Shots

2024-11-07

```
#Player 16937 Shots:

#11791 saved
#11828 saved
#107762 blocked
#135513 saved
```

```
tracks = read_csv("/Users/arthurlennard/Downloads/RBNY Data Science Intern Test (Spring 2025)/intern_tes
```

```
## Rows: 3539553 Columns: 16
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## dbl (16): period, time_elapsed, frame_count, player_id, team_id, goalkeeper,...
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
tracks
```

```
## # A tibble: 3,539,553 x 16
##    period time_elapsed frame_count player_id team_id goalkeeper is_visible
##     <dbl>        <dbl>       <dbl>     <dbl>   <dbl>      <dbl>      <dbl>
##  1      1        0.880       10022        -1      -1          0          1
##  2      1        0.880       10022    109967     623          0          1
##  3      1        0.880       10022    134089     623          0          1
##  4      1        0.880       10022     16937     623          0          1
##  5      1        0.880       10022     23824     623          0          1
##  6      1        0.880       10022     24618     623          1          1
##  7      1        0.880       10022    249648     623          0          1
##  8      1        0.880       10022     28944     623          0          1
##  9      1        0.880       10022     36759     623          0          1
## 10      1        0.880       10022     36820     623          0          1
## # i 3,539,543 more rows
## # i 9 more variables: attacking_multiplier <dbl>, lr_multiplier <dbl>,
## #   pos_x <dbl>, pos_y <dbl>, pos_z <dbl>, speed_x <dbl>, speed_y <dbl>,
## #   ball_in_play <dbl>, possessing_team_id <dbl>
```

```
#filter tracks for just that player
tracks_p = tracks %>%
  filter(player_id == 16937 | player_id == -1)
tracks_p
```

```
## # A tibble: 310,898 x 16
##    period time_elapsed frame_count player_id team_id goalkeeper is_visible
##     <dbl>        <dbl>       <dbl>     <dbl>   <dbl>      <dbl>      <dbl>
##  1      1        0.880       10022        -1      -1          0          1
##  2      1        0.880       10022     16937     623          0          1
##  3      1        0.920       10023        -1      -1          0          1
##  4      1        0.920       10023     16937     623          0          1
##  5      1        0.960       10024        -1      -1          0          1
##  6      1        0.960       10024     16937     623          0          1
##  7      1        1           10025        -1      -1          0          1
##  8      1        1           10025     16937     623          0          1
##  9      1        1.04        10026        -1      -1          0          1
## 10      1        1.04        10026     16937     623          0          1
## # i 310,888 more rows
## # i 9 more variables: attacking_multiplier <dbl>, lr_multiplier <dbl>,
## #   pos_x <dbl>, pos_y <dbl>, pos_z <dbl>, speed_x <dbl>, speed_y <dbl>,
## #   ball_in_play <dbl>, possessing_team_id <dbl>
```

```
#modifying data so instead of having 2 rows for each frame, there's just one row per frame and it has d
tracks_h <- tracks_p %>%
  mutate(type = if_else(player_id == 16937, "player", "ball")) %>%
  mutate(ball_x = if_else(type == "ball", pos_x, NA)) %>%
  mutate(ball_y = if_else(type == "ball", pos_y, NA)) %>%
  mutate(ball_z = if_else(type == "ball", pos_z, NA)) %>%
  mutate(player_x = if_else(type == "player", pos_x, NA)) %>%
  mutate(player_y = if_else(type == "player", pos_y, NA)) %>%
  mutate(player_z = if_else(type == "player", pos_z, NA)) %>%
  mutate(ball_speed_x = if_else(type == "ball", speed_x, NA)) %>%
  mutate(ball_speed_y = if_else(type == "ball", speed_y, NA)) %>%
  mutate(player_speed_x = if_else(type == "player", speed_x, NA)) %>%
  mutate(player_spped_y = if_else(type == "player", speed_y, NA))
tracks_h
```

```
## # A tibble: 310,898 x 27
##    period time_elapsed frame_count player_id team_id goalkeeper is_visible
##     <dbl>        <dbl>       <dbl>     <dbl>   <dbl>      <dbl>      <dbl>
##  1      1        0.880       10022        -1      -1          0          1
##  2      1        0.880       10022     16937     623          0          1
##  3      1        0.920       10023        -1      -1          0          1
##  4      1        0.920       10023     16937     623          0          1
##  5      1        0.960       10024        -1      -1          0          1
##  6      1        0.960       10024     16937     623          0          1
##  7      1        1           10025        -1      -1          0          1
##  8      1        1           10025     16937     623          0          1
##  9      1        1.04        10026        -1      -1          0          1
## 10      1        1.04        10026     16937     623          0          1
## # i 310,888 more rows
## # i 20 more variables: attacking_multiplier <dbl>, lr_multiplier <dbl>,
## #   pos_x <dbl>, pos_y <dbl>, pos_z <dbl>, speed_x <dbl>, speed_y <dbl>,
## #   ball_in_play <dbl>, possessing_team_id <dbl>, type <chr>, ball_x <dbl>,
## #   ball_y <dbl>, ball_z <dbl>, player_x <dbl>, player_y <dbl>, player_z <dbl>,
## #   ball_speed_x <dbl>, ball_speed_y <dbl>, player_speed_x <dbl>,
## #   player_spped_y <dbl>
```

```
tracks_h[3,20]
```

```
## # A tibble: 1 x 1
##   ball_z
##    <dbl>
## 1 0.0124
```

```
#condensing the 2 rows for each frame into one row, these loops take a while

numrows = nrow(tracks_h)

for (i in 1:(numrows-1)){
  if (is.na(tracks_h$player_x[i])){
    tracks_h$player_x[i] = tracks_h$player_x[i+1]
  }
}

tracks_h
```

```
## # A tibble: 310,898 x 27
##    period time_elapsed frame_count player_id team_id goalkeeper is_visible
##     <dbl>        <dbl>       <dbl>     <dbl>   <dbl>      <dbl>      <dbl>
##  1      1        0.880       10022        -1      -1          0          1
##  2      1        0.880       10022     16937     623          0          1
##  3      1        0.920       10023        -1      -1          0          1
##  4      1        0.920       10023     16937     623          0          1
##  5      1        0.960       10024        -1      -1          0          1
##  6      1        0.960       10024     16937     623          0          1
##  7      1        1           10025        -1      -1          0          1
##  8      1        1           10025     16937     623          0          1
##  9      1        1.04        10026        -1      -1          0          1
## 10      1        1.04        10026     16937     623          0          1
## # i 310,888 more rows
## # i 20 more variables: attacking_multiplier <dbl>, lr_multiplier <dbl>,
## #   pos_x <dbl>, pos_y <dbl>, pos_z <dbl>, speed_x <dbl>, speed_y <dbl>,
## #   ball_in_play <dbl>, possessing_team_id <dbl>, type <chr>, ball_x <dbl>,
## #   ball_y <dbl>, ball_z <dbl>, player_x <dbl>, player_y <dbl>, player_z <dbl>,
## #   ball_speed_x <dbl>, ball_speed_y <dbl>, player_speed_x <dbl>,
## #   player_spped_y <dbl>
```

```
#another long loop

for (i in 1:(numrows-1)){
  if (is.na(tracks_h$player_y[i])){
    tracks_h$player_y[i] = tracks_h$player_y[i+1]
  }
}

tracks_h
```

```
## # A tibble: 310,898 x 27
##    period time_elapsed frame_count player_id team_id goalkeeper is_visible
```

```
##     <dbl>        <dbl>       <dbl>     <dbl>   <dbl>      <dbl>      <dbl>
##  1      1        0.880       10022        -1      -1          0          1
##  2      1        0.880       10022     16937     623          0          1
##  3      1        0.920       10023        -1      -1          0          1
##  4      1        0.920       10023     16937     623          0          1
##  5      1        0.960       10024        -1      -1          0          1
##  6      1        0.960       10024     16937     623          0          1
##  7      1        1           10025        -1      -1          0          1
##  8      1        1           10025     16937     623          0          1
##  9      1        1.04        10026        -1      -1          0          1
## 10      1        1.04        10026     16937     623          0          1
## # i 310,888 more rows
## # i 20 more variables: attacking_multiplier <dbl>, lr_multiplier <dbl>,
## #   pos_x <dbl>, pos_y <dbl>, pos_z <dbl>, speed_x <dbl>, speed_y <dbl>,
## #   ball_in_play <dbl>, possessing_team_id <dbl>, type <chr>, ball_x <dbl>,
## #   ball_y <dbl>, ball_z <dbl>, player_x <dbl>, player_y <dbl>, player_z <dbl>,
## #   ball_speed_x <dbl>, ball_speed_y <dbl>, player_speed_x <dbl>,
## #   player_spped_y <dbl>
```

```r
#2 more long loops

for (i in 1:(numrows-1)){
  if (is.na(tracks_h$player_spped_y[i])){
    tracks_h$player_spped_y[i] = tracks_h$player_spped_y[i+1]
  }
}

for (i in 1:(numrows-1)){
  if (is.na(tracks_h$player_speed_x[i])){
    tracks_h$player_speed_x[i] = tracks_h$player_speed_x[i+1]
  }
}

tracks_h
```

```
## # A tibble: 310,898 x 27
##    period time_elapsed frame_count player_id team_id goalkeeper is_visible
##     <dbl>        <dbl>       <dbl>     <dbl>   <dbl>      <dbl>      <dbl>
##  1      1        0.880       10022        -1      -1          0          1
##  2      1        0.880       10022     16937     623          0          1
##  3      1        0.920       10023        -1      -1          0          1
##  4      1        0.920       10023     16937     623          0          1
##  5      1        0.960       10024        -1      -1          0          1
##  6      1        0.960       10024     16937     623          0          1
##  7      1        1           10025        -1      -1          0          1
##  8      1        1           10025     16937     623          0          1
##  9      1        1.04        10026        -1      -1          0          1
## 10      1        1.04        10026     16937     623          0          1
## # i 310,888 more rows
## # i 20 more variables: attacking_multiplier <dbl>, lr_multiplier <dbl>,
## #   pos_x <dbl>, pos_y <dbl>, pos_z <dbl>, speed_x <dbl>, speed_y <dbl>,
## #   ball_in_play <dbl>, possessing_team_id <dbl>, type <chr>, ball_x <dbl>,
## #   ball_y <dbl>, ball_z <dbl>, player_x <dbl>, player_y <dbl>, player_z <dbl>,
## #   ball_speed_x <dbl>, ball_speed_y <dbl>, player_speed_x <dbl>,
```

```
## #   player_spped_y <dbl>
```

```
tracks_h = tracks_h %>%
  select(-player_z)
tracks_n = na.omit(tracks_h)
tracks_n = tracks_n %>%
  select(-player_id, -team_id, -goalkeeper, -type, -pos_x, -pos_y, -pos_z, -type)
tracks_n
```

```
## # A tibble: 155,449 x 19
##    period time_elapsed frame_count is_visible attacking_multiplier lr_multiplier
##     <dbl>        <dbl>       <dbl>      <dbl>                <dbl>         <dbl>
##  1      1        0.880       10022          1                   -1             1
##  2      1        0.920       10023          1                   -1             1
##  3      1        0.960       10024          1                   -1             1
##  4      1        1           10025          1                   -1             1
##  5      1        1.04        10026          1                   -1             1
##  6      1        1.08        10027          1                   -1             1
##  7      1        1.12        10028          1                   -1             1
##  8      1        1.16        10029          1                   -1             1
##  9      1        1.20        10030          1                   -1             1
## 10      1        1.24        10031          1                   -1             1
## # i 155,439 more rows
## # i 13 more variables: speed_x <dbl>, speed_y <dbl>, ball_in_play <dbl>,
## #   possessing_team_id <dbl>, ball_x <dbl>, ball_y <dbl>, ball_z <dbl>,
## #   player_x <dbl>, player_y <dbl>, ball_speed_x <dbl>, ball_speed_y <dbl>,
## #   player_speed_x <dbl>, player_spped_y <dbl>
```

```
tracks_j = tracks_n %>%
  select(-ball_speed_x, -ball_speed_y)
tracks_j
```

