'y| xZ' y' n' {aZ' t' UZ' Vnk' Z' Vnk' u' M' b' j' Z', á'a' {aZ' " A2 " (° P'Y'á<-y' X'b' b' M'f' b' u' | {y', ab'va' MZ' Vnl' y' XZ' x' M' j' t' M'y' {Zx' {aM' {aZ' M' M'f' n' b' u' | {y'a' Aaby'San, ZfZxS, n| jX' j' b' Zj' t' "

xZwł bZ {aZ | yZ n_MjZfZj yab{Zx^a1ZfZj yab{Zxy'aMfZ jtk b'ynl 'an, 'wł b'jt {aZt'VMi'UZ'y, b'VaZX^a (Zi ZxMj'+'yuZMib`S{an|`aS{aZ_xZwł Zi Vt', b'a', ab/a Xb b'Nj'ub u| {y'VMi'y'VMi' {aZ'yb' | Njy» ZfZi' , b'a' {aZ'y, b'Vab` jtk b'yn_{aZ'jZfZj yab{Zxy» y{b'j, n|jX'uxn'f'XZ'UZ{{Zx'uZx_nxk MIVZ'j' b' {Zxk'y' n_yMk'ujb`xMZYA{aM'ytk'ujt'|yb` {aZ'Mi'Nj'n`ub y^aAaZxZ_nxZS, Z'yan|jX'UZ'MUjZ' {n'xZMk' yb' | Njy'Vnk' b` _xnk' {aZ' {Miz'k' ZMj| xZ'_nx'Xb_ZxZi' { 'fnj{MZ'jZfZjy'Mi'X'pnx'y{Mi'X'MX'UM|X'xMZY^a

H b'a'Nj' {aby'UZb`y'Nk'SZfZi' b' {aZ', nxy{V'WjZ'yVZi' M'bn, aZxZ', Z', n|jX'UZ'| | MUjZ' {n'xZMk'XMM' _xnk' {aZ' {Miz'k' ZMj| xZS{aby', n|jX' | n{ 'l' ZVZy'Nj'UxZM' n| x'uxn'ZV{^aBj{tk' MZj'tS, Z' | ZZX' {n` Z{ 'k' ZMj| xZk' Zi' {X'M'Nynk' Zan, SMI'X' | yb` 'M'Xb' b'Nj' {Miz'k' ZMj| xZ' b'ynl' Z'n_k' Mi't, M'y' {n'Xn' {aby^a H'Z'Vn|jX'Sb'y{ZM'S|yZ'VMk' ZxMj'SZi' VnXZxySMi'X'pnx'n{aZx'Xb'y{MIVZ'yZi' ynxy' {n'uZx_nxk' {aZ'yMk' Z' {Mj' b' 'M'Xb_ZxZi' {, M^aBj{tk' MZj'tS, Z'UZj'Z'fZ' {aZ' {Miz'k' ZMj| xZ', n|jX'UZ' {aZ'UZy' {nu{b'nl' _nx' {aZ'Vnl'y|k' ZxSU' { {aZxZ' MZ'n{aZx'nu{b'nl'y'n| { {aZxZ', ab/a', Z'Vn|jX' | yZ'Nj'y| Uy{b' {Zy'b' n| x' uxnhZV{ b' {aZ'ZfZi' {, Z'MZ' | | MUjZ' {n` Z{ {aZ' {Miz'k' ZMj| xZ' {n', nxi^a

3 Costs

5| x'XZ'fZj'nuk' Zi' {Vny'y'Vnk' Z'_xnk' {axZZ'uZnujZ', nxi' b` 'UÜ'an|xy'M, ZZi' M'ÖaÜ'Mi'an|x'uZx' uZxynl^aAMib` {aby'f'Nj| Z'_nx' {aZ'Üa', ZZi'y' {aM', Z'MZ', nxi' b` 'nl' {aby'uxnhZV{` b'Zy' | y'ÖaÜSÜÜ' _xnk' "wł M'bnl' a^a

".....5", "&72lj qwt", "32"j qwt uly ggm", "38"y ggm", "40"? "&82.222" "w^a

AaZ'Vny' {n_n| x'uxn' {n{tuZ', b'j'UZ' Öaã^aaP^a*_, Z'u| x'VaMjZ'n| x'uMk'y'b' U|ji' j'Ut' {aZ'ÜÜÜ'uMk'y'Än|x' {n'Nj', b'j'UZ' Öaã^aaY^aAaZ'UxZM'Xn, l' n_{aZyZ'Vny'y'MZ'j'by{ZX'UZjn, ^a

