

Using Elixir to Build a High-Availability Fleet Management Solution for Autonomous Vehicles

Serge Boucher — ElixirConf.EU

Tue 17, 2018



Software Solutions for
Driverless Vehicles



«People who are really serious
about software should make their
own hardware.»

— *Alan Kay*





JAN 31, 2018 @ 05:19 PM 1,796             

The Little Black Book of Billionaire Secrets

Ugly But Useful: Stockholm Introduces Driverless Buses

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I write about business, big and small, in the UK and Scandinavia [FULL BIO ▾](#)

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 So driverless buses and cars in Sweden seem a no-brainer. Think how many more hours you could spend on your startup as you cruise your autonomous vehicle down the long and empty motorway through the forests.


Ericsson
Stockholm's first driverless bus

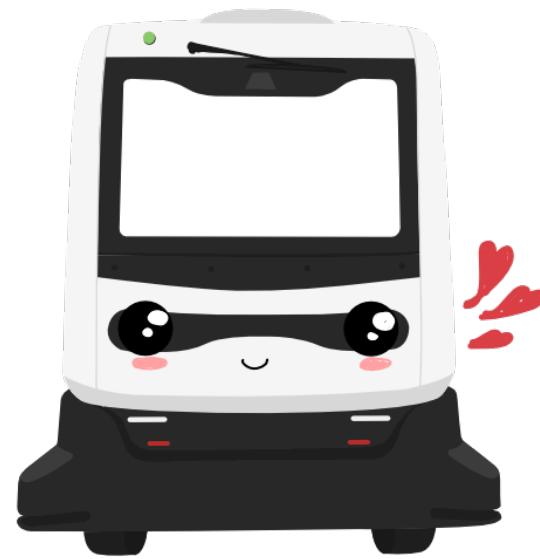
Possibly no-other European nation loves technology as much as the Swedes. Stockholm has more tech startups per capita than any other city in the world apart from Silicon Valley. Automation is almost everywhere in Sweden, helping to eliminate the requirement for expensive Swedish labour or cash. It's rare to find a