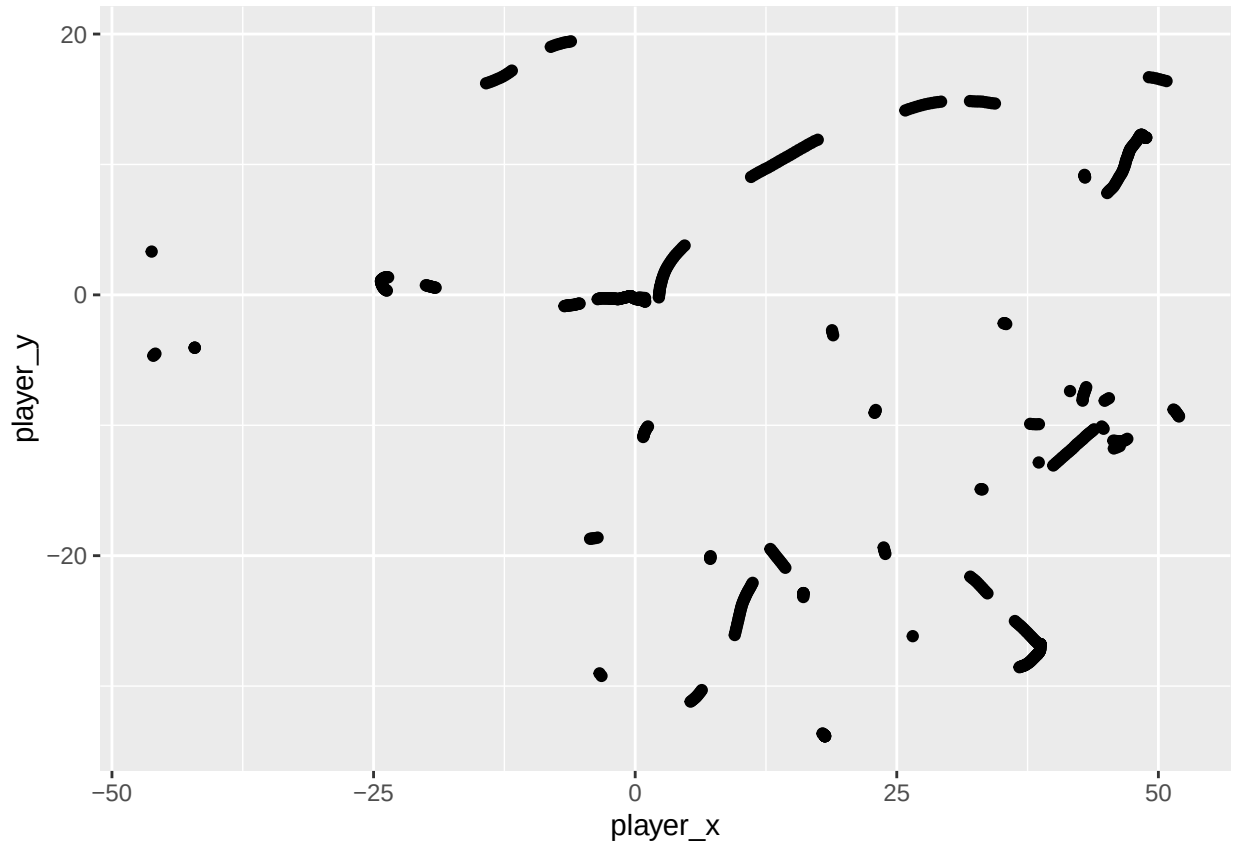
```
## # A tibble: 155,449 x 17
##    period time_elapsed frame_count is_visible attacking_multiplier lr_multiplier
##     <dbl>        <dbl>       <dbl>      <dbl>                <dbl>         <dbl>
##  1      1        0.880       10022          1                   -1             1
##  2      1        0.920       10023          1                   -1             1
##  3      1        0.960       10024          1                   -1             1
##  4      1        1           10025          1                   -1             1
##  5      1        1.04        10026          1                   -1             1
##  6      1        1.08        10027          1                   -1             1
##  7      1        1.12        10028          1                   -1             1
##  8      1        1.16        10029          1                   -1             1
##  9      1        1.20        10030          1                   -1             1
## 10      1        1.24        10031          1                   -1             1
## # i 155,439 more rows
## # i 11 more variables: speed_x <dbl>, speed_y <dbl>, ball_in_play <dbl>,
## #   possessing_team_id <dbl>, ball_x <dbl>, ball_y <dbl>, ball_z <dbl>,
## #   player_x <dbl>, player_y <dbl>, player_speed_x <dbl>, player_spped_y <dbl>
```

```
clean = tracks_j %>%
  filter((abs(player_x - ball_x) <= 1) & (abs(player_y - ball_y) <= 1))
clean
```