<Mk'	† ny{ç<xn{n{tuZÄ'	† ny{çç ji' 'ÜÜÜ'uMk'yÄ'
2 b'xnVnl' {xnjjZx' ç' A2" (° PÝã<1<B'1'ž b' b' ZtÄ'	ÓY ^a Üa'	ÓÜ ^a aP'
Ýã<b' @nV' Z{ç' ž ÝãÜž A'1' ž b' b' ZtÄ'	ÓÜ ^a pp'	ÓÜ ^a YÝ'
àG'Gnj{MZ'?'Z' jM'nx' çB° aãÜat' O' @'1'ž b' b' ZtÄ'	ÓÜ ^a aa'	ÓÜ ^a Bä'
ÜÜy' '† M'üM' {nx'ç.ÝÄç<ãÝã'13ž' 1'ž b' b' ZtÄ'	ÓÜ ^a Bä'	ÓÜ ^a Üa'
ÜÜi' ?Zy' {nx'çÜÜÜ>ŁO'13ž' 1'	ÓÜ ^a ÜÜ'	ÓÜ ^a ÜP'

ž b b ZtÀ		
ÝÝÜ?Zyby(nx;ÿ.YÄ;ÝÝÜ(ŁO'3ž '1' 1'ž b b ZtÀ	ÓÜaÝÜ	ÓÜaÜa
ÜaÜi ' ?Zyby(nx;ÿÜaÜO>ŁO'3ž '1' ž b b ZtÀ	ÓÜaÜÜ	ÓÜaÜP
PaPi ' ?Zyby(nx;ÿPaPO>ŁO'3ž '1' ž b b ZtÀ	ÓÜaÜÜ	ÓÜaÜP
ÝÝü' † MúMú(nx;ÿ.YÄ ÿPää'ÜaYá'3ž '1'ž b b ZtÀ	ÓÜaää	ÓÜaPá
Üá2) %bjnV † xty{Mj' ÿPÜÜ'áÜPß'3ž '1'ž b b ZtÀ	ÓÜaáß	ÓÜaPá
< yaU {{nl ' , ká '(xZZI '1" ž ' ÿßáÜ'Yáää'3ž '1'ž b b ZtÀ	Óa'ÜÜ	Óa'ÜP
Łj Z'1" ž ' ÿ' áÜPŁ'ŁŁ 3 † GÜLÜßáÜ'3ž '1' ž b b ZtÀ	ÓÜaÝÜ	ÓÜaÜa
@bXZ@ kVa ÿ 03ÜÜááá'3ž '1' ž b b ZtÀ	Óa'aY	Óß'aáß
äG'ŁM{Zxt'ÿ' k Nßd 'ŁMÿyÄ	ÓPaBá	ÓÜaY
Łj Z{nn{a'2 nX jZ'ÿ 2 'ÜÜ'1' Mß Nßd 'Vnk Ä	Óa'aä	Óa'ÜP
ž b b Mj'AMúZ'2 ZMj xZ' ÿZAMúZÜá " AÜá'aä'XU'?'<'1' Mß Nßd 'Vnk Ä	ÓY'aää	ÓY'aää
<Ł Ł'ÿ<Ł ŁH MÄ	Óa'	ÓÜaÜa
† Mÿb ` ÿPž 'uxb {Zy{tk MZÄ	ÓP'	ÓP'
5{aZx?Zyby(nxySAXMÿyby(nxyS MIX'(ZI ZxMj" jZV{xÜMj' † nk unl ZI {y;ž b b Zt' Zy{tk MZÄ	ÓÜÜ	ÓÜaÜ
An{Mj'† ny{	Óa'ÜPá	Óa'ÜPá

