Validation:
Are you building the right thing?

What is code for?

- Pass tests?
- Run fast?
- Look good?

Help humans!

- Automate tasks
- Analyze data
- Operate machinery
- …and much more

Boeing MCAS

- “Maneuvering Characteristics Augmentation System”
- Feature of the 737 MAX
- Prevents stalling
- Implemented as specified

Boeing MCAS

Ethiopian Airlines Flight 302

From Wikipedia, the free encyclopedia

On 10 March 2019, the Boeing 737 MAX 8 aircraft which operated the flight crashed near the town of Bishoftu six minutes after takeoff, killing all 157 people aboard.

Lion Air Flight 610

From Wikipedia, the free encyclopedia

On 29 October 2018, the Boeing 737 MAX 8 operating the route crashed into the Java Sea 13 minutes after takeoff, killing all 189 passengers and crew.

Boeing MCAS

Inception [edit]

Before the MCAS, test pilot Ray Craig determined the plane did not fly smoothly, in part due to the larger engines. Craig would have preferred an aerodynamic solution, but Boeing decided to implement a control law in software.

Operations manual and training [edit]

Initially, the MCAS was not mentioned in the aircraft's flight crew operations manual.[32]
According to Boeing, "a pilot should never see the operation of MCAS" in normal flying conditions.[6]

As an automated corrective measure, the MCAS was given full authority to bring the aircraft nose down, and could not be overridden by pilot resistance against the control wheel as on previous versions of the 737.[9]

The system acts on only one of two available AoA sensors, a single point of failure that goes against aviation requirements of robustness and integrity, for example using redundancy.[9][12][13][6]

Building the right thing

- Development processes
- Acceptance testing
- A/B testing

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A/B testing

- Not always explicit
  - More “real-world” conditions
- Can test anything
- Need careful statistics