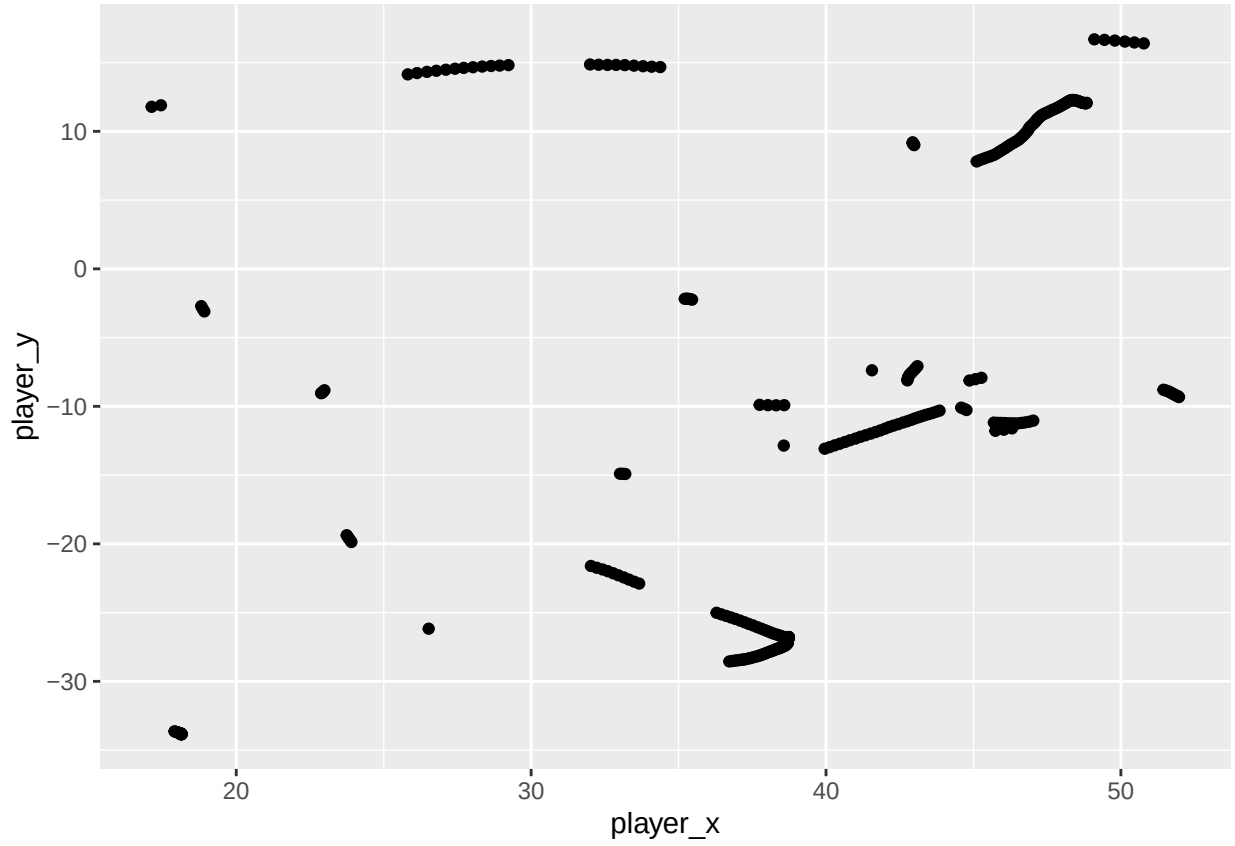
```
## # A tibble: 3,200 x 17
##    period time_elapsed frame_count is_visible attacking_multiplier lr_multiplier
##     <dbl>        <dbl>       <dbl>      <dbl>                <dbl>         <dbl>
##  1      1         66.6       11666          1                    1             1
##  2      1         66.7       11667          1                    1             1
##  3      1         66.7       11668          1                    1             1
##  4      1         71.5       11788          1                    1             1
##  5      1         71.6       11789          1                    1             1
##  6      1         71.6       11790          1                    1             1
##  7      1         71.6       11791          1                    1             1
##  8      1         73.0       11826          1                    1             1
##  9      1         73.1       11827          1                    1             1
## 10      1         73.1       11828          1                    1             1
## # i 3,190 more rows
## # i 11 more variables: speed_x <dbl>, speed_y <dbl>, ball_in_play <dbl>,
## #   possessing_team_id <dbl>, ball_x <dbl>, ball_y <dbl>, ball_z <dbl>,
## #   player_x <dbl>, player_y <dbl>, player_speed_x <dbl>, player_spped_y <dbl>
```

```
#clean = every time the player came within sqrt(2) meters of the ball

#sort by 1st and 2nd half

clean1 = clean %>%
  filter(period == 1)
clean2 = clean %>%
  filter(period == 2)
```

```
ggplot(data = clean1) +
  geom_point(aes(x = player_x, y = player_y))
```




```
#player's touches in the attacking third

clean1third = clean1 %>%
  filter(player_x >= 17)

ggplot(data = clean1third) +
  geom_point(aes(x = player_x, y = player_y))
```




```
clean1third
```

```
## # A tibble: 322 x 17
##    period time_elapsed frame_count is_visible attacking_multiplier lr_multiplier
##     <dbl>        <dbl>       <dbl>      <dbl>                <dbl>         <dbl>
##  1      1         66.6       11666          1                    1             1
##  2      1         66.7       11667          1                    1             1
##  3      1         66.7       11668          1                    1             1
##  4      1         71.5       11788          1                    1             1
##  5      1         71.6       11789          1                    1             1
##  6      1         71.6       11790          1                    1             1
##  7      1         71.6       11791          1                    1             1
##  8      1         73.0       11826          1                    1             1
##  9      1         73.1       11827          1                    1             1
## 10      1         73.1       11828          1                    1             1
## # i 312 more rows
## # i 11 more variables: speed_x <dbl>, speed_y <dbl>, ball_in_play <dbl>,
## #   possessing_team_id <dbl>, ball_x <dbl>, ball_y <dbl>, ball_z <dbl>,
## #   player_x <dbl>, player_y <dbl>, player_speed_x <dbl>, player_spped_y <dbl>
```

```
nrowsclean1 = nrow(clean1third)

clean1ends = clean1third %>%
  mutate(end = NA)
```

```r
for (i in 1:(nrowsclean1-1)){
  clean1ends$end[i] = clean1ends$frame_count[i] - clean1ends$frame_count[i+1]
}

clean1ends
```

```
## # A tibble: 322 x 18
##    period time_elapsed frame_count is_visible attacking_multiplier lr_multiplier
##     <dbl>        <dbl>       <dbl>      <dbl>                <dbl>         <dbl>
##  1      1         66.6       11666          1                    1             1
##  2      1         66.7       11667          1                    1             1
##  3      1         66.7       11668          1                    1             1
##  4      1         71.5       11788          1                    1             1
##  5      1         71.6       11789          1                    1             1
##  6      1         71.6       11790          1                    1             1
##  7      1         71.6       11791          1                    1             1
##  8      1         73.0       11826          1                    1             1
##  9      1         73.1       11827          1                    1             1
## 10      1         73.1       11828          1                    1             1
## # i 312 more rows
## # i 12 more variables: speed_x <dbl>, speed_y <dbl>, ball_in_play <dbl>,
## #   possessing_team_id <dbl>, ball_x <dbl>, ball_y <dbl>, ball_z <dbl>,
## #   player_x <dbl>, player_y <dbl>, player_speed_x <dbl>, player_spped_y <dbl>,
## #   end <dbl>
```

```r
clean1ends1 = clean1ends %>%
  filter(end != -1)
clean1ends1
```

```
## # A tibble: 24 x 18
##    period time_elapsed frame_count is_visible attacking_multiplier lr_multiplier
##     <dbl>        <dbl>       <dbl>      <dbl>                <dbl>         <dbl>
##  1      1         66.7       11668          1                    1             1
##  2      1         71.6       11791          1                    1             1
##  3      1         73.1       11828          1                    1             1
##  4      1         76.0       11899          1                    1             1
##  5      1        181.        14520          1                   -1             1
##  6      1        268.        16708          1                    1             1
##  7      1        528.        23199          1                    1             1
##  8      1        690.        27259          1                    1             1
##  9      1       1453.        46317          1                   -1             1
## 10      1       1826.        55648          1                    1             1
## # i 14 more rows
## # i 12 more variables: speed_x <dbl>, speed_y <dbl>, ball_in_play <dbl>,
## #   possessing_team_id <dbl>, ball_x <dbl>, ball_y <dbl>, ball_z <dbl>,
## #   player_x <dbl>, player_y <dbl>, player_speed_x <dbl>, player_spped_y <dbl>,
## #   end <dbl>
```

```r
#every time in the 1st half when the ball was close to him and then it wasn't anymore
#basically this is each moment it leaves his foot
#now I just need to find out where the ball went after it left him
```

```
#inital thoughts, 1st half
#this is all instances where the ball left his foot
#"no" means the ball didn't get closer to the goal in the x direction after he kicked it

#11668 - no
#11791 - likely
#11828 - likely
#11899 - no
#14520 - no
#16708 - no
#23199 - unlikely
#27259 - no
#46317 - no
#55648 - no
#55685 - no
#55702 - no
#56345 - no
#57127 - no
#58318 - no
#60079 - no
#67796 - unlikely
#67945 - very likely
#68161 - this is like a corner
#82512 - very likely
#83924 - no
#84240 - no
#84265 - no
tracks_j %>%
  filter(frame_count >= 46317)
```

```
## # A tibble: 119,154 x 17
##    period time_elapsed frame_count is_visible attacking_multiplier lr_multiplier
##     <dbl>        <dbl>       <dbl>      <dbl>                <dbl>         <dbl>
##  1      1        1453.       46317          1                   -1             1
##  2      1        1453.       46318          1                   -1             1
##  3      1        1453.       46319          1                   -1             1
##  4      1        1453.       46320          1                   -1             1
##  5      1        1453.       46321          1                   -1             1
##  6      1        1453.       46322          1                   -1             1
##  7      1        1453.       46323          1                   -1             1
##  8      1        1453.       46324          1                   -1             1
##  9      1        1453        46325          1                   -1             1
## 10      1        1453.       46326          1                   -1             1
## # i 119,144 more rows
## # i 11 more variables: speed_x <dbl>, speed_y <dbl>, ball_in_play <dbl>,
## #   possessing_team_id <dbl>, ball_x <dbl>, ball_y <dbl>, ball_z <dbl>,
## #   player_x <dbl>, player_y <dbl>, player_speed_x <dbl>, player_spped_y <dbl>
```

```
#same as before but for second half

clean2third = clean2 %>%
  filter(player_x <= -17)
```

```r
nrowsclean2 = nrow(clean2third)

clean2ends = clean2third %>%
  mutate(end = NA)

for (i in 1:(nrowsclean2-1)){
  clean2ends$end[i] = clean2ends$frame_count[i] - clean2ends$frame_count[i+1]
}

clean2ends
```

```
## # A tibble: 1,621 x 18
##    period time_elapsed frame_count is_visible attacking_multiplier lr_multiplier
##     <dbl>        <dbl>       <dbl>      <dbl>                <dbl>         <dbl>
##  1      2         45.4      101136          1                   -1             1
##  2      2         45.5      101137          1                   -1             1
##  3      2         45.5      101138          1                   -1             1
##  4      2         45.6      101139          1                   -1             1
##  5      2         45.6      101140          1                   -1             1
##  6      2         95.5      102387          1                   -1             1
##  7      2         95.5      102388          1                   -1             1
##  8      2         95.6      102389          1                   -1             1
##  9      2         95.6      102390          1                   -1             1
## 10      2         95.6      102391          1                   -1             1
## # i 1,611 more rows
## # i 12 more variables: speed_x <dbl>, speed_y <dbl>, ball_in_play <dbl>,
## #   possessing_team_id <dbl>, ball_x <dbl>, ball_y <dbl>, ball_z <dbl>,
## #   player_x <dbl>, player_y <dbl>, player_speed_x <dbl>, player_spped_y <dbl>,
## #   end <dbl>
```

```r
clean2ends1 = clean2ends %>%
  filter(end != -1)
clean2ends1
```

```
## # A tibble: 36 x 18
##    period time_elapsed frame_count is_visible attacking_multiplier lr_multiplier
##     <dbl>        <dbl>       <dbl>      <dbl>                <dbl>         <dbl>
##  1      2         45.6      101140          1                   -1             1
##  2      2         96.9      102422          1                   -1             1
##  3      2         99.6      102490          1                   -1             1
##  4      2        152.       103801          1                   -1             1
##  5      2        210.       105252          1                   -1             1
##  6      2        273.       106817          1                   -1             1
##  7      2        310.       107762          1                   -1             1
##  8      2        320.       108009          1                   -1             1
##  9      2        333.       108316          1                   -1             1
## 10      2        340.       108491          1                   -1             1
## # i 26 more rows
## # i 12 more variables: speed_x <dbl>, speed_y <dbl>, ball_in_play <dbl>,
## #   possessing_team_id <dbl>, ball_x <dbl>, ball_y <dbl>, ball_z <dbl>,
## #   player_x <dbl>, player_y <dbl>, player_speed_x <dbl>, player_spped_y <dbl>,
## #   end <dbl>
```

```
#inital thoughts for 2nd half part 1

#101140 - no
#102422 - no
#102490 - no
#103801 - no
#105252 - no
#106817 - no
#107762 - very likely
#108009 - no
#108316 - no
#108491 - no
#110829 - no
#112922 - no
#113604 - no
#113681 - no
#114623 - very likely (goal?)
#115312 - no
#125832 - likely
#125856 - likely
#126046 - no
#127338 - no
tracks_j %>%
  filter(frame_count >= 114623)
```

```
## # A tibble: 64,410 x 17
##    period time_elapsed frame_count is_visible attacking_multiplier lr_multiplier
##     <dbl>        <dbl>       <dbl>      <dbl>                <dbl>         <dbl>
##  1      2         585.      114623          1                   -1             1
##  2      2         585.      114624          1                   -1             1
##  3      2         585       114625          1                   -1             1
##  4      2         585.      114626          1                   -1             1
##  5      2         585.      114627          1                   -1             1
##  6      2         585.      114628          1                   -1             1
##  7      2         585.      114629          1                   -1             1
##  8      2         585.      114630          1                   -1             1
##  9      2         585.      114631          1                   -1             1
## 10      2         585.      114632          1                   -1             1
## # i 64,400 more rows
## # i 11 more variables: speed_x <dbl>, speed_y <dbl>, ball_in_play <dbl>,
## #   possessing_team_id <dbl>, ball_x <dbl>, ball_y <dbl>, ball_z <dbl>,
## #   player_x <dbl>, player_y <dbl>, player_speed_x <dbl>, player_spped_y <dbl>
```

```
clean2ends1
```

```
## # A tibble: 36 x 18
##    period time_elapsed frame_count is_visible attacking_multiplier lr_multiplier
##     <dbl>        <dbl>       <dbl>      <dbl>                <dbl>         <dbl>
##  1      2         45.6      101140          1                   -1             1
##  2      2         96.9      102422          1                   -1             1
##  3      2         99.6      102490          1                   -1             1
##  4      2        152.       103801          1                   -1             1
##  5      2        210.       105252          1                   -1             1
```

```
##  6      2        273.       106817          1                   -1             1
##  7      2        310.       107762          1                   -1             1
##  8      2        320.       108009          1                   -1             1
##  9      2        333.       108316          1                   -1             1
## 10      2        340.       108491          1                   -1             1
## # i 26 more rows
## # i 12 more variables: speed_x <dbl>, speed_y <dbl>, ball_in_play <dbl>,
## #   possessing_team_id <dbl>, ball_x <dbl>, ball_y <dbl>, ball_z <dbl>,
## #   player_x <dbl>, player_y <dbl>, player_speed_x <dbl>, player_spped_y <dbl>,
## #   end <dbl>
```