4 Schedule

H ZZi	3MaM lzj	A/	LNWa
' ZU ^a ÝBSÝÜYÜ	AMj , b'a k Wab Z yanu Mln xZVnk k ZI XMlbnl y_nx uatybMjXZyb l ^a @ Uk b'nxXZx_nx{MIZ k ZNy xZ M X b b'bj Vnk unl ZI {y ^a	?ZyZMVA <MI b` <xnUjZk ` j` nxbak y l` ujM {aZ Vxny ujM_nxk` Mdu`nl` Gby Mj@ Xbn`	?ZyZMVA b'z` fby Mj b {Zx_MZyMIX` y{x V{ xZy{n`Zk UZX` _nx`k nUljZ` MdujbMlbnl` XZfZjnuk ZI {a ^a
2 M ^a ÝSÝÜYÜ	5I VZ {MIZ k ZNy xZ by xZVZbZXSUZ` b` _b xb` n {an, yb l Mj {n {aZ XbyujM` , nxi ^a	ŁZ` b` Vnl I ZV{b` {aZ` Mdu`n Uj Z{nn{a M X` XbyujM b` {n {aZ yZx` b {aZ uanl Z` by` Vnl I ZV{ZX {n {aZ` Uj Z{nn{a`k nX jZ ^a	ŁZ` b` Vnl y{x V{bnl` MIX XZyb l` n`_b'z` k nXZj Mj nxbak` UMyZX`nl` b'Zl` xZy j{y`_xnk` jnx{b` Mj nxbak`
2 M ^a aSÝÜYÜ	' b MjZujM`_nx` VnjZV{b` `yb l Mj` _xnk` {aZ XbyujM S nxXZxZ. {xMuM{yMj` I ZZXZX ^a @ Uk b` uxnunyMj_nxXZx_nx` <Ł Ł ^a	H nxi`nl` {aZ`uMZ` , aZxZ`{aZ` k ZNy xZk ZI {fMj Zy` , b'j`UZ`NXXZX`MIX` Mjn, {aZ` yZx`{n` b u {fMj Zy` k M Mj t` M X`y{M{` `Z{{b` k ZNy xZk ZI {y`_xnk` Uj Z{nn{a`k nX jZ ^a	<xn` xM` Uj Z{nn{a` k nX jZ`{n`yZl` X` b` Vnk b` `XMIM_xnk` {aZ` k b'xnVnl {xnjjZxp{MIZ` k ZNy xZ` Vnk Ub` Mlbnl` {n`n x` k nUljZ` MdujbMlbnl` , aZl` @Zl` X`z`MIM Uj {{nl` by`uxZyyZX ^a " I y xZ`Mj` XMIMby` UZb` `yZl` {n`fZx`_xnk` k nX jZ`{n`k nUljZ` Mdu ^a
2 M ^a ÜaSÝÜYÜ	Axt`{n`b` VnxunxMZ` k b'xnVnl {xnjjZx`{n` xZNX`XMIM_xnk` XbyujM ^a	Ł nl` {b Z` Z{{b` k ZNy xZk ZI {y`_xnk` {MIZ`k ZNy xZ`MIX` yMfZ`{aZyZ`fMj Zy`b` Łn..VjMy, abZ` uMxyb` M X`k Ml b` y xZ`{aZ`b u {y`MZ` Xn UjZy ^a jyn`y{M{` Mj nxbak` ^a	ŁZ` b` NXXb` Vnyk Z{b' ZMl xZy`{n` {aZ`k nUljZ` MdujbMlbnl` j'b Z` jMUZjb` S b`fZl` {nxt`S MIX`VjMybMlbnl` n` b'Zk y ^a ByZxy`VM jMUZj` {aZbx`Un. Zy`MIX` yuZVb t` b`{aZ t` MZ` j'b a{SaZMf t` S_xMljZS

			Z{V ^a AaZ† VMi Mjyn {MIZ' b fZI {nxt' n_ , aM' bZk y' MZ' b' Z' N' Wa Un...}
2 M ^a YpŠYŮYŮ	@jXZxVnk unl ZI {y' nl {n' <† t ^a	† nl {b Z {n', nxi' nl' {aZ' Mj' nxbak' {aM' VMi' ujMwZ' {aZ' Un. Zy' b' Pz' MxM'	† xZMZ' l n{bMl' b' b {Zx MWZy' nx yZxy' , aZl' {aZ' Mj' nxbak' by' Vnk ujZ{ZSyn' {aZ† VMi' fZ, unyybJZ' ynj {bni y ^a ° XXb' ni Mj† VxMz' M ank Z' B* _nx' k nUbZ' MdujbMl' bni ^a
2 M ^a PŮŠYŮYŮ	ž Zyò Z. {Zxnx' Vnyb' _nx {Miz' k ZMy xZ ^a	H nxi' nl' {aZ' Un... XbyujM' uMz' Mx' VxMz' Pz' tk MZ'	tZ' b' {Zy{b' _n_{aZ' ynx{b' _Mj' nxbak' Mx' Pz' k nXZj Mj' nxbak' , tãa' {aZ' Uj Z{nn{a' k nX jZ'
° ux ^a áŠYŮYŮ	° yyZk UjZ' {Miz' k ZMy xZ' Mx' k MZ' k nXbMl' bni y' My' l ZZXZx ^a	† nl {b Z', nxi' b' _nl' {aZ' XbyujM' uMz'	BuXMz' Mx' xZ' b' Z' Mj' nxbak' UMyZx' n_ n_{Zy{b' _xZy j{y' Mx' M Mj† yby'
° ux ^a ÜpŠYŮYŮ	ž Zyò 'Mx† Mva' u' , ZZi'	ž Zyò 'Mx† Mva' u' , ZZi'	ž Zyò 'Mx† Mva' u' , ZZi'
° ux ^a YŮŠYŮYŮ	ž Zyò 'Mx† Mva' u' , ZZi'	ž Zyò 'Mx† Mva' u' , ZZi'	ž Zyò 'Mx† Mva' u' , ZZi'
° ux ^a YaŠYŮYŮ	ž Zk n'	ž Zk n'	ž Zk n'
2 M' BŠYŮYŮ	<xZyZl {Ml' bni	<xZyZl {Ml' bni	<xZyZl {Ml' bni