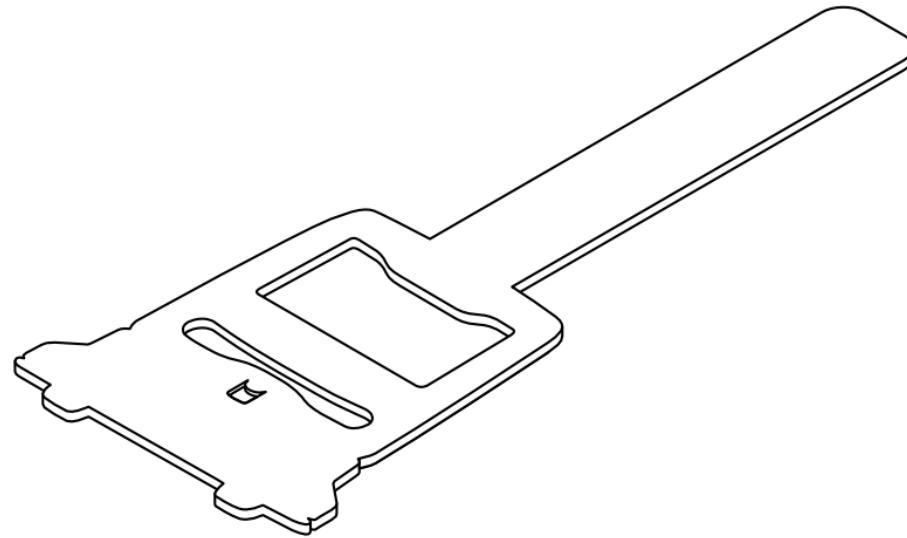


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€22,80 

ugly
bus

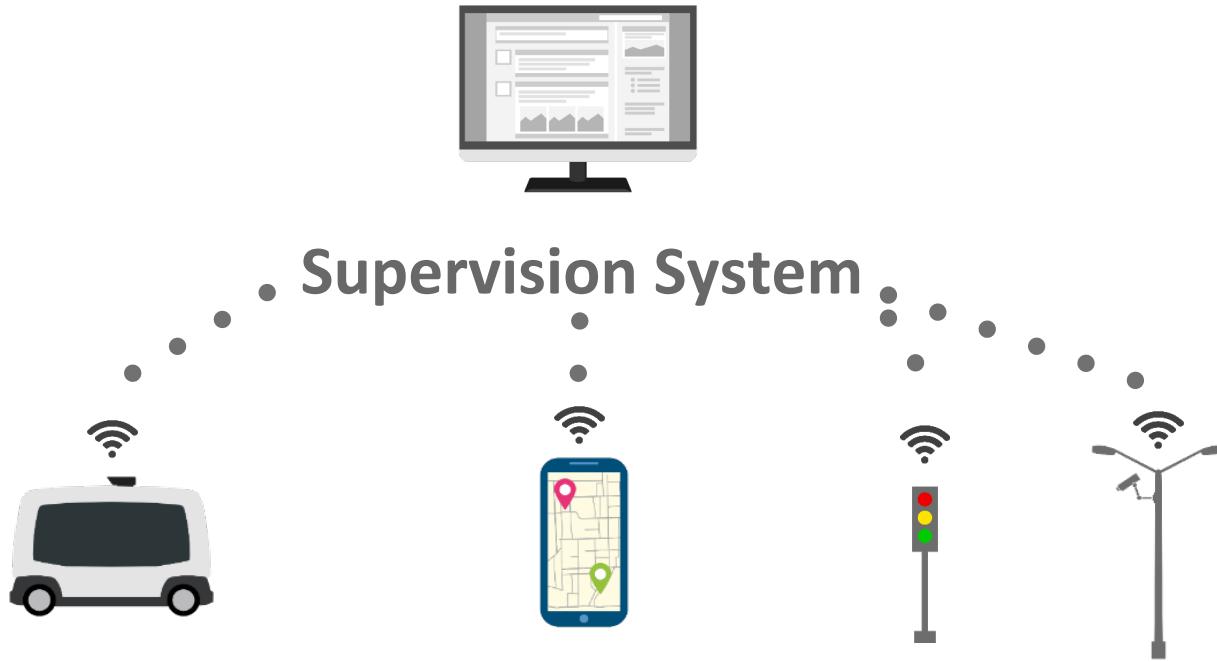


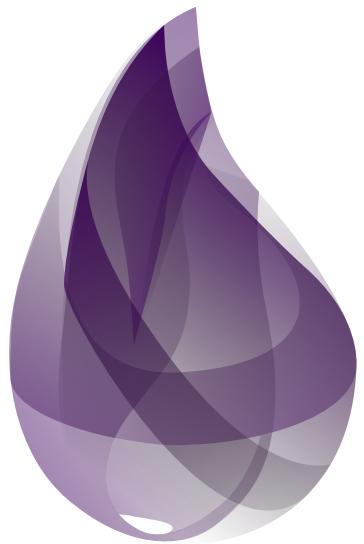
useful



UGLY  USEFUL







elixir

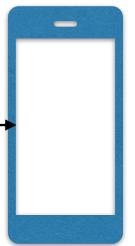
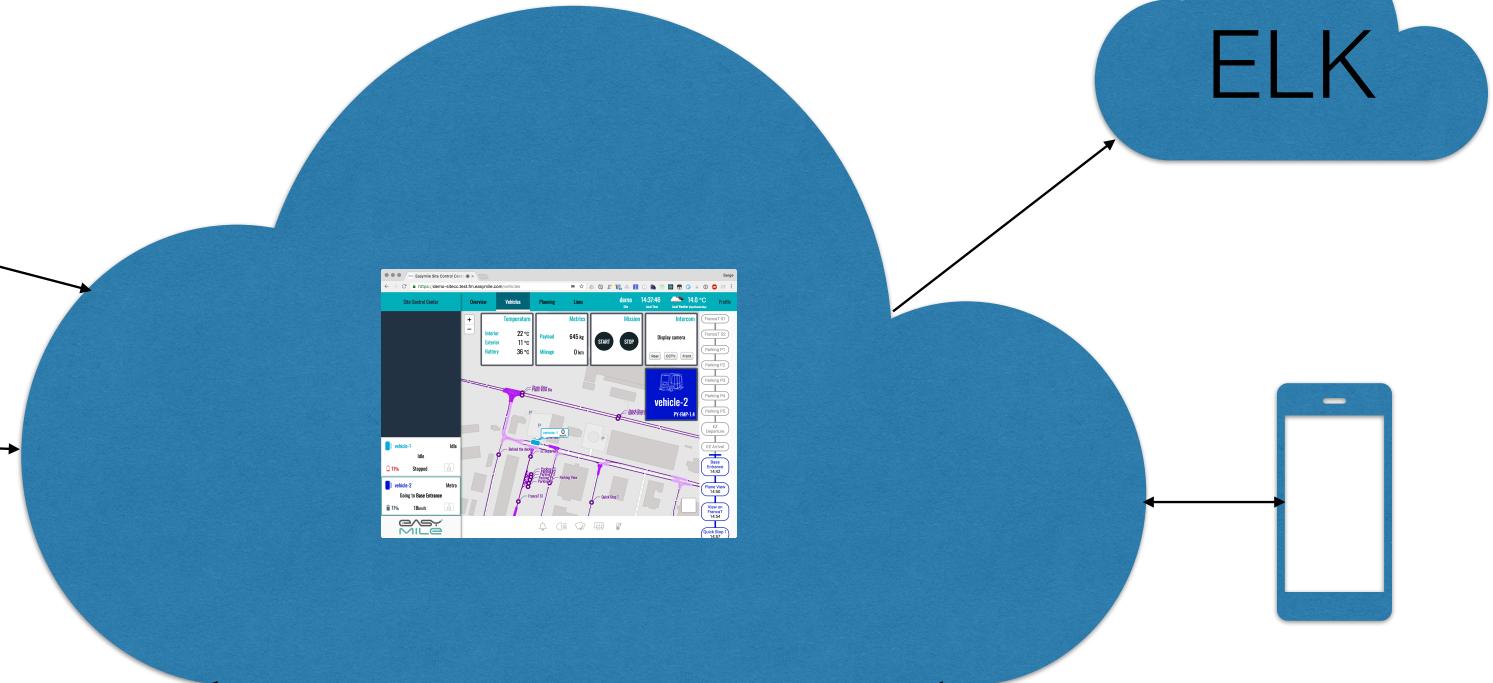