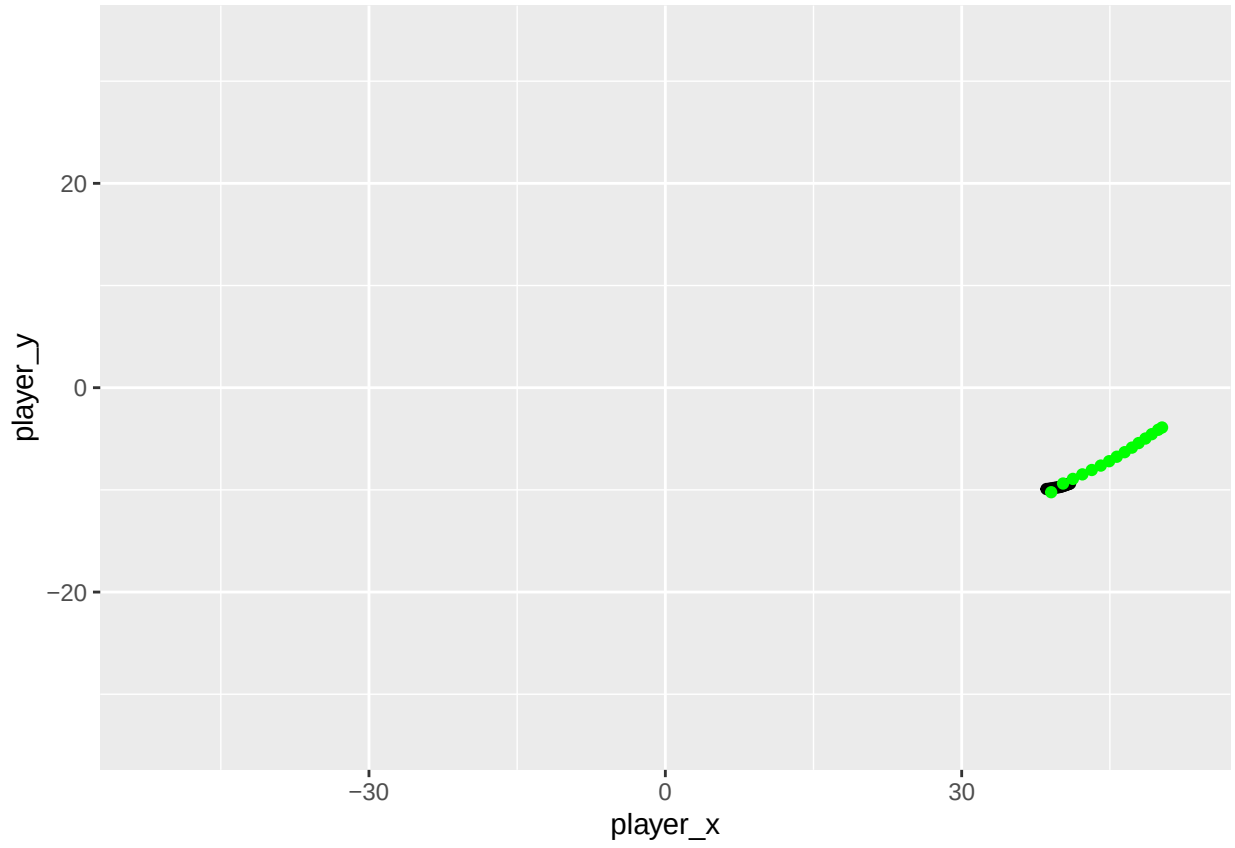
```
#initial thoughts for 2nd half part 2

#127460 - no
#135473 - likely
#135511 - likely
#136072 - likely
#138935 - no
#139000 - no
#139238 - maybe blocked
#142191 - no
#154302 - no
#154437 - no
#154538 - no
#154673 - no
#155020 - no
#160567 - no
#166174 - no
#168900 - no
tracks_j %>%
  filter(frame_count >= 135513)
```

```
## # A tibble: 43,520 x 17
##    period time_elapsed frame_count is_visible attacking_multiplier lr_multiplier
##     <dbl>        <dbl>       <dbl>      <dbl>                <dbl>         <dbl>
##  1      2        1421.      135513          1                   -1             1
##  2      2        1421.      135514          1                   -1             1
##  3      2        1421.      135515          1                   -1             1
##  4      2        1421.      135516          1                   -1             1
##  5      2        1421.      135517          1                   -1             1
##  6      2        1421.      135518          1                   -1             1
##  7      2        1421.      135519          1                   -1             1
##  8      2        1421.      135520          1                   -1             1
##  9      2        1421.      135521          1                   -1             1
## 10      2        1421.      135522          1                   -1             1
## # i 43,510 more rows
## # i 11 more variables: speed_x <dbl>, speed_y <dbl>, ball_in_play <dbl>,
## #   possessing_team_id <dbl>, ball_x <dbl>, ball_y <dbl>, ball_z <dbl>,
## #   player_x <dbl>, player_y <dbl>, player_speed_x <dbl>, player_spped_y <dbl>
```

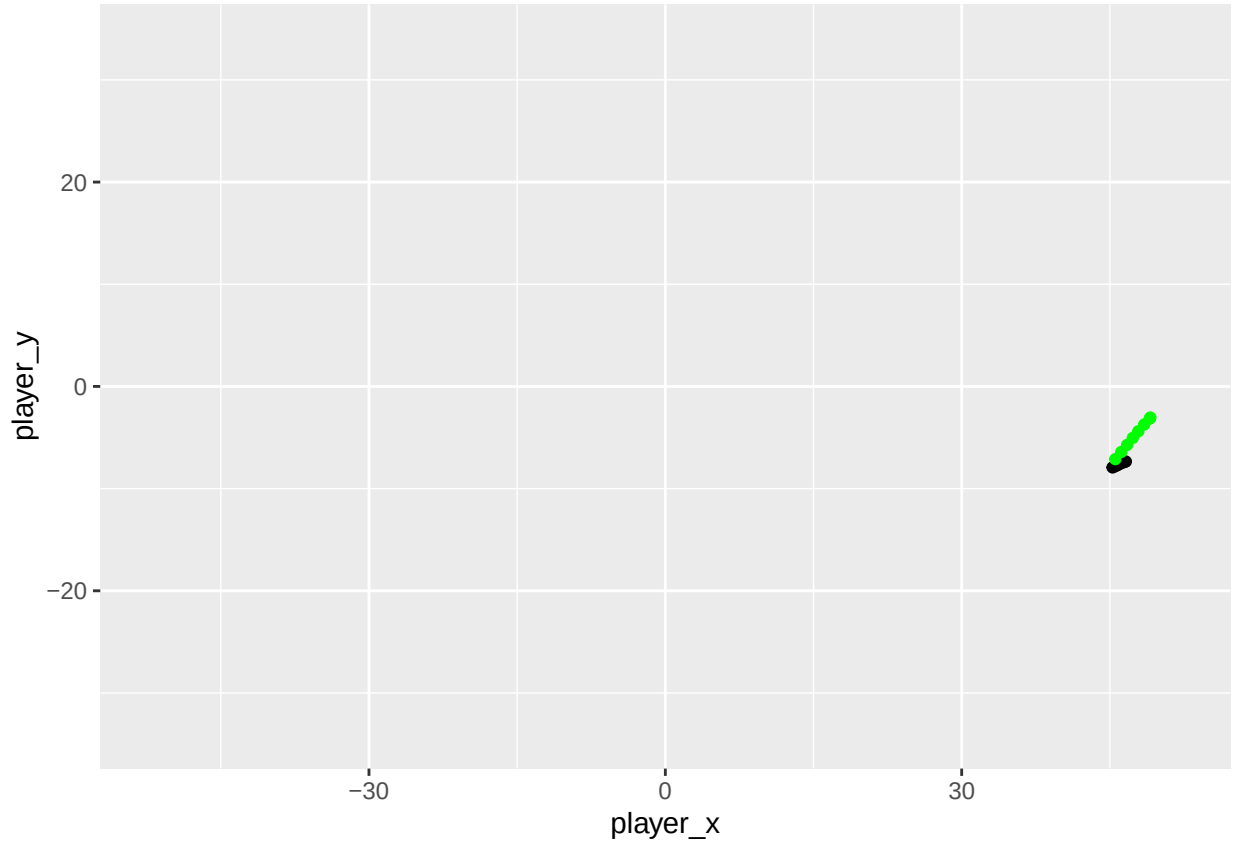
```
#final thoughts after plotting each instance

#11791 yes on target
```

```
#11828 yes on target
#23199 no
#67796 no
#67945 no
#82512 no
#107762 yes blocked
#114623 no
#125832 no
#125856 no
#135473 yes (135513) on target
#135511 ^
#136072 no
#139238 no

#+/- 3.66 for y is the goal
```

```
a1 = tracks_j %>%
  filter(frame_count >= 11791) %>%
  filter(frame_count <= 11805)

ggplot(data = a1) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```

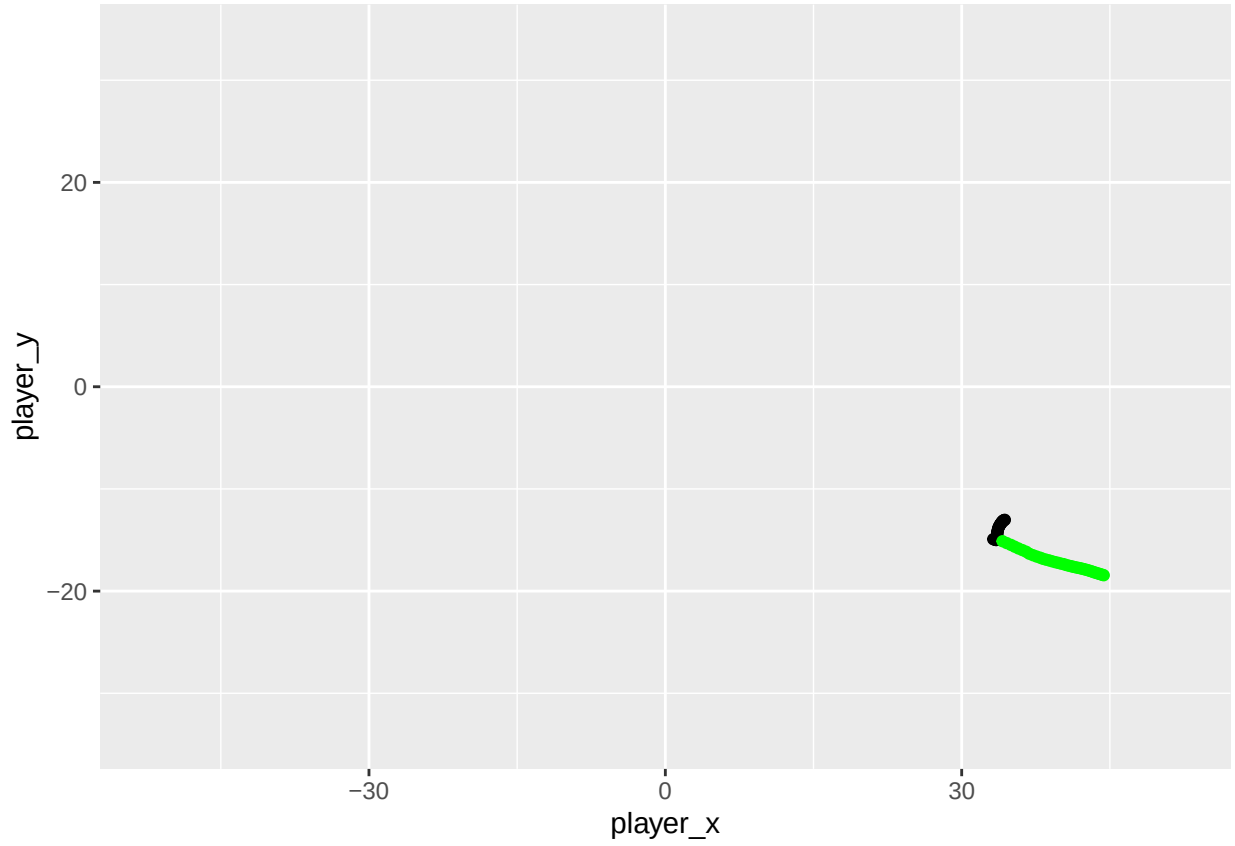