5 Safety and Ethics

AaZxZ' MZ' MZ, 'yMz{† MxZ{abMj' Vnl VZxl y{aM' xZy' XZ', tãa' n | x' uxn' hZV{^a 5l Z' n_{aZ' k M' yMz{† Vnl VZxl y' Vnk Zy' _nxk' {aZ' jãab' k' bni 'UM{ZxZy | yZX' Ut' n | xXb' tãMj' {Miz' k ZMy | xZ^a AaZyZ' UM{ZxZy VMi' Z. ujnXZ' b_{aZ† UZVnk Z' n' fZxVaMx' ZX' nx' xZ' M' a' M' Z. {xZk Z' aZM' {Zk uZxM | xZ' ÁãÁ' ° XXb' ni Mj† S{aZyZ' UM{ZxZy yan | jX' l n{ 'UZ' VaMx' ZX' b' Z. {xZk Z' VnjX' {Zk uZxM | xZyZ' tãaZx' Mj' {aZ† VMi' XZ{ZxnxMz' Mx' jZM' VaZk' bMj' Mx' ÁãÁ' An' Zl y | xZ' yMz{† S, Z', bj' MxZw' MZj† {Zy' Mx'

k nI bnx{aZ'UM{Zxt'VZjj{Zk uZxM| xZ {n'ZI y| xZ b'yn'fZxMj' w| Nj' b' t' M' X' uZx' n' k' M' VZ' _njjn, b'` {aZ'` | bXZj' b' Zy' n' } {b'` {a' b' y' U' M' {Z' x' t' j' M' y' MZ' {t'` | bXZ' A' U' A'`

° I n{aZ'x'yMZ{t'Vnl VZxl' y{Zk' y' _xnk' {aZ'ZI VjnyZX'Uj| Z{nn{a'k' nX| jZ' M' {M' WaZX' nI {n' {aZ' X' b' b' M' j' {M' Z' k' Z' M' y' | xZ' a' b' VZ' {aZ' {M' Z' k' Z' M' y' | xZ' V' M' UZ' | yZ' X' b' Un{a' b' Xnnx' M' X' n' | {Xnnx' Z' I' f' b' nI k' Z' I' {yS' {aZ' Uj| Z{nn{a' k' nX| jZ' yan| jX' UZ' Z' I' V' yZ' X' b' k' MZ' x' b' j' b' y' Va' M' M' t' l' n' k' n' b' y' | xZ' n' x' , MZ' x' V' M' y' yanx| {aZ' V' b' V' b' a' n' x' n' | x' yuZ' V' b' b' M' b' nI S' {aZ' V' y' b' ` k' MZ' x' b' j' , b' j' N' KaZ' X' {n' * < a' a' y' M' I' X' M' X' y' Z' I' y' x' b' ` b' , b' j' , b' ay' {M' X' | u' {n' U' k' Z' Z' x' n' , MZ' x' _njjn, b'` {aZ'` | bXZj' b' Zy' n' {aZ' t' ` xZy' < n' {Z' V' {b' nI' y' {M' I' X' M' X' A' U' A'`