10 things I wish I knew
two years ago

Architecture



ZARZĄD TRANSPORTU MIEJSKIEGO
W WARSZAWIE



Custom Protocol — Protobuf over TCP/IP / MQTT

Elixir

Phoenix

ES6/React/Redux/Brunch/Flow/Jest/Storybooks

Kubernetes

AWS

1. GenServers aren't
Classes

Plan

Objective

Vehicle

Mission

Command

```
def abort_plan(pid) do
  GenServer.call(pid, :abort_plan)
end

def handle_call(:abort_plan, _from, ctx = %Context{}) do
  new_ctx = ctx |> stop_plan() |> stop_objective() |> start_abort_mission() |> cleanup_activity()
  {:reply, :ok, new_ctx}
end

defp stop_plan(ctx) do
  Plan.stop(ctx.plan_pid)
  ctx
end

defp stop_objective(ctx, reason) do
  send(ctx.objective_pid, {:vehicle_status, self(), :plan_finished, reason})
  ctx
end

defp start_abort_mission(ctx) do
  {:ok, pid} = Mission.start_abort_mission(ctx.supervisor_pid, ctx.vehicle_id, ctx.conf)
  Map.put(ctx, :abort_mission_pid, pid)
end
```

Plan

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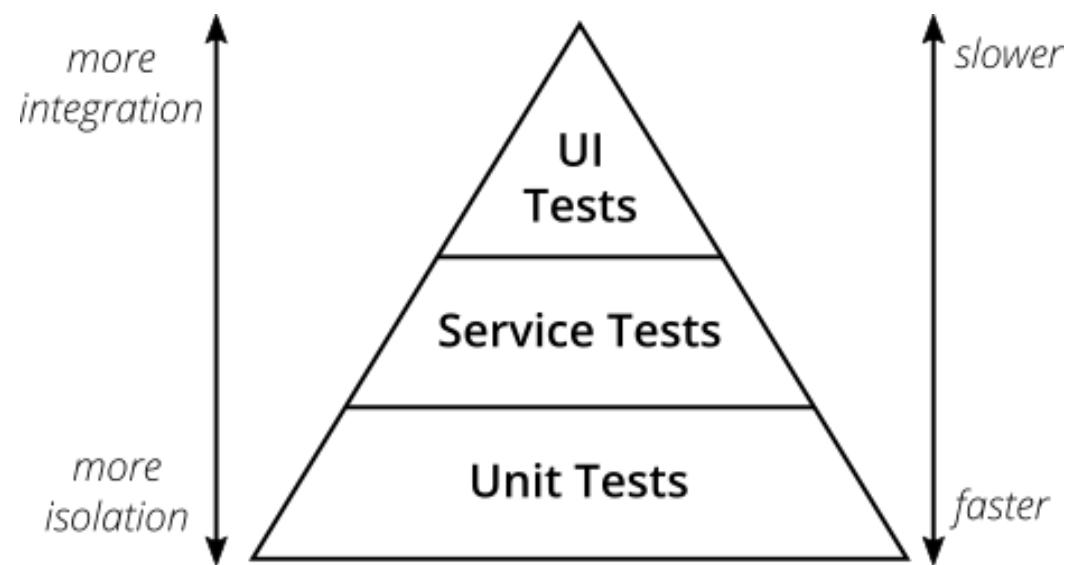
Command

2. Put all Business Logic in Pure Functions

3. ExUnit is for Unit Testing

<http://blog.plataformatec.com.br/2015/10/mocks-and-explicit-contracts/>

4. You Don't Need “Medium” Tests



5. Monolith is not a Bad Word

Front-end

ControlCenter

FleetManager

Gateway



Front-End Front-End Front-End

Elixir



<https://www.youtube.com/watch?v=VKe9EE4MUxk>

6. Heroku isn't the Real World

<http://www.elixirconf.eu/elixirconfeu2018/albert-zak>

7. There are Missing Libraries

8. The Community is
Great!

9. Elixir is Fast Enough

10. remote_console is
awesome!

11. Compilation Time Rises Quickly

12. Erlang Programmers
are Awesome

13. High Availability is
Builtin

«It is remarkable how much long-term advantage people like us have gotten by trying to be consistently not stupid, instead of trying to be very intelligent.»

— *Charles Munger*



Thank You