```r
#shot on target, next player to touch it is other team's gk

a2 = tracks_j %>%
  filter(frame_count >= 11828) %>%
  filter(frame_count <= 11835)

ggplot(data = a2) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```

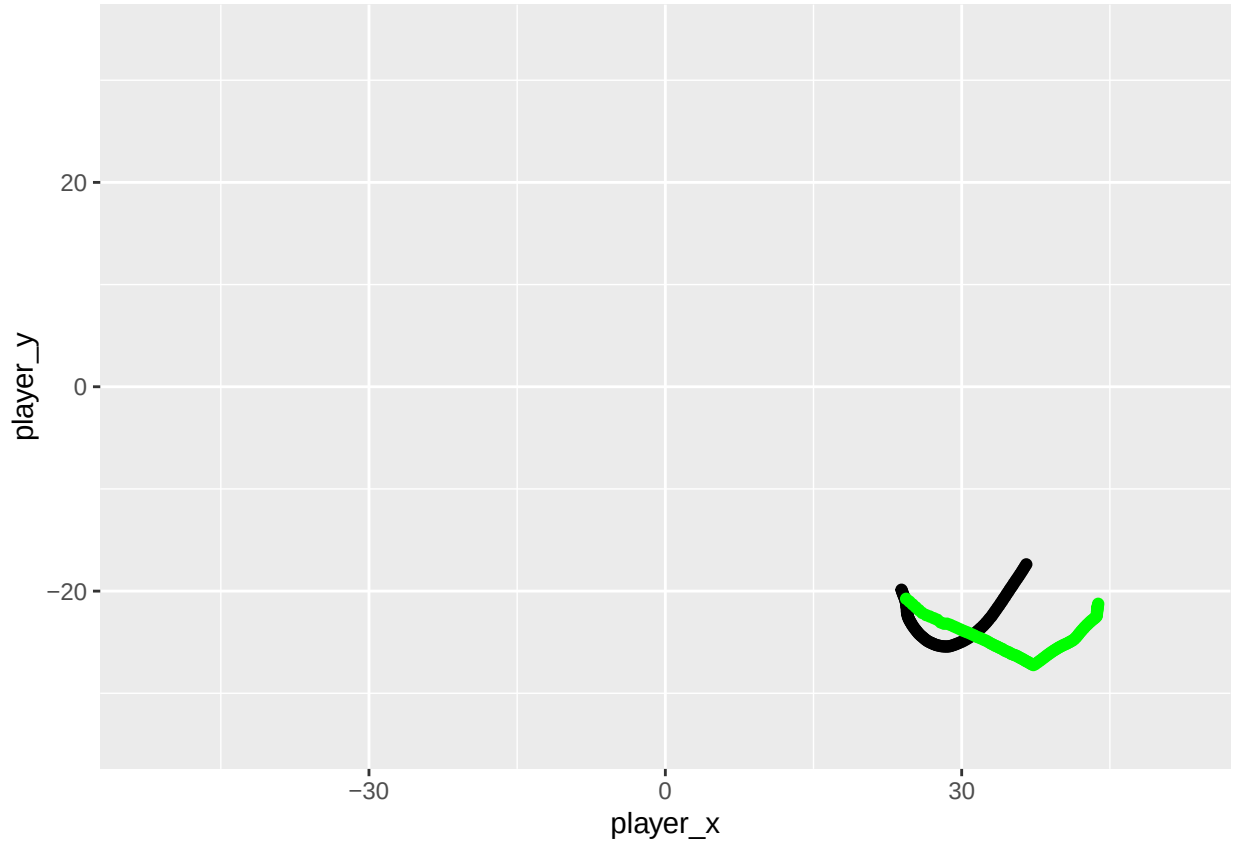



```r
#rebound from first one, shot on target again, saved again
```

```r
a3 = tracks_j %>%
  filter(frame_count >= 23199) %>%
  filter(frame_count <= 23237)

ggplot(data = a3) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```

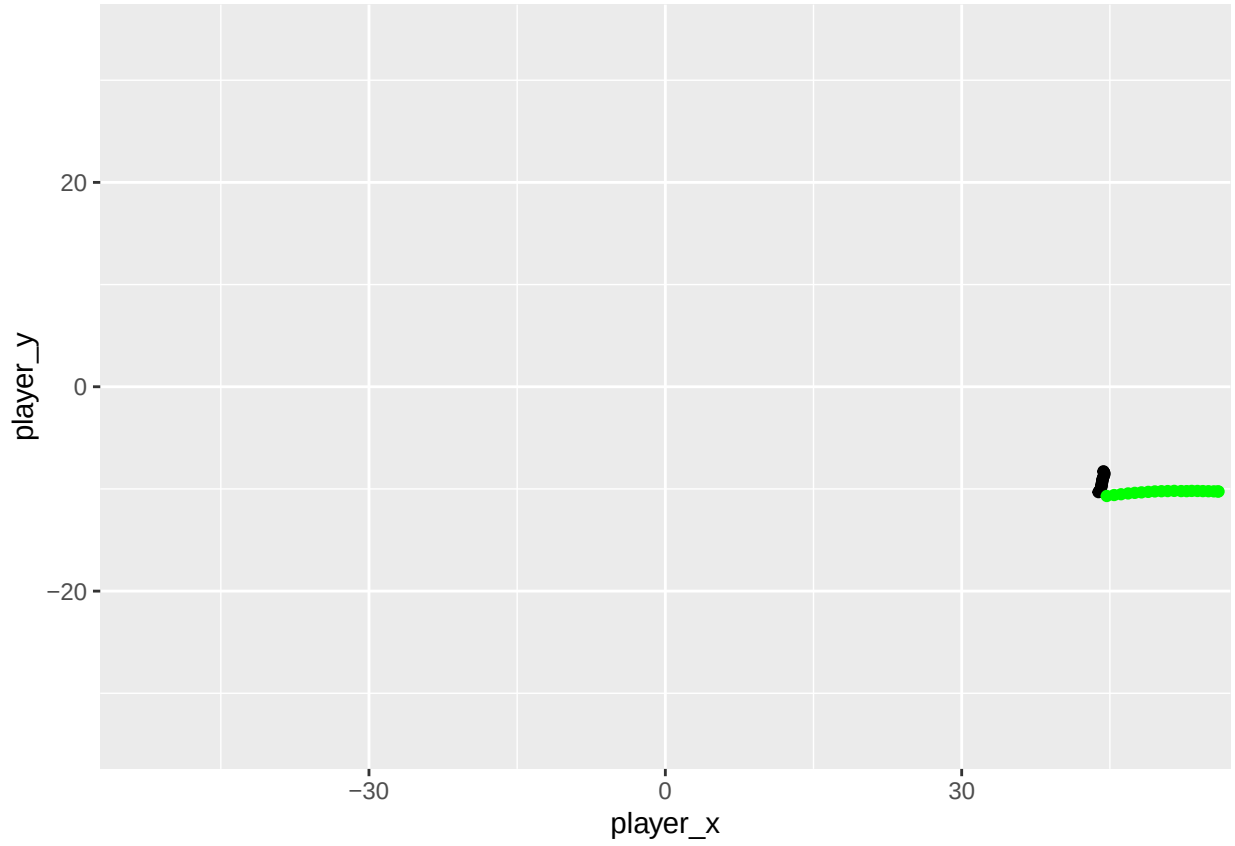



```
#no

a4 = tracks_j %>%
  filter(frame_count >= 67796) %>%
  filter(frame_count <= 67897)

ggplot(data = a4) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```

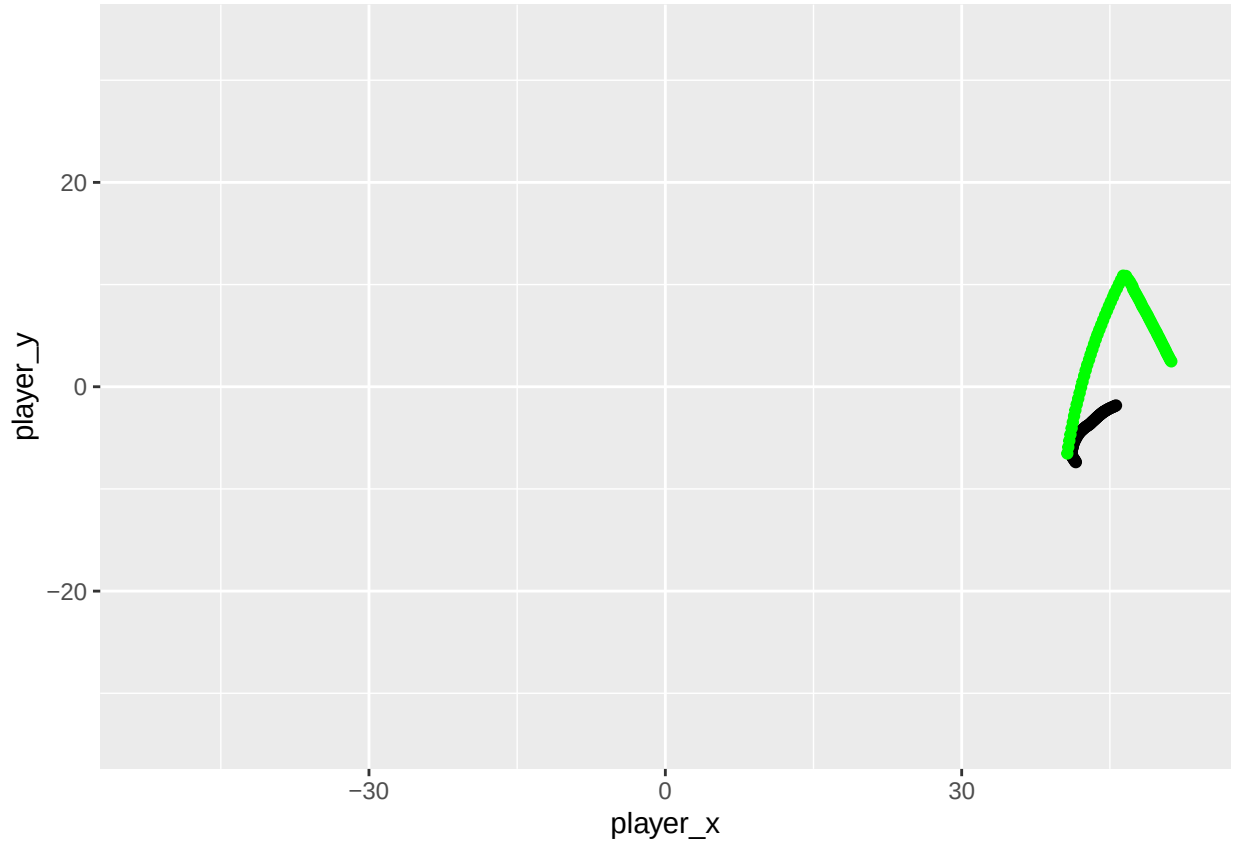



```
#no
```

```
a5 = tracks_j %>%
  filter(frame_count >= 67945) %>%
  filter(frame_count <= 67964)

ggplot(data = a5) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```

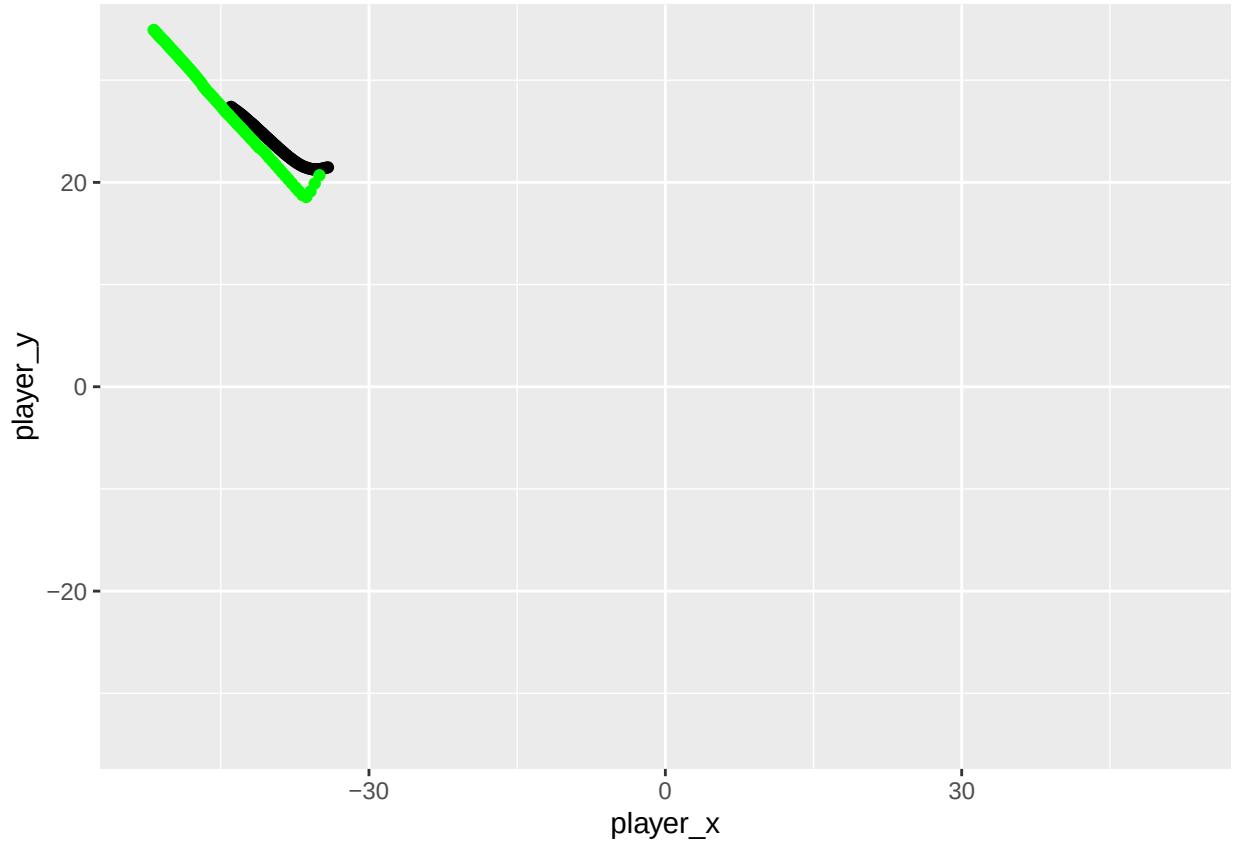