AaZ'Uj| Z{nn{a' k' nX| jZ' b' yZ' j' _Njyn' x' M' y' Zy' M' y' MZ' {t'Vnl VZxl' X| Z' {n' {aZ' Z' .uny| xZ' n' , bXZy' {a' M' {aZ' k' nX| jZ' V' M' X' Z' y' a' . .unyZX' , bXZy' V' M' y' Z' y' b' y' | Zy' _nx' Un{a' {aZ' | yZ' x' M' X' {aZ' XZ' f' b' Z' b' yZ' j' a' n' x' {aZ' XZ' f' b' Z' S' {aZ' Z' .unyZX' , bXZy' V' M' UZ' X' M' k' MZ' X' M' X' p' n' x' yanx| V' b' V' b' b' Z' X' {axn| ` a' M' f' M' Z' {t' n' k' Z' M' y' b' Vj| X' b' ` a| k' M' b' X| VZ' X' a') n, ZfZxS' {aZ' Ub' ` Zx' y' MZ' {t' b' y' | Z' V' nk' Zy' _xnk' {aZ' | yZ' x' Z' I' X' M' y' Z' .unyZX' , bXZy' V' M' V' M' y' Z' a' M' k' {n' {aZ' | yZ' x' | y' b' ` {aZ' XZ' f' b' Z' a' n' jZ' V' {x' b' M' j' i' yan' V' i' y' M' X' U| x' i' y' MZ' h' y' { ynk' Z' n' {aZ' X' M' k' MZ' {a' M' | yZ' x' y' V' M' x' Z' V' b' Z' X' | Z' {n' {aZ' b' {Z' x' M' {b' nI' _xnk' Z' .unyZX' , bXZy' a' n' N' X' X' Z' y' {a' b' y' MZ' {t' b' y' | Z' S, Z' , b' j' _b' y' {Z' I' y' | xZ' {aZ' V' n' x' Z' V' {M' k' n| I' {n' _f' n' j' {MZ' M' X' V' | xZ' I' {b' j' _j' n, b'` {axn| ` a' Z' M' a' Z' jZ' V' {x' b' M' j' V' nk' unI' Z' I' {b' n' | x' Uj| Z{nn{a' k' nX| jZ' U' t' u' x' n' U' b' ` Z' M' a' u' M' k' {M' X' f' Z' x' b' t' b' ` b' , b' a' n' | x' x' Z' w' b' Z' k' Z' I' {y' a' 3Z' .{S, Z' , b' j' {aZ' | b' y' | j' MZ' {aZ' , bXZy' {n' u' x' Z' f' Z' I' {M' t' n' _{aZ' k' _xnk' UZ' b' ` Z' .unyZX' {n' {aZ' | yZ' x' a' H' Z' u' j' M' nI' b' y' | j' M' b' ` {aZ' , bXZy' | y' b' ` Z' jZ' V' {x' b' M' j' i' n' x' {aZ' x' k' M' j' b' y' | j' M' b' ` {M' Z' nI' n' | x' , bXZy' a' n' Z' I' y' | xZ' {aZ' {M' Z' a' M' y' M' XZ' b' b' b' Z' yZ' M' nI' {aZ' , bXZyS, Z' , b' j' {Zy' {M' X' k' MZ' y' | xZ' b' X' n' Z' y' I' n' {Vnl X| V' {M' t' Z' jZ' V' {x' b' M' j' i' M' y' , Z' j' j' M' y' aZ' M' | u' a' H' Z' , b' j' {Zy' {U' t' _njjn, b'` {aZ' y' | XZ' I' {k' M' | M' j' _nx' Z' jZ' V' {x' b' M' j' i' y' MZ' {t' A' U' A'`