```
#i'm guessing overhit throughball

a6 = tracks_j %>%
  filter(frame_count >= 82512) %>%
  filter(frame_count <= 82588)

ggplot(data = a6) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```

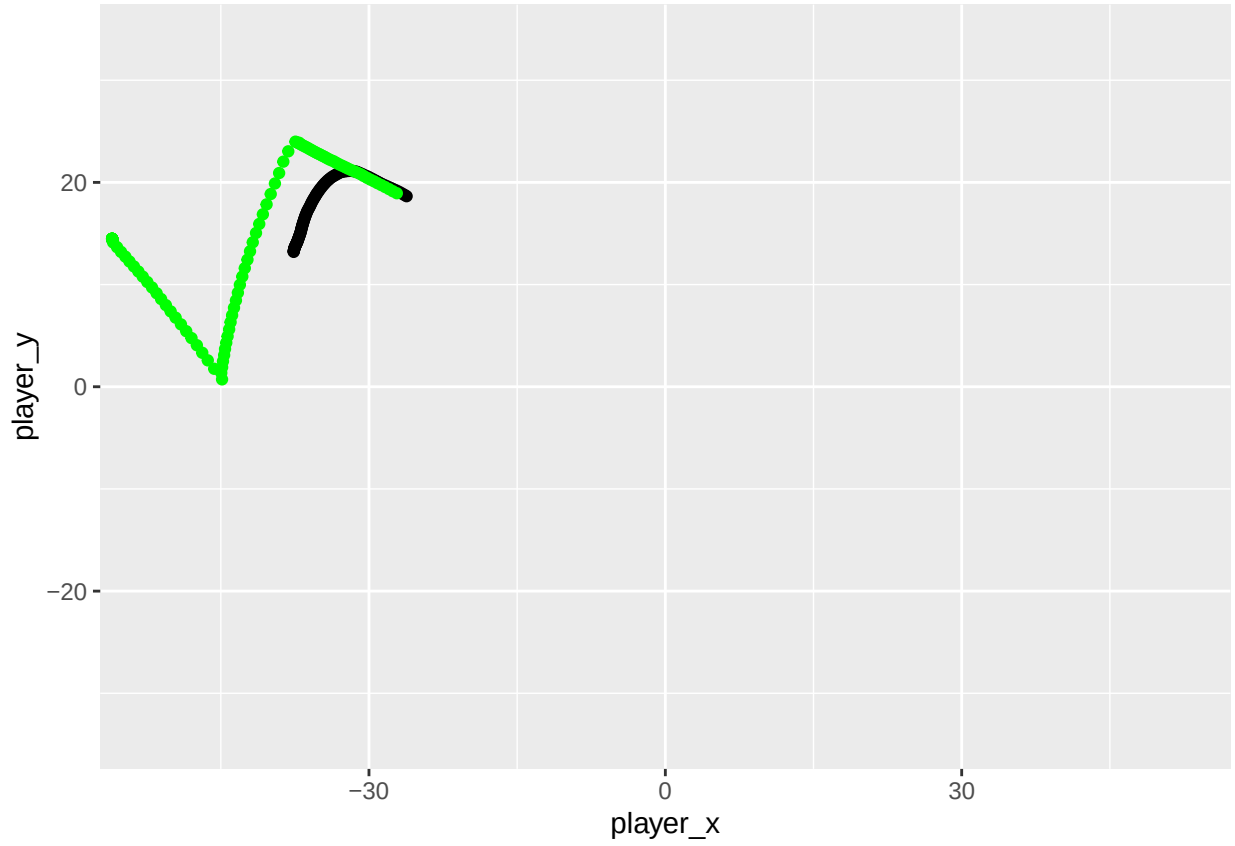



```
#cross
```

```
a7 = tracks_j %>%
  filter(frame_count >= 107762) %>%
  filter(frame_count <= 107841)

ggplot(data = a7) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```

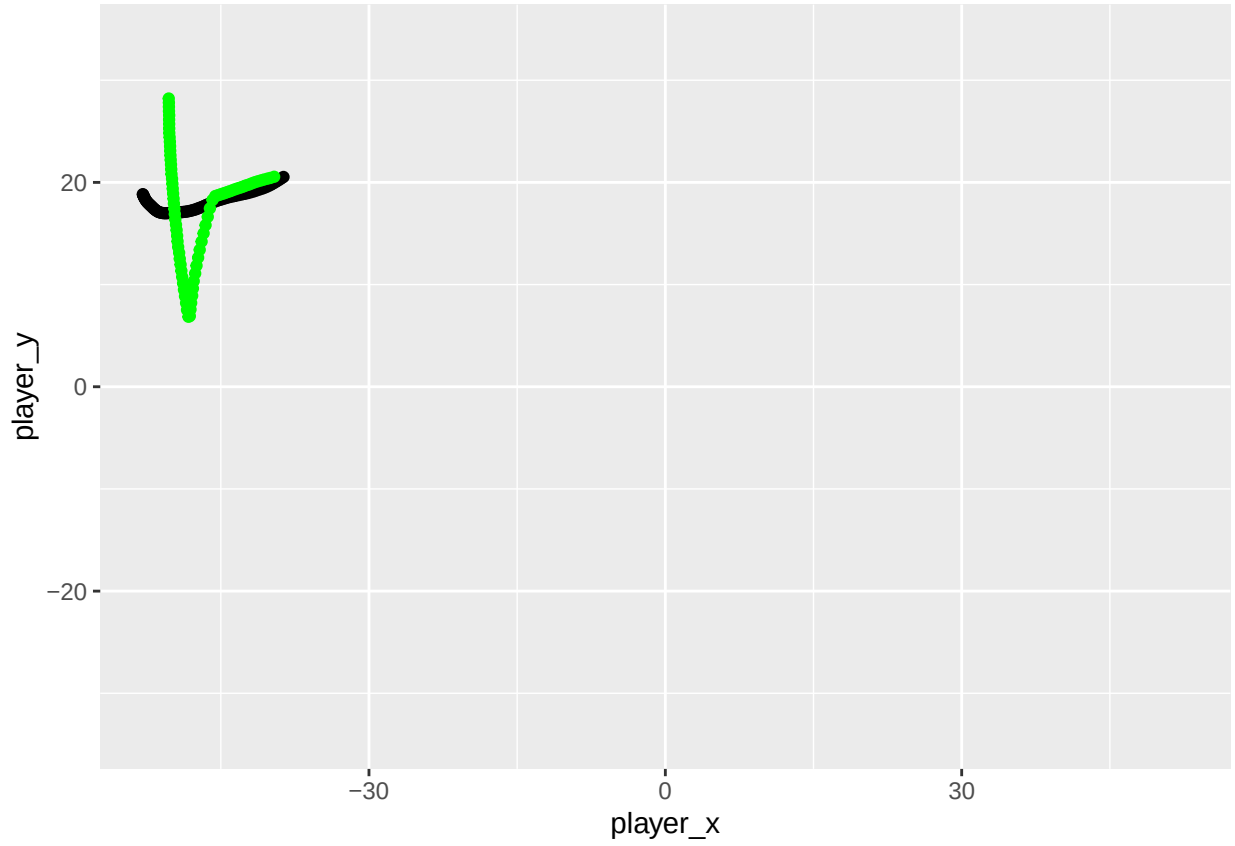



```
#maybe blocked shot actually

a8 = tracks_j %>%
  filter(frame_count >= 114623) %>%
  filter(frame_count <= 114732)

ggplot(data = a8) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```

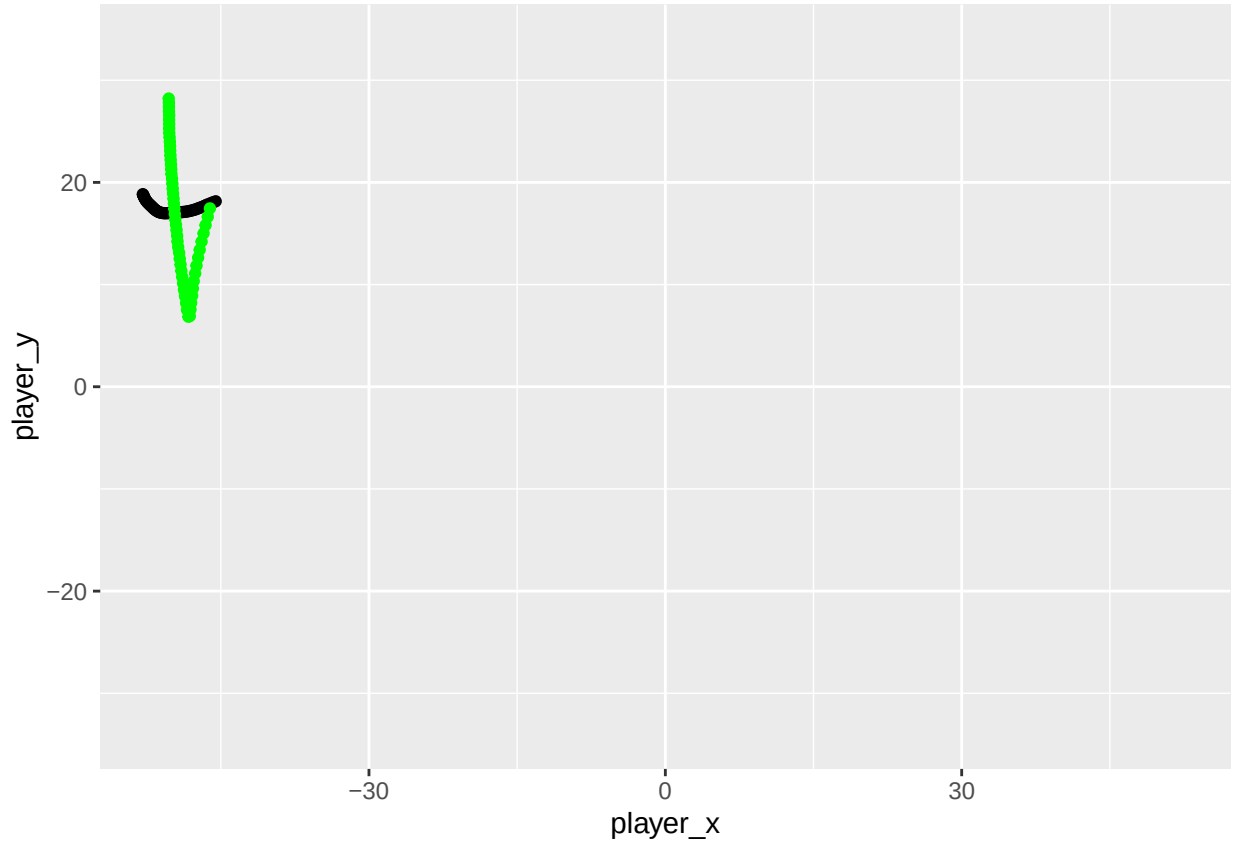



```
#cross and then foul
```

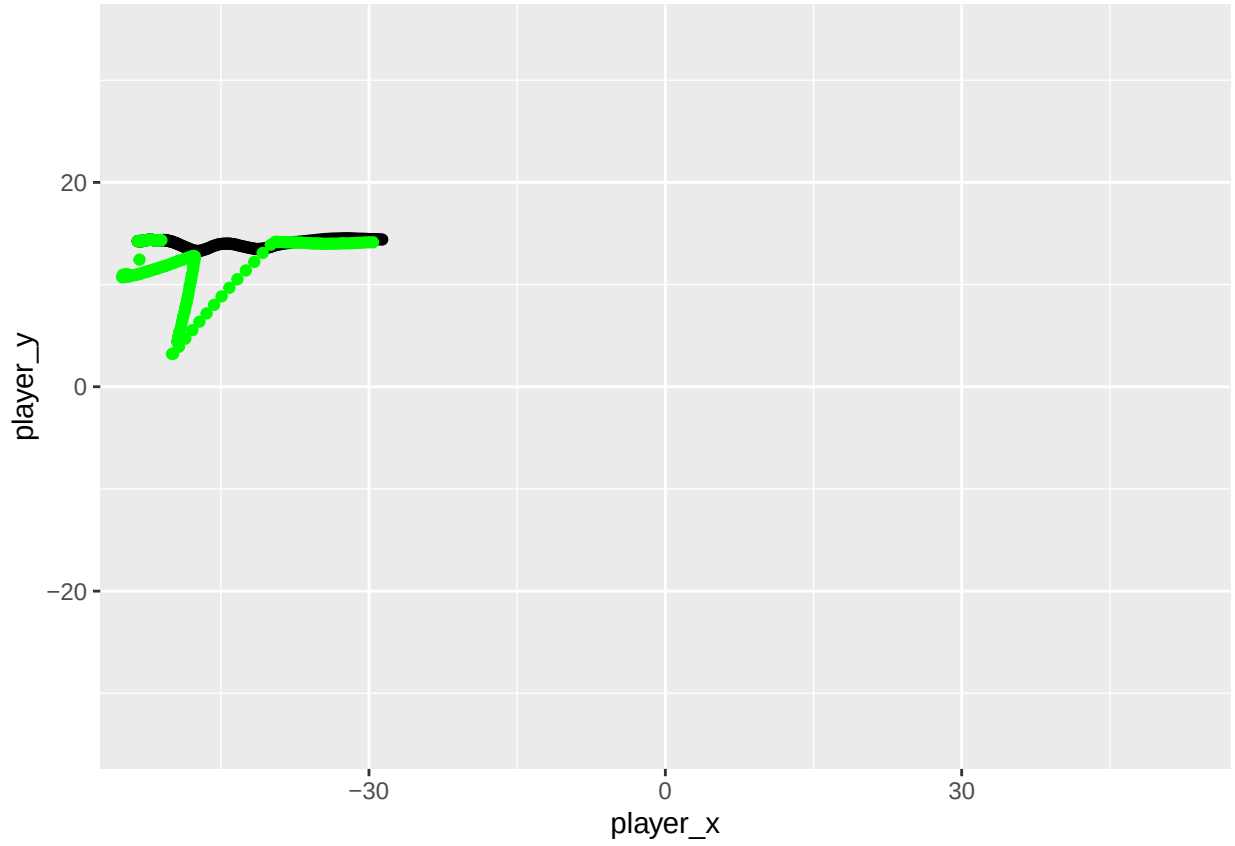
```
a9 = tracks_j %>%
  filter(frame_count >= 125832) %>%
  filter(frame_count <= 125913)

ggplot(data = a9) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```




```
#cross

a10 = tracks_j %>%
  filter(frame_count >= 125856) %>%
  filter(frame_count <= 125913)

ggplot(data = a10) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```

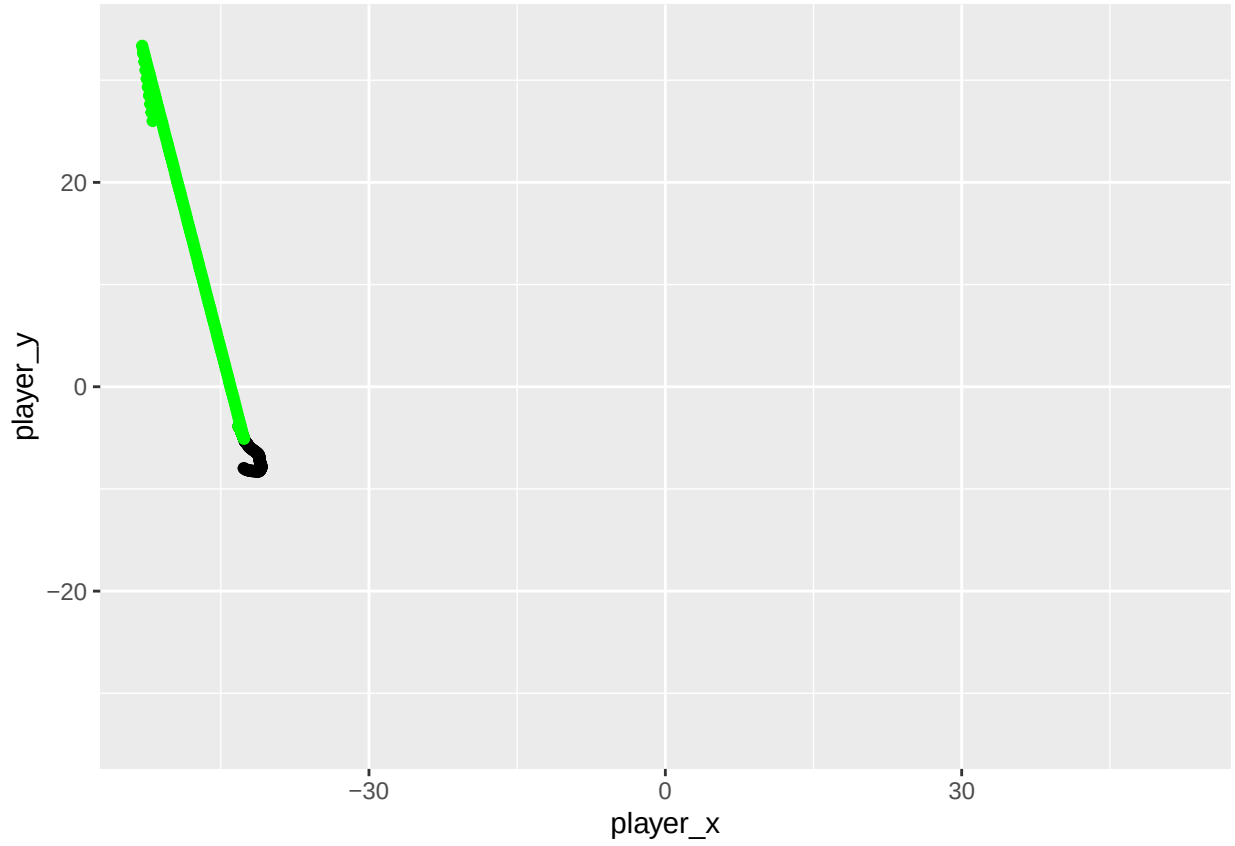



```
a11 = tracks_j %>%
  filter(frame_count >= 135473) %>%
  filter(frame_count <= 135626)
#135547
#135473
ggplot(data = a11) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```

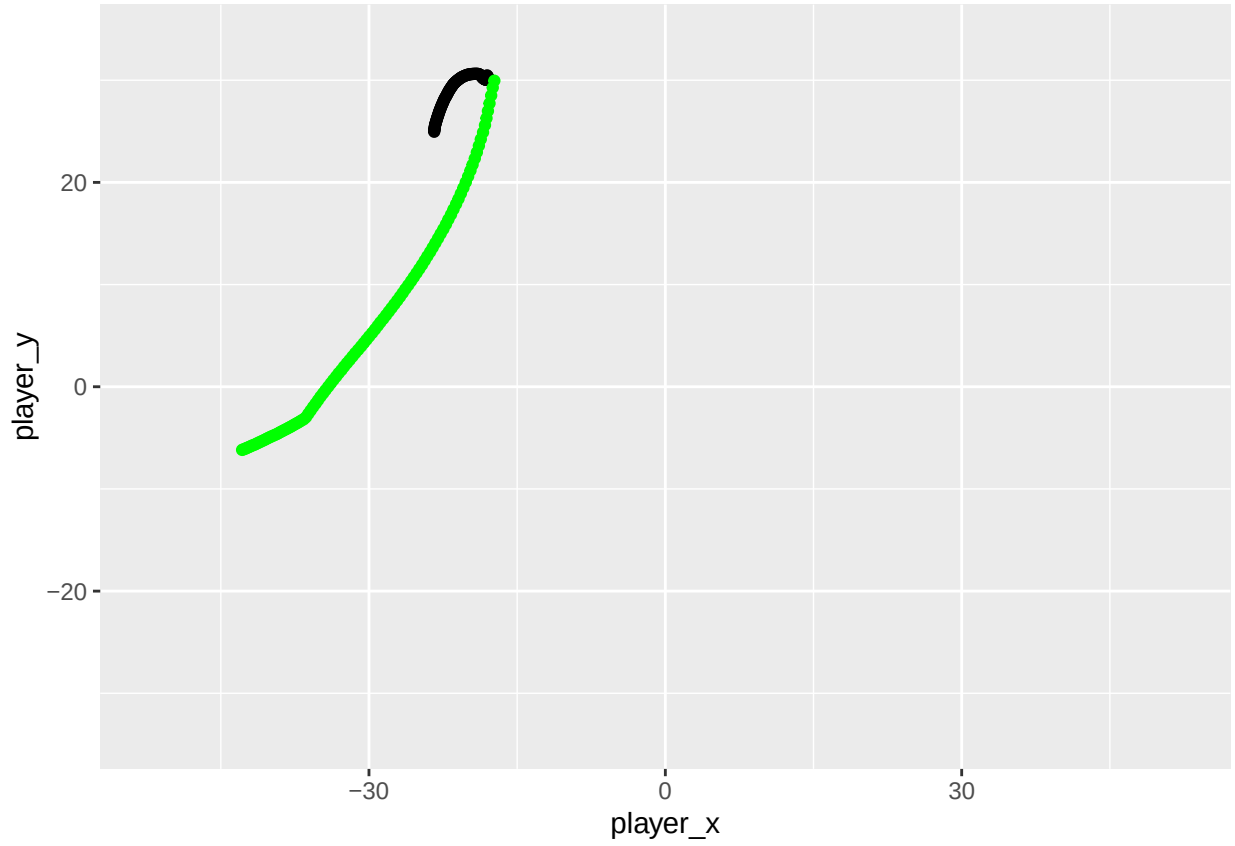