° I Z' {a' b' M' j' i' Vnl VZxl' n' | x' u' x' n' Z' V' {x' M' y' Z' y' b' f' n' j' f' Z' y' {aZ' Vnl {M' k' Z' I' {n' _u' x' b' MZ' | yZ' x' X' M' M' H' b' a' b' n' | x' k' n' U' j' Z' M' u' j' b' M' b' nI' S| yZ' x' y' , b' j' UZ' M' U' j' Z' {n' y' {n' x' Z' {aZ' b' n, I' u' x' b' MZ' X' M' M' {a' M' y' i' Z' u' {a' b' X' Z' I' _xnk' n' {aZ' x' | yZ' x' y' a' a' b' y' b' y' | Z' x' M' y' Z' y' {aZ' Vnl VZxl' n' _u' n' y' b' j' Z' X' M' M' j' Z' M' y' n' x' u' b' M' t' {a' M' V' M' {M' Z' u' j' MZ' {axn| ` a' k' M' j' b' nI' y' n' _f' , MZ' M' {M' i' y' _nV| yZ' X' nI' M' i' u' n' x' u' a' nI' Z' X' M' M' AaZyZ' b' y' | Zy' ` n' M' M' b' y' {aZ' * * * t' nXZ' n' _{a' b' y' O' a' i' {n' M' f' n' b' b' h' x' b' ` n' {aZ' x' y' S' {aZ' b' u' x' n' u' Z' x' t' S' x' Z' u' | {M' b' nI' S' n' x' Z' k' u' j' n' t' k' Z' I' {U' t' _NjyZ' n' x' k' Nj' b' nI' y' N' k' b' nI' A' A' a' n' k' b' b' MZ' {a' b' y' b' y' | Z' S, Z' , b' j' a' M' Z' M' n' {b' b' M' b' nI' M' u' Z' M' {n' | yZ' x' y' xZ' V' nk' k' Z' I' X' b' ` u' n' u' | j' M' y' Z' V' | x' b' t' M' u' j' b' M' b' nI' y' {n' b' y' {M' j' b' {aZ' t' MZ' I' n' {b' y' {M' j' Z' X' Nj' k' Z' N' t' a'`

@ VZ' {aZ' k' n' U' j' Z' M' u' j' b' M' b' nI' V' Nj' M' j' MZy' {aZ' I' Z' Z' XZ' X' M' k' n| I' {n' _y' u' MZ' {n' a' n' j' X' nI' Z' y' UZ' j' nI' ` b' ` yS' n' | x' u' x' n' Z' V' {x' M' y' Z' y' Vnl VZxl' n' _{M' b' ` N' k' f' M' {MZ' n' _{aZ' ` b' Z' I' k' Z' M' y' | xZ' k' Z' I' {X' M' M' M' X' y' | ` Zy' {b' ` {aZ' U' b' ` Zy' {y' b' % {x| V' i' u' n' y' b' j' Z' a' a' a' b' y' Vnl VZxl' f' b' n' j' MZy' {aZ' * * * t' nXZ' n' _{a' b' y' O' P' i' {n' UZ' a' nI' Zy' {M' X' x' Z' Nj' b' {b' b' y' {M' b' ` V' Nj' k' y' n' x' Z' y' {b' k' MZy' U' M' y' Z' X' nI' M' f' n' j' M' j' Z' X' M' M' A' A' a' n' M' f' n' b' x' f' b' n' j' M' b' nI' S, Z' , M' i' {n' Vnl y' {x| V' {M' X' XZ' f' Z' j' n' u' M' i' M' j' n' x' b' a' k' {a' M' X' n' Z' y' I' n' {h' y' {Zy' {b' k' MZ' {aZ' y' u' MZ' _xnk' {aZ' ` b' Z' I' | yZ' x' k' Z' M' y' | xZ' k' Z' I' {X' M' M' S' U' | {nI' Z' {a' M' V' Nj' M' j' MZy' {aZ' Z' I' {bX' X' M' M' y' Z' {M' X' Vnl Vj| XZy' M' {n' M' j' M' k' n| I' {n' _y' u' MZ' I' Z' Z' XZ' X' _nx' {aZ' | yZ' x' a' ` X' X' b' nI' Nj' t' S' {a' b' y' k' Z' M' y' {a' M' {aZ' X' M' M' x' Z' V' b' Z' X' _xnk' {aZ' u' x' Z' I' . b' y' {b' ` {M' Z' k' Z' M' y' | xZ' k' | y' {UZ' M' V' | x' MZ' M' X' u' x' Z' V' yZ' , aZ' I' yZ' I' {n' f' Z' x' Uj| Z{nn{a' Vnl I' Z' V' {b' nI' a'`

H Z'k | y'ZI y| xZ {aM} {aZ'k ZNY| xZk ZI {XMMby'NW} xMZ' My'VM 'UZ' b' nxXZx_nx'n| x'Mj' nxbak {n'
VjM} jMZ {aZ' bXZM'IX'nu{bk' My'ny} | {bnl' _nx' {aZ' | yZx^aAaZ' Mj' nxbak \$' bZl' {aZ'NW} xMZ' M'X'
uxZVyz'k ZNY| xZk ZI {XMM\$, n| jX' {aZl' uZx_nxk' nfZx' {aZ' ZI {bz'XMIMYZ' M'X' xZVnk k ZI X' {n' {aZ'
| yZx', aM'y%{x| M' {aZt'yan| jX' Z' bZl' {aZ' | yZx'k ZNY| xZx'k ZNY| xZk ZI {XMM'

' b' MjtS{n' M'fnd' fbnjMbnl' n_**" " ' nXZ' n_" {ab'Y'0U'1'anjX'uMNM n| | { {aZ' yMZ' {tSaZNY' {aSM'IX'
, Zj_MZ' n_ {aZ' u| Ujb'S' {n' y'xbZ' {n' Vnk' ujt', bZ' Z' {ab' Mj' XZybI' M'X' y| y' {M' M'jZ' XZfZjnuk ZI {'
uxW' {bZySM'IX' {n' Xb' M'nyZ' uxnk' u'jt' _M' {nxy' {aM' k' b' {Zl' XMI' Zx' {aZ' u| Ujb' /nx' {aZ' Zl' fbnl' k ZI {'
Aa^A^, Z'NWZu' xZyuni' y'ub' b' t' _nx'n| xXZybI' ^5| xuxntZV' M'k' y' {n' Zl' y| xZ' {aZ' yMZ' {t' n_ b'y' | yZxy'
M'X', abZ', Z' anuZ' {n' {Zy' Mj' unyy' b' jZ' yVZl' M'ny' {aZxZ' MZ' M'ubjbnl' k' nxZ' {aM' k' M' nW| x^'
AaZxZ_nxZ\$, Z'NWZu' xZyuni' y'ub' b' t' _nx'_Mj' {y' b' 'n| xXZybI' M'X' Zl' y| xZ', Z' {MZ' M'uxnux' MZ'
M' {bnl' {n' Zl' y| xZ' | yZx' yMZ' {t', aZl' {aZyZ' _Mj' {y' nW| x^'

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

?Z_ZxZI VZy©

ÁÛÄ! a) njk ZyS-ÝÜÜä 'q{MyMIX" W{y'n_{aZ" k ZxbMI '2 nfZxS® 2 nfZ^{hx} ŠÜb'2 M'ÝÜÜä^a
Á5I jþ ZÄ" fNfMjZ©a{{uy@µ, , , k nfZ^{hx} µk nfþ ` 'y{My' _W{yµ'Á WZyyZX©Üä" ZU'ÝÜÜÜÄ'

ÁÿÄ<nu|jMlml " W{ys® BI kZX'3Mlml y<nu|jMlml ž bfyml Šfnj^aàŠl n^aÝÜÜäŠuu^aÜ° àŠž ZV'ÝÜÜä^a

ÁpÄ@ž, †ZxS-Jn| x'2 nfZ'@k ujbZX©AaZ'ä ŁZy{'' uuy_nx'2 nfþ ` S®?*@ ZXWgÜÝ'1|jÝÜÜä^a
Á5I jþ ZÄ" fNfMjZ©

a{{uy@µxk ZXWgMnk µÝÜÜäµÜäµÜÝµtn| x'k nfZ'yk ujbZX'ä'UZy{1Muy'k nfþ ` µ'Á WZyyZX©
Üä" ZU'ÝÜÜÜÄ'

ÁBÄ^a(xZZI S-) n, '2 | Va ž nZy'ž'† ny{An') bZ'2 nfZxy'† nk ujZ{Z(| bZS® 2 †'2 nfþ ` ?ZfZ, yS
Üä'3nf'ÝÜÜä^aÁ5I jþ ZÄ" fNfMjZ©

a{{uy@µ, , , k tk nfþ ` xZfZ, y^vnk µk nfZµan, 'k | Va'XnZy'k'Vny{1{n'abZ'k nfZxyµ'Á WZyyZX©
Üä" ZU'ÝÜÜÜÄ'

ÁäÄUM{Zxt| | bZxyk†^aVnk S-1káb k 'lml 'qMZ{†† nl VZxl yS® 1káb k 'lml 'qMZ{†† nl VZxl y° ŁM{Zxt'
BI bZxyk†^aÁ5I jþ ZÄ" fNfMjZ©

a{{uy@µUM{Zxt| | bZxyk†^aVnk µjZMl µVabZyjáb k 'lml 'yMZ{††nl VZxl y^aÁ WZyyZX©
Üä" ZU'ÝÜÜÜÄ'

ÁäÄ*ZZZ^{hx} ŠE" " " * " " † nXZ'n_" {abWŠÝÜÜä^aÁ5I jþ ZÄ" fNfMjZ©

a{{u@µ, , , qZZZ^{hx} µMln| {µVnxunxMZµ nfZxl MI VZµá'ā^aa{k j^aÁ WZyyZX©Üb'1" ZU'ÝÜÜÜÄ'