```
#shot to the near post, keeper saves, doesn't hold on, eventually jumps on it.
```

```
a12 = tracks_j %>%
  filter(frame_count >= 136050) %>%
  filter(frame_count <= 136191)

ggplot(data = a12) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```




```
  #coord_cartesian(xlim = c(-52, -35.5), ylim = c(-20.16, 20.16))

a13 = tracks_j %>%
  filter(frame_count >= 139238) %>%
  filter(frame_count <= 139349)

ggplot(data = a13) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```




```
tracks %>%
  filter(frame_count == 136071)
```

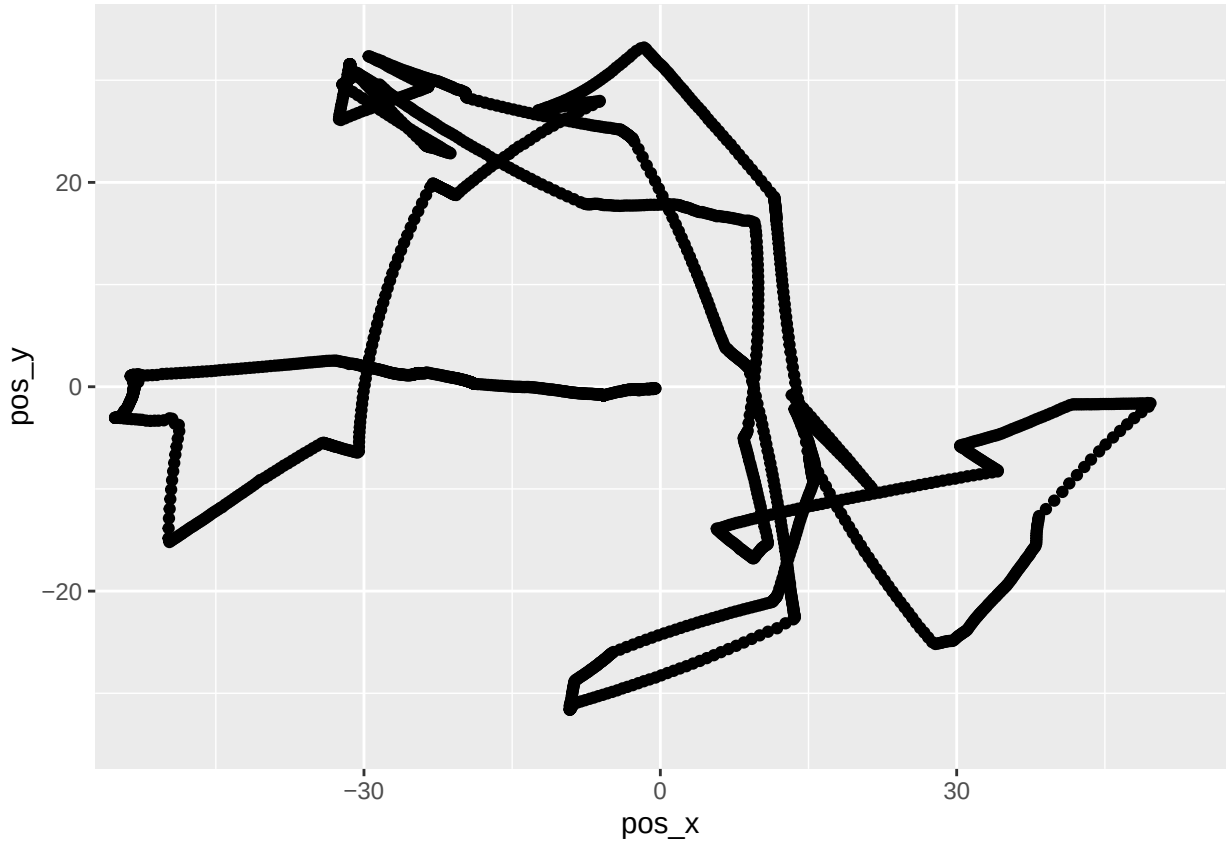
```
## # A tibble: 23 x 16
##    period time_elapsed frame_count player_id team_id goalkeeper is_visible
##     <dbl>        <dbl>       <dbl>     <dbl>   <dbl>      <dbl>      <dbl>
##  1      2        1443.      136071        -1      -1          0          1
##  2      2        1443.      136071    112917     623          0          1
##  3      2        1443.      136071    134089     623          0          1
##  4      2        1443.      136071     16937     623          0          1
##  5      2        1443.      136071     23824     623          0          1
##  6      2        1443.      136071     24618     623          1          1
##  7      2        1443.      136071     24753     623          0          1
##  8      2        1443.      136071     36759     623          0          1
##  9      2        1443.      136071     36820     623          0          1
## 10      2        1443.      136071     42981     623          0          1
## # i 13 more rows
## # i 9 more variables: attacking_multiplier <dbl>, lr_multiplier <dbl>,
## #   pos_x <dbl>, pos_y <dbl>, pos_z <dbl>, speed_x <dbl>, speed_y <dbl>,
## #   ball_in_play <dbl>, possessing_team_id <dbl>
```

```
tracks %>%
  filter(player_id == -1) %>%
  filter(pos_x >=-0.5 & pos_x <= 0.5) %>%
  filter(pos_y >=-0.5 & pos_y <= 0.5)
```

```
## # A tibble: 991 x 16
##    period time_elapsed frame_count player_id team_id goalkeeper is_visible
##     <dbl>        <dbl>       <dbl>     <dbl>   <dbl>      <dbl>      <dbl>
##  1      1        0.880       10022        -1      -1          0          1
##  2      1        3.44        10086        -1      -1          0          1
##  3      1        3.48        10087        -1      -1          0          1
##  4      1        3.52        10088        -1      -1          0          1
##  5      1        3.56        10089        -1      -1          0          1
##  6      1      913.          32821        -1      -1          0          1
##  7      1      913.          32822        -1      -1          0          1
##  8      1      913.          32823        -1      -1          0          1
##  9      1      913.          32824        -1      -1          0          1
## 10      1      913           32825        -1      -1          0          1
## # i 981 more rows
## # i 9 more variables: attacking_multiplier <dbl>, lr_multiplier <dbl>,
## #   pos_x <dbl>, pos_y <dbl>, pos_z <dbl>, speed_x <dbl>, speed_y <dbl>,
## #   ball_in_play <dbl>, possessing_team_id <dbl>
```

```
#potential goals
#kick off frames
#32821
#41775
#57199
#115754
```

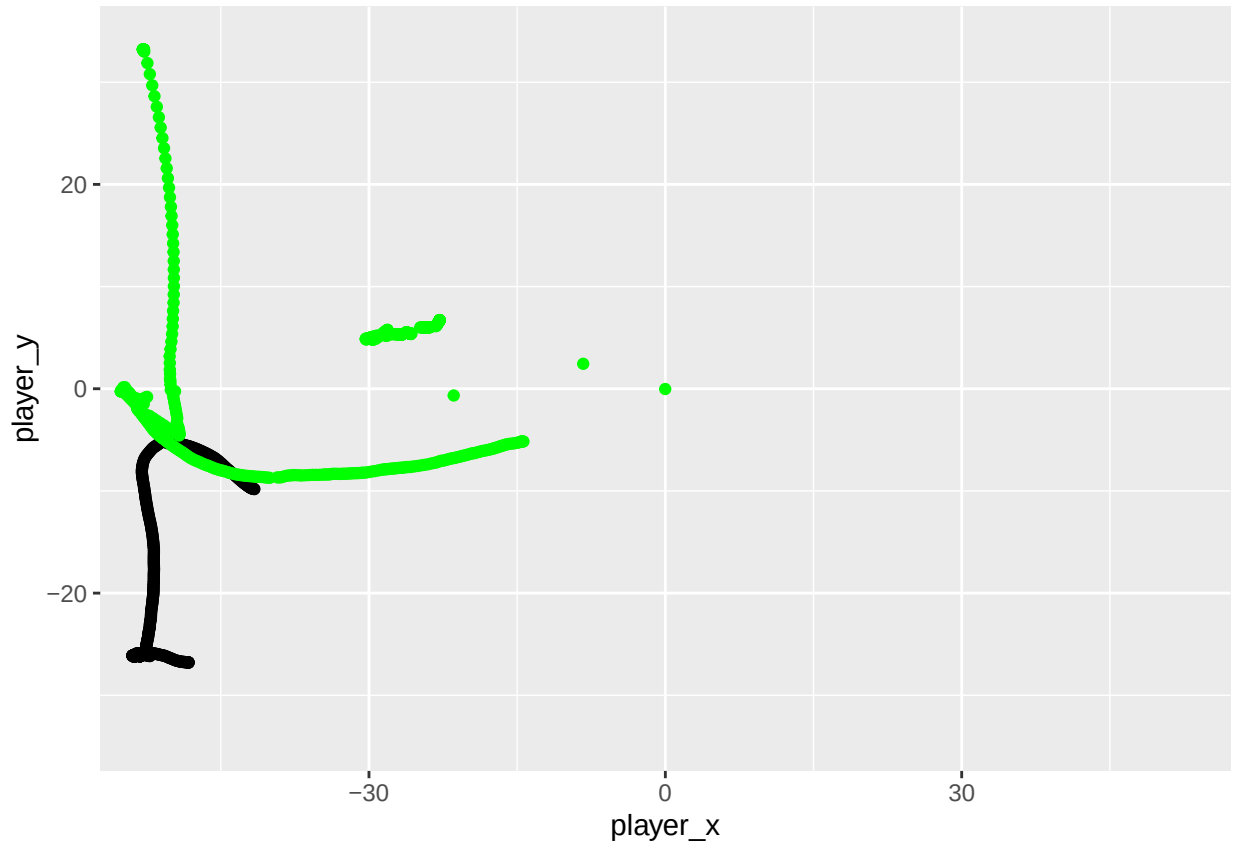
```
b1 = tracks %>%
  filter(player_id == -1) %>%
  filter(frame_count >= 30400) %>%
  filter(frame_count <= 32821)

ggplot(data = b1) +
  geom_point(aes(x = pos_x, y = pos_y)) +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```




```
bb1 = tracks_j %>%
  filter(frame_count >= 30400) %>%
  filter(frame_count <= 32821)

ggplot(data = bb1) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```


```
#other team scoring
```

```
bb2 = tracks_j %>%
  filter(frame_count >= 115240) %>%
  filter(frame_count <= 115754)

ggplot(data = bb2) +
  geom_point(aes(x = player_x, y = player_y)) +
  geom_point(aes(x = ball_x, y = ball_y), color = "green") +
  coord_cartesian(xlim = c(-52, 52), ylim = c(-34, 34))
```




```
#corner goal i think
#1-1?
```

```
#Final Answer
#Player 16937 Shots:

#11791 saved
#11828 saved
#107762 blocked
#135513 saved
```