ÁäÄ° a) Mxys-ŁZy{ž b kNf'AMIZ'2 ZNy| xZyÝÜÜÜ'1?ZfZ, y'† 'Anu'<bm yS®) ZNfāt) MIXtk MIS

Üä'1M'ÝÜÜÜÄ'Á5I jþ ZÄ" fNfMjZ©a{{uy@µaZNf{ataMIXtk M^aVnk µUZy{1Xb kNf' {MIZ'k ZNy| xZyµ'
Á WZyyZX©Üä" ZU'ÝÜÜÜÄ'

ÁäÄ-° xX| b n'ŁA'ž|j| Z{nn{aŠS® ° xX| b n'Á5I jþ ZÄ" fNfMjZ©

a{{uy@µ, , , qMx| b n^aWµZI µ2 Mµ µ' xX| b n'ēnMxŁAž_xnk ø2 Mµ^a xX| b n'ēnMxŁj| Z{nn{a^a
Á WZyyZX©ÜÜ'1" ZU'ÝÜÜÜÄ'

ÁäÄ2^a† | xxZtS-) 2 'ÜÜŁj| Z{nn{a'ßŁ'1" '2 nX| jZyS®2 M{†† | xxZtSÜä'1M'ÝÜÜä^aÁ5I jþ ZÄ"

° fNfMjZ©a{{u@µ, , , k M{†† V| xxZt^aVnk µak 'ÜÜ'1Uj| Z{nn{a'ßUj'1k nX| jZyµ'Á WZyyZX©
ÜÝ'2 M'ÝÜÜÜÄ'

ÁÚÛÄ-ž b7b7bnl 'n_?ZyZMVA'@MZ{tS®*jbb nbyªÁ5I jbb ZÄª° fNjMjZ©
a{{uy@µXxyªjbb nbyªZX| µkMZµ@MZ{t1buxMtµkMf(Zxt@MZ{tªª WZyyZX©ÝP' ZU'ÝÜÝÜÄª

ÁÚÛÄ-ª `xZyy<xn{ZV{bnl ì `*ªAZy{b `©3A©S®3Mlbnl MjAZVal bMj'aty{Zk yªÁ5I jbb ZÄª° fNjMjZ©
a{{uy@µ . .ª {yªVnk µyZxfbZyµ{Zy{b `µZI fbnl k ZI {Njµb `xZyy'uxn{ZV{bnl µªª WZyyZX©
ÝP' ZU'ÝÜÝÜÄª

ÁÚÛÄ-"jZV{xnbMj'@MZ{t©@MZ{tì) ZMj(a'nx"jZV{xnbMj'AxNkZy;@|XZI {2 Ml|NjAS®ZjVhyaªÁ5I jbb ZÄª°
° fNjMjZ©a{{u@µ . .ªZjVhyaªnx µXnV| k ZI {µÜáÝBµäÜµXÜÜÜàBµµyZV{bnl àªª{k jªª WZyyZX©
ÝP' ZU'ÝÜÝÜÄª

ÁÚPÄZAMIZÜBªÁ5I jbb ZÄª° fNjMjZ©a{{uy@µZ{MIZÜªªVnk µyanupZ{MIZÜª¹Xb kMj'f{MIZ¹k ZMj| xZµª
ª WZyyZX©ÝÜ' ZU'ÝÜÝÜÄª

ÁÚBÄªª<MxMj §-@xnbMj'<xn{nVnjy† nk uMZX§®Zk UZXXZXªVnk §PÜ'2 M'ÝÜÜÝªªÁ5I jbb ZÄª° fNjMjZ©
a{{uy@µ . .ªZk UZXXZXªVnk µyZxbMj'uxn{nVnjy¹Vnk uMZXµªª WZyyZX©Ýªª' ZU'ÝÜÝÜÄª

ÁÚªÄ-MlNjñ`?ZNXjAS®ª xX|bnSª¹@Zu'ÝÜÜªªªÁ5I jbb ZÄª° fNjMjZ©
a{{uy@µ . .ªªX| b nªWµxZ_ZxZI VZµZI µjMl` |MZµµ| |V{bnl yµMlNjñ`¹bnµMlNjñ` xZNXµªª WZyyZX©
Ýªª' ZU'ÝÜÝÜÄª

° uuZI Xb.: © ž b kMj'AMUZ'2 ZMyl xZ''' .Mk ujZ'



Figure 8. Digital Laser Tape Measure

